

(6/26/12)

**LEASE AGREEMENT
(With Option to Purchase-Parking Garage)**

Between

**KIRKLAND PARK & RIDE, L.L.C.,
a Washington limited liability company**

As Landlord

and

**KING COUNTY,
a political subdivision of the State of Washington**

As Tenant

**[•], 2012
King County Transit Oriented Development
Parking Garage Project
Bellevue, Washington**

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LEASE AGREEMENT
(With Option to Purchase-Parking Garage)

THIS LEASE AGREEMENT (WITH OPTION TO PURCHASE-PARKING GARAGE) (“Lease”) dated for reference purposes as of _____, 2012 is by and between KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company (“Landlord”) and KING COUNTY, a political subdivision of the State of Washington (“Tenant”), with reference to the following facts:

RECITALS

A. In January of 1998, Tenant adopted a Transit Oriented Development Program (T.O.D.) to encourage public or private development that creates new mixed-income housing development, including related commercial activity in close proximity to transit facilities and services to increase ridership of Tenant’s metropolitan public transportation system, decrease automobile trips and traffic congestion and provide additional fare revenue to support metropolitan public transportation services through King County.

B. Consistent with King County Motion 13516 and pursuant to its Request for Proposals – South Kirkland Park-and-Ride Transit Oriented Development No. 1324 11RLD dated August 25, 2011 (as revised by three addenda) (the “RFP”), Tenant requested proposals from developers for a project that would provide the greatest financial returns to Tenant, develop a transit center (“**Transit Center**”), expand essential transit commuter parking by replacing the existing 603 surface parking spaces with a structured parking garage containing approximately 532 parking stalls and surface parking for an additional 321 vehicles for a total of 853 parking stalls for use by transit commuters (the “**Garage**”), provide a mixture of affordable housing and market rate housing, associated parking and mixed-use commercial development (the “**Housing Project**”) and promote the City of Kirkland’s emerging vision for the Yarrow Bay Business District, on seven and one-half acres of real property owned by Tenant and located in the cities of Kirkland and Bellevue, King County, Washington (the “**Land**”) in one or more phases. The eventual development of affordable housing is a critical component of Tenant’s plan for the Land. The Transit Center, the Garage and the Housing Project are hereinafter referred to collectively as the “**South Kirkland T.O.D. Facility**”. The Land is currently used as a transit center and park and ride lot containing approximately 603 parking stalls.

C. For reasons of economic efficiency and to ensure that transit services to transit passengers are not disrupted during the construction, the parties have agreed on a phased approach to the development of the South Kirkland T.O.D. Facility on the Land, with construction of the Transit Center and Garage on a portion of the Land for lease and possible purchase by Tenant as Phase I and II and redevelopment by Landlord of the remainder of the Land with the Housing Project as Phase III. Tenant would not have entered into the Garage Ground Lease (defined below) and this Lease but for the agreement by Landlord to also enter into (a) the Transit Center Ground Lease and the Transit Center Project Lease (each as defined below) and develop the Transit Center thereon, (b) relocate the existing transit center and relocate and replace transit commuter parking as required during the construction of Phases I and II so that transit services for transit passengers are not disrupted and the number of parking spaces available for use by transit passengers is maintained throughout the construction process, and (c) purchase the Housing Land and Housing Easements (each as defined below) and develop

the Housing Project on the Housing Land and Housing Easements following final completion of the Transit Center and the Garage in accordance with the Housing Covenants (as defined below).

D. In order to accommodate the development of the South Kirkland T.O.D. Facility in Phases, Landlord intends to short plat the Land into three legal lots consisting of the Transit Center Land, the Garage Land and the Housing Land, each as defined below, subject to Tenant's approval which approval shall not be unreasonably withheld. Concurrently herewith, Tenant shall enter into a ground lease of the Garage Land with Landlord as ground lessee on the express condition that Landlord execute this Lease and agree to design, develop, finance, construct, equip and complete the Garage on the Garage Land and thereafter lease the Garage together with the Landlord's rights in the Garage Land (the "**Premises**") to Tenant at the Monthly Rent, for the Term and on the other terms and conditions hereinafter set forth. Tenant and Landlord shall also enter into a separate ground lease of the Transit Center Land (the "**Transit Center Ground Lease**") on the express condition that Landlord agree to design, develop, finance, construct, equip and complete the Transit Center on the Transit Center Land and thereafter lease the Transit Center, together with Landlord's rights in the Transit Center Land to Tenant at the monthly rent, for the term and on the other terms and conditions set forth in a project lease (the "**Transit Center Project Lease**"). The design, development, construction, financing, and equipment of the Garage on the Premises is hereinafter referred to as the "**Project**". The design, development, construction, financing and equipment of the Transit Center on the Transit Center Land is hereinafter referred to as the "**Transit Center Project**."

E. Landlord and Tenant acknowledge that the Land currently consists of a single legal lot and that initially the Premises shall constitute the entirety of the Land. Landlord shall cause the Land to be short platted into a minimum of three lots, one of which will consist of the Transit Center Land, one of which will consist of the Garage Land and the remainder of which will constitute the Housing Land, with the approximate locations of each lot to be as depicted on the map attached hereto as **Exhibit C-2**. Upon completion of the short plat of the Land creating the Transit Center Land, the Garage Land and the Housing Land, the legal description of the Transit Center Land, the Garage Land and the Housing Land shall be attached to this Lease as **Exhibits D, E and F** respectively. Following completion of the short plat Landlord and Tenant shall amend both the Garage Ground Lease and this Lease to exclude the Transit Center Land and the Housing Land from the definition of real property demised thereunder and shall amend the Transit Center Ground Lease and the Transit Center Project Lease to exclude the Garage Land and the Housing Land from the real property demised thereunder. The Construction Loan and the Deed of Trust (each as defined below) shall expressly provide for the release of the Garage Land from the lien of the Deed of Trust upon Closing of the purchase of the Garage.

F. Tenant is authorized by KCC 4.56.160, RCW 36.34.205 and Chapter 35.42 RCW to acquire facilities including transit centers and public parking garages by means of a lease/leaseback that contains an option to purchase. The execution by Tenant of the Garage Ground Lease, this Lease, the Transit Center Ground Lease, the Transit Center Project Lease and the Housing Covenants, and resulting redevelopment of the Land with the South Kirkland T.O.D. Facility, a phased transit-oriented development consisting of the Transit Center, the Garage and the Housing Project, will promote the public welfare by supporting transit ridership along the State Route 520 Corridor, provide additional public parking for single-trip transit commuters, provide additional safe and affordable housing for residents of King County in close proximity to existing transit facilities and advance other important public purposes.

G. Tenant desires to lease from Landlord and Landlord desires to lease to Tenant the Premises (as defined below) on the terms and conditions set forth in this Lease; provided, however, that in no event shall Tenant be liable for all or any part of the cost of design, development or construction of the Project, nor shall Tenant be liable for payment of Monthly Rent under this Lease until Substantial Completion of the Project.

H. Tenant is authorized to enter into the Garage Ground Lease, this Lease, the Transit Center Ground Lease and the Transit Center Project Lease by Ordinance _____ enacted by the King County Council on [•] 2012.

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Landlord and Tenant agree as follows:

AGREEMENT

1. Incorporation of Recitals; Definitions. Each recital set forth above is incorporated into this Lease as though fully set forth herein. All capitalized terms not otherwise defined in the Recitals or elsewhere in this Lease, shall have the meaning set forth in this Section 1:

1.1 “ADA” means the Americans With Disabilities Act of 1990, as amended from time to time.

1.2 “Additional Rent” means any monetary sum required to be paid by Tenant to Landlord under the provisions of this Lease (other than Monthly Rent).

1.3 “Architect” means Weber Thompson, the architect for the Project selected by Landlord with Tenant’s approval.

1.4 “Business Day” means any day other than a Saturday, Sunday, legal holiday or day that Tenant’s offices are closed by order of the King County Executive.

1.5 “Cash Option Price” means the Option Price less the fair market value of the Housing Land and the Housing Easements.

1.6 “Certificate of Occupancy” means the temporary certificate of occupancy issued by the City to Landlord certifying that the Garage may be occupied for the Permitted Use.

1.7 “Certificates” means any certificates of participation in Monthly Rent executed and delivered by the Trustee pursuant to the Trust Agreement.

1.8 “Change Orders” means any Landlord-Initiated Change Orders and any Tenant-Initiated Change Orders.

1.9 “City” means the City of Bellevue and/or the City of Kirkland, as the context may require.

1.10 “Closing” means (i) with respect to the Option to purchase the Garage as set forth in Section 22, the delivery to Escrow Agent of all documents and funds required to be delivered

to complete the purchase and sale of the Garage in accordance with the provisions of Section 22 hereof, and (ii) with respect to the assignment of this Lease to the Trustee in connection with the issuance of the Certificates as provided in Section 4.4 hereof, the delivery of documents and funds required to be delivered by Landlord, Tenant and Trustee to complete the assignment of the Garage Ground Lease and this Lease to Trustee and payment of the Option Price to Landlord in connection with such assignment.

1.11 “Closing Date” means the date on which the Closing occurs.

1.12 “Commencement Date” means the date of Final Completion of the Project, which is also the date upon which Tenant’s obligation to pay Monthly Rent hereunder commences.

1.13 “Commencement of Construction” means the later of (a) the date Tenant notifies Landlord that the Conditions Precedent set forth in Section 6 of this Lease have been met or waived in writing by Tenant, (b) the date Landlord executes and delivers to the General Contractor the notice to proceed with construction of the Project attached to the General Construction Contract, or (c) the commencement of mobilization, site preparation, grading, excavation for foundations of buildings or other structures to be constructed as part of the Project or any combination of such events occurs.

1.14 “Conditions Precedent Satisfaction Date” means the date that all conditions precedent set forth in Section 6 have been satisfied.

1.15 “Construction Contracts” means (i) the General Construction Contract, and (ii) all other contracts for construction services entered into between Landlord and any Contractor, including the General Contractor, for construction of any other portion of the Project not covered by the General Construction Contract.

1.16 “Construction Documents” mean the Construction Drawings and Detailed Specifications approved by Landlord and Tenant pursuant to Section 9.3 below, for the construction of the Project, including technical drawings, schedules, diagrams, plans and specifications setting forth in detail the requirements for construction of the Project and providing information customarily required for the use of the building trades.

1.17 “Construction Drawings” means drawings setting forth in detail the requirements for the construction of the Project. As used herein, the term “Construction Drawings” includes all graphic and pictorial documents depicting the design, location and dimensions of the Project and includes plans, elevations, sections, details, schedules and diagrams for the Project.

1.18 “Construction Lender” means a state or national bank, insurance company, pension fund, credit union or other major financial lending institution or other entity generally recognized as a source of mortgage financing with total assets as of the date of its most recent available financial statement of at least One Hundred Million Dollars (\$100,000,000) and which has a long term rating of at least “A” from either Moody’s Investors Services, Inc. or Standard & Poor’s Financial Services LLC (unless otherwise approved by Tenant).

1.19 “Construction Loan” means a loan obtained by Landlord from the Construction Lender in an amount not to exceed the Fixed Price for the purpose of providing for the payment of Project Costs.

1.20 “Contract Documents” means the Construction Documents, the Construction Contracts and the other documents identified as Contract Documents in the General Construction Contract.

1.21 “Contractors” means the General Contractor and any other construction contractors with whom Landlord enters into direct contracts, or with whom General Contractor on behalf of and acting as the Landlord’s agent, contracts for the Project.

1.22 “Controlling Interest” means, with respect to Landlord or any member or manager of Landlord, an interest in Landlord or such member or manager that gives the holder of such interest the power to direct or cause the direction of the management or policies of Landlord or such member or manager, directly or indirectly, whether through the ownership of voting securities, membership interests, by contract or otherwise.

1.23 “Deed of Trust” means any mortgage or deed of trust encumbering Landlord’s leasehold interest under the Garage Ground Lease and this Lease executed by Landlord in favor of Construction Lender to secure the Construction Loan.

1.24 “Design Development Drawings” means drawings that are a consistent development of the Schematic Drawings and further define and describe all important aspects of the Project. The Design Development Drawings will serve as the basis for the Construction Drawings.

1.25 “Detailed Specifications” means all written detailed requirements for materials, equipment, construction systems, standards and workmanship for the construction of the Project.

1.26 “Effective Date” means the date that Tenant notifies Landlord that the conditions precedent set forth in Section 6 of this Lease have been met or waived and Landlord has been authorized to proceed in writing by Tenant.

1.27 “Environmental Laws” means, as amended from time to time, the Federal Resource Conservation and Recovery Act of 1976, 42 U.S.C. § 6901 et seq., Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9601 et seq., Federal Hazardous Materials Transportation Control Act, 42 U.S.C. § 1801 et seq., Federal Clean Air Act, 42 U.S.C. § 7401 et seq., Federal Water Pollution Control Act, Federal Water Act of 1977, 93 U.S.C. § 1251 et seq., Federal Insecticide, Fungicide and Rodenticide Act, Federal Pesticide Act of 1978, 7 U.S.C. § 136 et seq., Federal Toxic Substances Control Act, 15 U.S.C. § 2601 et seq., Federal Safe Drinking Water Act, 42 U.S.C. § 300f et seq., Washington Water Pollution Control Act, RCW ch. 90.48, Washington Clean Air Act, RCW ch. 70.94, Washington Solid Waste Management Recovery and Recycling Act, RCW ch. 70.95, Washington Hazardous Waste Management Act, RCW ch. 70.105, Washington Hazardous Waste Fees Act, RCW ch. 70.95E, Washington Model Toxics Control Act, RCW ch. 70.105D, Washington Nuclear Energy and Radiation Act, RCW ch. 70.98, Washington Radioactive Waste Storage and Transportation Act of 1980, RCW ch. 70.99, Washington Underground Petroleum Storage Tanks Act, RCW ch. 70.148.

1.28 “Escrow Agent” means the Title Company or another nationally recognized title insurance company selected by Landlord and not objected to by Tenant which shall provide escrow services and issue the Title Policy to be delivered to Tenant in connection with the Closing.

1.29 “Events of Default” has the meaning set forth in Section 23 and 24 of this Lease.

1.30 “Execution Date” means the date that this Lease has been fully executed, acknowledged for delivered by both Landlord and Tenant.

1.31 “Expiration Date” means the earliest of: (i) the date which is twenty-five (25) years after the Commencement Date; or (ii) the date on which the Garage Ground Lease is terminated as a result of payment or defeasance in full of all Monthly Rent set forth on **Exhibit A** hereto; or (iii) any date on which this Lease terminates in accordance with its terms.

1.32 “Final Completion of the Project” means that the following events have occurred with respect to the Project:

(a) Substantial Completion of the Project (as defined in Section 1.79 of this Lease) has occurred;

(b) The City has issued a final, unconditional Certificate of Occupancy, such that Tenant is permitted to and could physically occupy the Project for the Permitted Use.

(c) Each Contractor shall have issued its “Certificate of Substantial Completion” together with its Affidavit of Payment of Debts and Claims (AIA Forms 706 and 706A), and all Contractors and their subcontractors performing work on the Project have executed and delivered final waivers and releases of lien in form satisfactory to Landlord and Tenant.

(d) All Punch List items have been completed.

(e) Landlord shall have submitted evidence reasonably satisfactory to Tenant that all construction costs have been paid in full, including evidence of full payment for any personal property installed on the Garage Land as part of the Project Costs.

(f) The period for filing construction liens has expired or releases or discharges of construction liens in form and substance satisfactory to Tenant have been obtained by the Landlord from all Contractors and their subcontractors performing work on the Project in accordance with all Construction Contracts or Tenant has received the title endorsement contemplated under subsection (i) below in form reasonably acceptable to Tenant.

(g) Architect shall have issued its “Certificate of Final Completion”.

(h) The General Contractor shall have issued a certificate that (i) the Project has been finally completed in substantial accordance with the Contract Documents, and (ii) no Hazardous Substances (as defined in Section 1.41 of this Lease) were incorporated into the structure of the Project.

(i) Tenant shall have received an endorsement to its Title Policy dated as of and issued on the date of Final Completion of the Project, which shall insure Tenant: (i) against any liens for labor or materials, whether or not of record, which may have arisen in connection with the construction of the Project, and (ii) show no additional exceptions to its Title Policy, if any, other than those approved by or arising through Tenant.

(j) All signage and graphics required under the Construction Documents has been installed in the Garage, all security systems have been installed and are operational, the Garage is no longer in use as a construction staging area for the storage of construction materials, machinery and equipment or to provide temporary parking for construction workers' automobiles and equipment and the entire Garage is open to members of the general public for the parking of vehicles.

(k) Each Contractor who has performed work on the Project shall have submitted its statements of intent to pay prevailing wages and affidavits of wages paid to the date of Final Completion of the Project and copies of all other documentation required by Chapter 39.12 RCW and/or the Davis Bacon Act, as applicable. Landlord has delivered Tenant its affidavit that the Construction Contracts with Contractors and subcontractors of such Contractors for the Project required such parties to pay prevailing wages in accordance with Section 9.5.5 below, and Landlord shall have provided evidence reasonably satisfactory to Tenant that the Project has been designed, developed and constructed in accordance with the relevant provisions of the FTA Requirements set forth in **Exhibit O** attached hereto and by the reference incorporated herein; and

(l) Landlord shall have completed and delivered the matters required under Section 9.10 of this Lease.

1.33 "Financing Costs" means all costs incurred by Landlord in obtaining financing for the Project, including, but not limited to loan fees, origination fees, appraisal fees, legal fees, interest and all other costs incurred or payable by Landlord to obtain financing for the Project, including any and all amounts payable to Construction Lender in connection with the Construction Loan or the Security Documents.

1.34 "Fixed Price" means Sixteen Million Four Hundred Fifty Thousand Dollars (\$16,450,000).

1.35 "Garage" means a 3½ story parking structure containing a minimum of 532 parking stalls together with surface parking for an additional 321 vehicles for a total of 853 parking stalls for use by transit commuters to be constructed on the Garage Land as part of the Project. The Garage is more particularly described in the Preliminary Plans and Outline Specifications, a schedule of which is attached hereto as **Exhibit B** and by this reference incorporated herein.

1.36 "Garage Ground Lease" means the ground lease of the Garage Land entered into or to be entered into of even date herewith, by and between Kirkland Park & Ride, L.L.C., as the ground lessee and King County as the ground lessor, as the same may be amended or modified from time to time.

1.37 “**Garage Land**” means that portion of the Land on which the Garage will be located. The legal description of the Garage Land will be attached to this Lease as **Exhibit E** upon completion of the short plat of the Land as described in Section 2.4 of the Transit Center Ground Lease.

1.38 “**General Construction Contract**” means the general construction agreement between Landlord and the General Contractor for construction of the Project, which shall provide a Guaranteed Maximum Construction Price.

1.39 “**General Contractor**” means a duly licensed general contractor in the State of Washington, the contractor for the Project selected by Landlord with Tenant’s approval.

1.40 “**Guaranteed Maximum Construction Price**” means the maximum cost for design and construction of the Project as guaranteed by the General Contractor pursuant to the terms of the General Construction Contract.

1.41 “**Hazardous Substances**” means any material, waste, substance, industrial waste, toxic waste, chemical contaminant, petroleum, asbestos, polychlorinated biphenyls, radioactive materials, or other substances regulated or classified by Environmental Laws as hazardous, toxic or lethal to persons or property.

1.42 “**Housing Covenants**” means the covenants encumbering the Housing Land which restrict use of the Housing Land for a minimum term of ten (10) years to development of the Market Rate Housing Community and the Affordable Housing Community thereon, the forms of which shall be agreed upon prior to the Initial Conditions Precedent Satisfaction Date and at a minimum shall contain the affordability requirements set forth in the RFP and as required by the City of Kirkland.

1.43 “**Housing Easements**” means the following easements which shall constitute easements appurtenant to the Housing Land and which are necessary to develop the Housing Project on the Housing Land: (a) public plaza easement, (b) storm water detention facility easement, and (c) access easement for vehicular ingress and egress by residents and invitees of the Housing Project to/from NE 38th Place and 108th Avenue NE. The Housing Easements are set forth in the South Kirkland T.O.D. Easements Agreement in the form attached hereto as **Exhibit G**.

1.44 “**Housing Land**” means that portion of the Land on which the Housing Project will be located. The legal description of the Housing Land will be attached to this Lease as **Exhibit F** upon completion of the short plat of the Land as described in Section 2.4 of the Transit Center Ground Lease.

1.45 “**Housing Project**” means the development of a mixed use, mixed income residential development consisting of the development of a market rate rental community with a minimum of 177 units together with associated underground parking and commercial and retail uses on a portion of the Housing Land (the “**Market Rate Housing Community**”) and the development of an affordable housing community with a minimum of 58 units on a portion of the Housing Land (the “**Affordable Housing Community**”).

1.46 “**Initial Conditions Precedent Satisfaction Date**” means July 2, 2012.

1.47 “**Land**” means the real property in King County, Washington, on which the South Kirkland T.O.D. Facility will be developed in phases, as more particularly described in **Exhibit C-1** attached hereto and by this reference incorporated herein.

1.48 “**Landlord**” means Kirkland Park & Ride, L.L.C., a Washington limited liability company, whose sole members are KTOD Developer, L.L.C., a Washington limited liability company and South KTOD Development LLC, the sole member of which is Imagine Housing, a Washington nonprofit corporation.

1.49 “**Landlord-Initiated Change Order**” means Change Orders during the construction of the Project that are initiated by Landlord pursuant to Section 9.6.

1.50 “**Laws**” mean any constitution, statute, ordinance, regulation, rule, resolution, judicial decision, administrative order or other requirement of any federal, state, county, municipal or other governmental agency or authority having jurisdiction over the parties or the Premises, or both, in effect either at the time of execution of this Lease or at any time during the Term, including without limitation, any regulation or order of a quasi official entity or body (e.g., board of fire examiners or public utilities) including, but not limited to Environmental Laws and all rules, laws and regulations issued thereunder, as the same may be amended from time to time.

1.51 “**Lease**” means this Lease between Kirkland Park & Ride, L.L.C. as Landlord and King County as Tenant, as the same may be amended or modified from time to time.

1.52 “**Lease Year**” means each succeeding year of the Term, commencing with the Commencement Date and ending with the date which is one (1) day less than one (1) year later.

1.53 “**Liens**” means any lien, charge, security interest or encumbrance, including the Security Documents, which may be attached to, upon or against the Premises or any portion thereof.

1.54 “**Monthly Rent**” means the rent payable by Tenant under this Lease from the Commencement Date to and including the Expiration Date in the amounts for each Lease Year as set forth on the Schedule of Monthly Rent attached hereto as **Exhibit A** and by this reference incorporated herein, as such Schedule may be amended from time to time.

1.55 “**Notice Address**” means as to each of the parties its respective address as specified in Section 34.7 of this Lease.

1.56 “**Notice Parties**” means each of Landlord, Tenant and Construction Lender.

1.57 “**Option**” means Tenant’s Option to purchase the Premises as provided in Section 21 of this Lease.

1.58 “**Option Price**” means the Fixed Price less all sums paid by Tenant as Monthly Rent under this Lease payable on the Closing Date. The Option Price shall be paid by (a) crediting the fair market value of the Housing Land and the Housing Easements (which the parties agree have a fair market value to Landlord of Ten Million Dollars (\$10,000,000)) against the Fixed Price and (b) the balance of the Option Price or Six Million Four Hundred Fifty Thousand and No/100 Dollars (\$6,450,000.00) shall be paid in cash (“**Cash Option Price**”).

The Housing Land and the Housing Easements shall be conveyed to Landlord at Closing in part payment of the Option Price.

1.59 “Outside Completion Date” means December 14, 2015.

1.60 “Permits” means all land use permits, authorizations and approvals required for construction of the Project.

1.61 “Permitted Liens” means the Security Documents.

1.62 “Permitted Use” has the meaning given to it in Section 7 of this Lease.

1.63 “Permitted Exceptions” has the meaning set forth in Section 21.3 of this Lease.

1.64 “Phasing Plan” means the drawings prepared by Landlord and approved by Tenant which describes each construction phase of the South Kirkland T.O.D. Facility, impacts on transit center operations and availability and location of transit commuter parking on the Land, a copy of which is attached hereto as **Exhibit H** and by this reference incorporated herein.

1.65 “Person” means a natural person, corporation, trust, partnership, limited partnership, limited liability company, governmental subdivision or agency, municipal corporation, city, state or other legal entity.

1.66 “Preliminary Plans and Outline Specifications” are the initial renditions for the Garage, a schedule of which Preliminary Plans and Outline Specifications is attached hereto as **Exhibit B** and by this reference incorporated herein.

1.67 “Premises” means the entirety of the Garage (including surface parking spaces) to be constructed on the Garage Land together with a leasehold interest in the Garage Land pursuant to the Garage Ground Lease. From and after the completion of the short plat of the Land into the Transit Center Land, the Garage Land and the Housing Land, the Premises shall mean the entirety of the Garage to be constructed on the Garage Land together with a leasehold interest in the Garage Land pursuant to the Garage Ground Lease.

1.68 “Project” means the total design, development, permitting, financing, construction and equipping of the Garage, including, without limitation, all site work, landscaping, sidewalks, driveways (as may be necessary to access the Garage from adjacent public streets), offsite improvements and road improvements, all utility relocation and installation of utilities as required to serve the Project, all professional design services and all labor, material, supplies and equipment used or incorporated in such design and construction of the Garage, (including surface parking spaces and ancillary improvements) to be constructed on the Garage Land. The Project also includes the relocation of the transit center to the Housing Land and the relocation and/or replacement of parking spaces available for use by transit passengers from time to time (which parking spaces may be provided off-site pursuant to the terms of Section 16.2 of this Lease) during the construction of Phase I and Phase II of the development of the South Kirkland T.O.D. Facility in accordance with the Phasing Plan. The Project shall include work which is consistent with and reasonably inferable from the approved Project Requirements as being necessary to produce the intended results.

1.69 “Project Contingency” means the contingency by that name set forth in the Project Budget.

1.70 “Project Costs” means all costs for the design, development, permitting, financing and construction of the Project, including, without limitation, all site work, landscaping, off-site improvements, sidewalks, driveways (as may be necessary to access the Garage from adjacent public streets), and road improvements, all costs associated with the relocation of the transit center and relocation or replacement of parking spaces available for use by transit passengers during the construction of the Project, including, but not limited to, all costs associated with the lease of the Replacement Park and Ride Facility, all work and other improvements required under Permits, utility relocation and installation of utilities as required to serve the Project, all Permit fees, all costs of the Garage, HVAC electrical and other building systems, all costs of fixtures, furnishing and equipment, if any, described in the Construction Documents, all costs of architectural services provided by the Architect, all other professional design and other services provided by Architect, Contractors or other professionals engaged by Landlord or General Contractor, all amounts paid to General Contractor under the General Construction Contracts including all labor, materials, supplies and equipment used or incorporated in such design and construction, all amounts paid to other Contractors and subcontractors, if any, under any other Construction Contract or subcontract entered into by Landlord or by General Contractor including all labor, materials, equipment used or incorporated in such design and construction, services provided by engineers, attorneys, accountants, environmental consultants, surveyors and other professionals and consultants retained by Landlord or General Contractor in connection with the Project, Landlord’s development fees, Landlord’s overhead, general expenses, salaries or other compensation of Landlord’s personnel or of General Contractor’s personnel whether situated at Landlord’s principal office, General Contractor’s principal offices or otherwise and other administrative costs, real estate brokerage and leasing commissions, if any, and all other costs incurred in connection with the Project Financing Costs, Project Contingency, insurance, applicable state and local retail sales, business and occupation and other taxes (including real property taxes and assessments accruing from the Effective Date to Final Completion of the Project).

1.71 “Project Requirements” means the Preliminary Plans and Outline Specifications, those portions of the RFP dealing with the Garage, the FTA Requirements and other requirements for the Project specifically agreed to by Landlord and Tenant.

1.72 “Project Schedule” means the schedule for the Project as revised from time to time by General Contractor and Landlord; provided, however, that in no event shall the Project Schedule provide for Substantial Completion of the Project to occur later than the Required Completion Date without the consent of Tenant. The initial Project Schedule is set forth in **Exhibit I** attached hereto and by this reference incorporated herein.

1.73 “Punch List” means a list of items required to be completed prior to Final Completion of the Project that are minor items which do not affect Landlord’s ability to lease the Premises to Tenant and do not affect Tenant’s ability to use the Premises for its Permitted Use.

1.74 “Required Completion Date” means a date no later than December 14, 2014. The Required Completion Date shall be extended to the extent of (i) Unavoidable Delays; and (ii) delays incurred as a result of the time required to remediate Hazardous Substances existing

in, on or emanating from the Garage Land and discovered during the construction of the Project, provided Landlord shall use reasonable efforts to minimize the impact on the Project Schedule due to such remediation; provided, however, that extensions due to Unavoidable Delay or delays resulting from remediation of such pre-existing Hazardous Substances shall not exceed twelve (12) months.

1.75 “Requirements of Law” means all requirements relating to land and building construction (including those specifically applicable to Tenant’s contemplated use of the Premises for its Permitted Use), including, without limitation, planning, zoning, subdivision, platting, environmental, air quality, flood hazard, fire safety, accessibility, and other governmental approvals, permits, licenses and/or certificates as may be necessary from time to time to comply with all the foregoing, all Federal Transit Administration rules, regulations and requirements, including but not limited to those attached hereto as **Exhibit O** and by this reference incorporated herein, and other applicable statutes, rules, orders, regulations, laws, ordinances, and covenants, conditions and restrictions, which now apply to and/or affect the design, construction, existence, intended use, operation and/or occupancy of the Garage, the Garage Land, the Premises or any part thereof.

1.76 “Schematic Drawings” means drawings establishing the general scope, conceptual design, scale and relationship among the components of the Project.

1.77 “Security Documents” means the Deed of Trust, and all other documents as may be required by Construction Lender in connection with the Construction Loan to finance the Project Costs.

1.78 “Subordination Agreement” means the Subordination, Non-Disturbance and Attornment Agreement to be executed by Landlord, Tenant and Construction Lender in the form attached hereto as **Exhibit M** and by this reference incorporated herein.

1.79 “Substantial Completion” means that the Project is Substantially Complete and each of the following events shall have occurred with respect to the Project:

(a) General Contractor shall have notified Landlord and Tenant in writing that the Project is Substantially Complete in substantial accordance with the Contract Documents, subject only to the completion of normal Punch List items;

(b) Architect shall have issued its “Certificate of Substantial Completion” (AIA Document G704) stating that the work under the General Construction Contract is sufficiently complete in substantial accordance with the Contract Documents to permit Tenant to occupy or utilize the Garage for its Permitted Use;

(c) The City has issued a temporary certificate of occupancy such that Tenant is permitted to and could, pursuant to such issued certificate of occupancy, physically occupy the Garage for its Permitted Use;

(d) Tenant has received satisfactory evidence from Landlord that all real property taxes and assessments payable on the Premises have been paid;

(e) Each Contractor shall have issued its "Certificate of Substantial Completion" together with its "Affidavit of Payment of Debts and Claims" (AIA Forms 706 and 706A), together with partial waivers and releases of lien for work performed prior to the date of its "Certificate of Substantial Completion" in form and substance reasonably satisfactory to Tenant;

(f) Each Contractor who has performed work on the Project shall have submitted its statements of intent to pay prevailing wages and affidavits of wages paid to the date of Substantial Completion and copies of all other documentation required by Chapter 39.12 RCW and/or the Davis Bacon Act, as applicable. Landlord has delivered Tenant its affidavit that the Construction Contracts with Contractors and subcontractors of such Contractors for the Project required such parties to pay prevailing wages in accordance with Section 9.5.5 below, and Landlord shall have provided evidence reasonably satisfactory to Tenant that the Project has been designed, developed and constructed in accordance with all relevant provisions of the FTA Requirements set forth in **Exhibit O** attached hereto and by the reference incorporated herein; and

(g) Tenant shall have accepted the Project as Substantially Complete, subject to completion of the Punch List items agreed upon with Landlord.

1.80 "Substantially Complete" means that the Garage has been constructed in substantial accordance with the Contract Documents and: (a) all elements required for the functioning of the Garage shall be operational and in good working order and condition including satisfying applicable ADA building requirements and the Washington State Law Against Discrimination, RCW ch. 49.60, as well as regulations adopted thereunder; (b) the Garage shall be weather tight and waterproof; (c) the fire and life safety systems within the Garage shall be operational and in good working order and condition; (d) the elevators within the Garage shall operate and function in good working order and condition, but may still require touch up installation and cleaning; (e) the mechanical and electrical systems, including the HVAC system, if any, shall be individually tested and in good working order able to support the Garage and shall also be tested to assure that the Garage systems operate on an integrated basis, but the HVAC system may still require final balancing work; (f) the finish work is substantially completed, including, but not limited to public entryways, elevators, doors and other partitions and the HVAC, plumbing, fire and life safety, sprinkler and electrical systems have been installed and are in good working order and condition, and all construction debris has been removed; (g) all site utilities, paving, striping, sidewalks and landscaping are substantially completed and construction barricades and equipment have been removed; (h) all Garage elevators and lobbies and all entrances and exits to the Garage (including all roads, driveways and sidewalks providing for pedestrian and vehicular access to the Garage from adjacent public streets) are completed; (i) the access and security systems for the Garage are installed and operational, except in each case minor Punch List items which do not materially affect use and occupancy of the Garage for the Permitted Use.

1.81 "Taxes" means all real property taxes and assessments (including assessments for special improvements), license and permit fees, charges for public utilities, leasehold excise taxes, other excise taxes, levies, sales, use and occupancy taxes, any tax or charge assessed against the Monthly Rent or fair market value of the Premises and any taxes levied or assessed in addition to or in lieu of, in whole or in part, such taxes, assessments or other charges and all

other governmental impositions and charges of every kind and nature, general and special, ordinary and extraordinary, foreseen and unforeseen of every character (including interest and penalties thereon) which at any time from and after the Effective Date of this Lease may be imposed, levied upon or assessed against or which arise with respect to or constitute a lien upon the Garage Land, Project or the Premises (or any part thereof), the leasehold estate created by this Lease or the Garage Ground Lease any part thereof, or any estate, right or interest therein, or any occupancy, use or possession of or activity conducted on the Premises or any part thereof. Taxes shall not include any tax computed on the basis of Landlord's net income.

1.82 "Tenant" means King County, a political subdivision of the State of Washington, and its successors and permitted assigns as the tenant under this Lease.

1.83 "Tenant-Initiated Change Order" means Change Orders that are initiated by Tenant pursuant to Section 9.6.

1.84 "Tenant's Project Manager" means the project manager for the Project identified by the Tenant's Department of Construction and Facilities Management, or his or her designee. Tenant's Project Manager shall have authority to approve all Change Orders on behalf of Tenant and to approve Design Development Drawings and Construction Drawings pursuant to Section 9.3 of this Lease.

1.85 "Term" means the period beginning on the Commencement Date and ending on the Expiration Date.

1.86 "Title Company" means First American Title Insurance Company, which will be issuing the Title Policy.

1.87 "Title Policy" has the meaning set forth in Section 21.3 below.

1.88 "Transit Center" means an off street transit facility with internal circulation separated from general traffic containing transit bays for use by busses collecting and discharging passengers, together with ancillary transit passenger amenities such as an overhead canopy which will provide a weather-protected waiting area for transit passengers, seating, lighting, signage, bike racks and other transit-related facilities.

1.89 "Transit Center Land" means that portion of the Land on which the Transit Center will be located. The legal description of the Transit Center Land will be attached to this Lease as **Exhibit D** upon completion of the short plat of the Land as described in Section 2.4 of the Transit Center Ground Lease.

1.90 "Transit Center Ground Lease" means the ground lease of the Transit Center Land entered into or to be entered into of even date herewith by and between Landlord as the ground lessee and King County as the ground lessor, as the same may be amended or modified from time to time.

1.91 "Transit Center Project" means the design, development, construction, financing and equipment of the Transit Center on the Transit Center Land pursuant to the Transit Center Project Lease.

1.92 "Transit Center Project Lease" means that certain Lease Agreement (with Option to Purchase-Transit Center) between Kirkland Park & Ride, L.L.C. as Landlord and King County, as Tenant as the same may be amended or modified from time to time.

1.93 "Trust Agreement" means the trust agreement executed by Trustee and Tenant in connection with the execution and delivery of the Certificates.

1.94 "Trustee" means a national bank or other financial institution with trust powers selected by Tenant to enter into the Trust Agreement and issue the Certificates in Monthly Rent or any duly authorized successor thereto appointed pursuant to the Trustee Agreement.

1.95 "Unavoidable Delays" means any delay in the performance by Landlord or General Contractor of its obligations with respect to the Project caused by strikes (other than those directly caused by the acts or omissions of Landlord or the General Contractor or the failure by the Landlord or the General Contractor to bargain in good faith), acts of God, unusually inclement weather, unavoidable casualties and similar causes beyond the reasonable control of Landlord or General Contractor which, after the exercise of due diligence to mitigate the effects thereof, delay construction of the Project, other than such delays resulting from (a) Landlord's failure to comply with the terms and provision of this Lease; (b) General Contractor's failure to comply with the terms of the General Construction Contract; (c) increased prices, or (d) unavailability of funds. Unavoidable Delays will entitle Landlord to request an extension of the Required Completion Date (not to exceed a total of twelve (12) months) but will in no way entitle Landlord to any increase in Monthly Rent or any increase in the Fixed Price or the Option Price.

1.96 "Utilities" means all utilities and services furnished to the Premises, including without limitation, gas, electricity, water, sewer, garbage collection, and telephone service.

1.97 "Warranty Period" means that period commencing on the date of Final Completion of the Project and expiring two (2) years thereafter.

2. Premises. Landlord leases to Tenant and Tenant leases from Landlord the Premises for the Term.

3. Term. The Term shall commence on the Effective Date and shall expire on the Expiration Date, unless sooner terminated as provided herein; provided, however, that the obligation of Tenant to pay Monthly Rent shall not commence until the Commencement Date. Landlord and Tenant shall confirm the Commencement and Expiration Dates by executing within fifteen (15) days after the Commencement Date, a written Confirmation of Commencement and Expiration Dates in the form attached hereto as **Exhibit J** and by this reference incorporated herein, which Confirmation of Commencement and Expiration Dates shall become a part of this Lease and be binding upon Landlord and Tenant to establish the actual Commencement and Expiration Dates of the Term. Notwithstanding that the obligation of Tenant to pay Monthly Rent under this Lease shall not commence until the Commencement Date, all of the other terms and provisions of this Lease shall be effective from and after the Effective Date (except as otherwise provided herein).

4. Monthly Rent.

4.1 Obligation to Pay Rent. Commencing on the first Business Day of the first month following the Commencement Date and on the first Business Day of each and every month thereafter during the Term, Tenant shall pay to Landlord or as Landlord may otherwise direct in writing and without deduction, offset, prior notice or demand, an amount equal to Monthly Rent as set forth on the schedule of Monthly Rent attached hereto as **Exhibit A** and this reference incorporated herein; provided, however that the first payment of Monthly Rent shall also include an amount in arrears for the Monthly Rent due and owing from the Commencement Date through and including the last day of the month preceding such first payment date.

4.2 Proration of Rent. Monthly Rent for any partial month shall be prorated on a daily basis at the rate of 1/30 of the Monthly Rent. All payments of Monthly Rent under this Lease shall be paid in lawful money of the United States and in immediately available funds. In the event that the date on which Monthly Rent is due is not a Business Day, such Monthly Rent shall be due on the following Business Day.

4.3 Rent a General Obligation. Tenant's obligation to pay Monthly Rent constitutes a limited tax general obligation of Tenant. Tenant irrevocably covenants and agrees that it will include in its annual budget and levy taxes annually on all taxable property within King County, within and as a part of the tax levy permitted to Tenant without a vote of the electors, amounts sufficient, together with all other money legally available and to be used therefor, to pay Monthly Rent as the same shall become due. The full faith, credit and resources of Tenant are irrevocably pledged for the annual levy and collection of such taxes and the prompt payment of Monthly Rent.

4.4 Prepayment of Monthly Rent through Issuance of Certificates. Landlord and Tenant acknowledge that it is Tenant's intent that Certificates will be issued as a means to pay Landlord the Cash Option Price, which together with the credit of the fair market value of the Housing Land and the Housing Easement against the Option Price (which shall be conveyed to Landlord on the Closing Date) shall be used by Landlord to repay the Construction Loan, if Tenant has not exercised its option to purchase the Premises pursuant to Sections 21 and 22 hereof within fifteen (15) days following the Substantial Completion of the Project.

(a) Tenant shall have the right to arrange for the issuance of Certificates to provide long-term financing for the Project in an amount sufficient to pay the Cash Option Price. Tenant shall notify Landlord in writing within fifteen (15) days following the Substantial Completion of the Project of Tenant's intent to issue the Certificates, the name of the Trustee who will become the successor in interest to Landlord's right, title and interest under the Garage Ground Lease and this Lease as to the Garage Land, and the name of the underwriter that will underwrite the Certificates (the "**Notice of Intent to Issue Certificates**"). In the event Tenant delivers Landlord the Notice of Intent to Issue Certificates, Tenant will use its best efforts to cause the issuance of the Certificates and payment of the Option Price to Landlord within ninety (90) days thereafter; provided, however, that in no event shall Closing or issuance of the Certificates occur prior to the Final Completion of the Project.

(b) In the event that Tenant has not exercised its option to purchase the Premises pursuant to Sections 21 and 22 hereof or has not delivered the Notice of Intent to Issue

Certificates provided in Section 4.4(a) above within twenty (20) days following the Substantial Completion of the Project, then Landlord may elect to arrange for the issuance of the Certificates. The Landlord shall notify Tenant of its intent to exercise its right to cause issuance of the Certificates pursuant to this Section 4.4(b) not less than ninety (90) days prior to the expected Closing Date for the issuance of such Certificates. Such Certificates shall be issued in a principal amount equal to the anticipated Cash Option Price as of the Closing Date. Tenant agrees to cooperate with Landlord in the issuance of the Certificates, including providing information on the Tenant for any offering circular, entering into an ongoing disclosure agreement and executing customary certifications; provided, however, that in no event shall Closing or issuance of the Certificates occur prior to the Final Completion of the Project.

(c) On the Closing of the issuance of the Certificates and payment of the Cash Option Price and conveyance of the Housing Land and the Housing Easements to Landlord, all right, title and interest of Landlord under the Garage Ground Lease and this Lease as to the Garage Land shall be assigned to Trustee. Tenant hereby consents to such assignment and from and after the Closing, Tenant shall make future payments of Monthly Rent directly to the Trustee. The Trustee shall be directed to pay Landlord the Cash Option Price calculated as of the Closing Date in immediately available funds from the proceeds from the sale of the Certificates. Landlord shall execute such amendments to the Garage Ground Lease and this Lease as Tenant or Trustee may request in order to cause the issuance of the Certificates, including an amended Schedule of Monthly Rent designating principal and interest components corresponding to principal and interest payments for the Certificates, so long as such amendments do not materially increase Landlord's obligations under the Garage Ground Lease or this Lease. Tenant agrees to pay the reasonable and typical costs of issuing the Certificates. Upon the assignment of its rights under the Garage Ground Lease and this Lease as to the Garage Land to Trustee, Landlord shall cause its interests in the Premises, the Garage Ground Lease and this Lease as to the Garage Land to be released from any lien arising under the Security Documents or other claim in favor of Construction Lender and Landlord shall be relieved from any obligation under the Garage Ground Lease or this Lease as to the Garage Land arising from any event occurring after the date of such assignment, other than those obligations which by their terms are expressly intended to remain Landlord's obligations after the assignment to Trustee, including, but not limited to Landlord's obligations with respect to any representations and warranties made with respect to the Project during the Warranty Period.

5. Taxes and Utilities.

5.1 Payment of Taxes by Landlord. Landlord shall be responsible for the payment of all Taxes from the Effective Date to the date prior to the Commencement Date of this Lease. Landlord shall pay all Taxes directly to the applicable governmental agency prior to delinquency and shall provide proof of such payment promptly to Tenant upon request.

5.2 Payment of Taxes by Tenant. From and after the Commencement Date, Tenant shall pay all Taxes directly to the applicable governmental agency prior to delinquency and shall provide proof of such payment promptly to Landlord upon request. To the extent Taxes or other charges can be paid in installments, Tenant may pay such Taxes in installments and shall only be liable for Taxes which accrue from and after the Commencement Date. With respect to any general or special assessments which may be levied against or upon the Premises, or which under the Laws then in force may be evidenced by improvements or other bonds or may be paid in

annual installments, only the amount of such annual installment, and interest due thereon, shall be included within the computation of Taxes.

5.3 Real Property Tax Statements. Tenant shall make appropriate arrangements to receive directly from the applicable governmental agency assessment notices and real property tax statements for the current year and Tenant shall provide a copy thereof to Landlord within five (5) days following receipt of such assessment notices or tax statements.

5.4 Right to Contest Taxes. If Landlord receives prior notice that an appraisal of the Premises, or any portion thereof, will be conducted for real property tax purposes, Landlord shall so notify Tenant and permit Tenant to be present during such appraisal if Tenant so elects. Tenant shall have the right in Landlord's name and stead, and at Tenant's sole expense, to contest the validity or amount of any real property taxes. Landlord shall cooperate with Tenant and provide reasonable assistance with respect to any such contest, including, without limitation, such information and supporting documents as may be reasonably requested by Tenant. Notwithstanding any provision of this Lease to the contrary, Tenant shall not be required, nor shall Landlord have the right, to pay, discharge or remove any such real property tax so long as no Event of Default has occurred and Tenant is contesting the existence, amount, applicability or validity thereof by appropriate proceedings conducted in good faith with due diligence. In the event Landlord shall obtain a tax refund as a result of any such tax appeal or other proceedings Tenant shall be entitled to, and Landlord shall promptly pay to Tenant, all such tax refunds.

5.5 Personal Property Taxes. Tenant shall pay prior to delinquency all personal property taxes assessed against and levied upon Tenant's furnishings, equipment and all other of Tenant's personal property contained in the Premises. If possible, Tenant shall cause all such property to be assessed and billed separately from the Premises.

5.6 Utilities. Landlord shall be responsible for the payment of all charges for utilities used or consumed at the Premises from the Effective Date to the date prior to the Commencement Date. From and after the Commencement Date of this Lease, Tenant shall be solely responsible for and shall pay separately for all charges for Utilities used or consumed in the Premises. It is understood that Landlord shall not be required to provide any Utilities to Tenant, and Tenant shall make any necessary arrangements to have all such Utilities billed directly to and paid for directly by Tenant. Landlord shall be solely responsible for and shall pay separately for all charges for Utilities provided to the Premises from the Effective Date to and including the Commencement Date of this Lease.

6. Conditions Precedent. As conditions precedent to Tenant's obligations to ground lease the Garage Land to Landlord and Landlord's obligation to ground lease the Garage Land pursuant to the Garage Ground Lease, and Landlord's obligations to design, develop, construct and finance the Project and Tenant's obligation to lease the Project upon Substantial Completion thereof pursuant to the terms and conditions of this Lease, the conditions set forth in Subsections 6.1 through 6.4 must be met to the reasonable satisfaction of the parties hereto prior to July 2, 2012 ("**Initial Conditions Precedent Satisfaction Date**"). Upon execution of this Lease, Landlord and Tenant shall each work diligently and in good faith to satisfy each of the conditions set forth in Section 6.1 through 6.4 below on or before the Initial Conditions Precedent Satisfaction Date:

6.1 Replacement Park and Ride Facility. Landlord has acquired by lease the Replacement Park and Ride Facility (as defined in Section 16 of this Lease) acceptable to Tenant, which approval shall not be unreasonably withheld, conditioned or delayed so long as the lease terms comply with the terms and conditions set forth in Section 16 of this Lease.

6.2 Approval of Financing Plan for Project and the Transit Center Project. Landlord intends to finance the development and construction of the Project and the Transit Center Project with construction loan financing and equity investments. Landlord shall make the following information available in Seattle, Washington for review by Tenant's Director of the Department of Transportation or such person's designee who shall recommend approval or disapproval of such Financing Plan to the King County Executive. All financial and tax information provided by Landlord will be kept strictly confidential by Tenant and its attorneys, consultants and employees to the fullest extent permitted by law and shall not be copied or distributed by Tenant to any third party (except as required by law or in legal proceedings brought to enforce either the Garage Ground Lease or this Lease or the Transit Center Ground Lease and the Transit Center Project Lease):

6.2.1 Evidence reasonably acceptable to Tenant of the source and availability of any debt and equity funding required to build the Project and the Transit Center Project. Copies of executed term sheets or executed commitment letters from institutional lenders reasonably acceptable to Tenant with terms and conditions reasonably acceptable to Tenant and with terms that also satisfy the requirements of Section 10 below will be considered sufficient evidence of financing under this Section 6.2.1; and

6.2.2 Copies of Landlord's limited liability company or other organizational documents with evidence of funding commitments from existing members and proposed investors.

6.2.3 Such other information and documents as Tenant may reasonably request, including but not limited to, financial statements, tax returns, banking references or other information regarding the members or proposed equity investors in Landlord.

6.2.4 Any financing obtained by Landlord used for construction of the Project and the Transit Center Project must be fully authorized by the granting agencies for such use to the Tenant's reasonable satisfaction.

6.2.5 The forms of the Housing Covenants have been agreed upon.

Upon approval of the information and agreements set forth in Section 6.2.1 through 6.2.5, such documents and the intended financing of the Project and the Transit Center Project shall constitute the "**Approved Financing Plan**" for the Project and the Transit Center Project. Tenant shall have no financial liability of any kind for costs arising from or related to construction of the Transit Center or the Garage, as required by RCW Ch. 35.42., including those that may arise from any grant funds obtained by the Landlord. There shall be no change in the Approved Financing Plan without the prior written approval of the Tenant, which approval shall not be unreasonably withheld.

6.3 No Bankruptcy. Neither Landlord nor any of its members or managers: (a) has applied for or consented to the appointment of a receiver, custodian or trustee for it or any of its

property, (b) has become insolvent, (c) has failed generally or admitted in writing its inability to pay its debts as they become due, (d) has consolidated, liquidated or dissolved, (e) has filed a petition or action for relief relating to any federal or state bankruptcy, reorganization, insolvency, moratorium or similar statute or any other law or laws for the relief of or relating to debtors, or (f) has made an assignment for the benefit of its creditors or entered into an agreement of composition with its creditors, nor (g) has a petition been filed by or against Landlord or any of its members or managers under any federal or state bankruptcy, reorganization, insolvency, moratorium or similar statute, or any other law or laws for the relief of or relating to debtors.

6.4 Inspection and Evaluation of Housing Land and Housing Easements; As Is Sale. Landlord has completed its due diligence investigation of the Housing Land and the Housing Easements, has approved title to and the environmental condition of the Housing Land and the feasibility of the development of the Housing Project on the Housing Land and the Housing Easements. Landlord acknowledges and agrees that Landlord will be concluding its acquisition of the Housing Land and Housing Easements based upon Landlord's inspection, investigation of the Housing Land and Housing Easements and its suitability for Landlord's intended purpose. Landlord further acknowledges and agrees, that, except as expressly provided in this Lease, Tenant does not make any representations or warranties of any kind, either express or implied, with respect to the Housing Land and Housing Easements, including, but not limited to, the size, quality, character, use or condition of the Housing Land and Housing Easements, compliance with applicable statutes, laws, codes ordinances, regulations or requirements, zoning, subdivision, building, fire, safety, health or environmental matters. **TENANT SPECIFICALLY DISCLAIMS ANY REPRESENTATION, WARRANTY OR ASSURANCE WHATSOEVER TO LANDLORD AND TENANT MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND OR CHARACTER, EITHER EXPRESS OR IMPLIED WITH RESPECT TO THE MAINTENANCE, REPAIR, CONDITION, DESIGN OR MARKETABILITY OF ANY PORTION OF THE HOUSING LAND OR HOUSING EASEMENTS, INCLUDING BUT NOT LIMITED TO (A) ANY IMPLIED OR EXPRESS WARRANTY OF MERCHANTABILITY, (B) ANY IMPLIED OR EXPRESS WARRANTY OF FITNESS OR SUITABILITY FOR A PARTICULAR PURPOSE, (C) THE PRESENCE OR ABSENCE OF HAZARDOUS SUBSTANCES ON THE HOUSING LAND AND HOUSING EASEMENTS, (D) THE FINANCIAL CONDITION, SIZE, QUALITY, CHARACTER OR VALUE OF THE HOUSING LAND AND HOUSING EASEMENTS, OR (E) THE COMPLIANCE OR LACK THEREOF OF THE HOUSING LAND AND/OR THE HOUSING EASEMENTS WITH GOVERNMENTAL REGULATIONS, IT BEING THE EXPRESS INTENTION OF TENANT AND LANDLORD THAT THE HOUSING LAND AND HOUSING EASEMENTS WILL BE CONVEYED AND TRANSFERRED TO LANDLORD ON THE CLOSING DATE IN ITS PRESENT CONDITION AND STATE OF REPAIR, "AS IS," "WHERE IS," WITH ALL FAULTS.** LANDLORD REPRESENTS THAT IT IS A KNOWLEDGEABLE, EXPERIENCED AND SOPHISTICATED PURCHASER OF REAL PROPERTY SUCH AS THE HOUSING LAND AND HOUSING EASEMENTS AND THAT IT IS RELYING SOLELY ON ITS OWN EXPERTISE AND THAT OF ITS CONSULTANTS IN PURCHASING THE HOUSING LAND AND HOUSING EASEMENTS. LANDLORD CONFIRMS THAT IT HAS CONDUCTED SUCH INDEPENDENT INSPECTION OF THE HOUSING LAND AND HOUSING EASEMENTS AND RELATED MATTERS AS LANDLORD DEEMS NECESSARY INCLUDING BUT NOT LIMITED TO, THE PHYSICAL AND ENVIRONMENTAL CONDITION OF THE HOUSING LAND AND HOUSING EASEMENTS. TENANT HAS NO OBLIGATION TO MAKE REPAIRS,

REPLACEMENTS OR IMPROVEMENTS TO THE HOUSING LAND AND HOUSING EASEMENTS.

In addition to continued satisfaction of the conditions set forth in Section 6.1 through 6.4 above, the condition set forth in Section 6.5 must be met to the reasonable satisfaction of the parties on or before August 1, 2012 and the conditions set forth in Sections 6.6 through 6.11 must be met to the reasonable satisfaction of the parties prior to October 1, 2012 (“**Conditions Precedent Satisfaction Date**”). Following satisfaction of the conditions set forth in Section 6.1 through 6.4, Landlord shall work diligently and in good faith to satisfy the conditions set forth in Section 6.5 on or before August 1, 2012 and shall work diligently and in good faith to satisfy the conditions set forth in Section 6.6 through 6.11 below on or before the Conditions Precedent Satisfaction Date:

6.5 Short Plat of Land Completed. Landlord has completed the short plat of the Land into the Transit Center, the Garage Land and the Housing Land, and the parties have (a) amended the Garage Ground Lease and this Lease to exclude the Transit Center Land and the Housing Land therefrom, and (b) amended the Transit Center Ground Lease and the Transit Center Project Lease to exclude the Garage Land and the Housing Land therefrom.

6.6 FTA Approval. The FTA has approved the terms and conditions of (a) the Transit Center Ground Lease and the Transit Center Project Lease, and (b) the Garage Ground Lease and this Lease.

6.7 Issuance of Building Permits. Landlord has participated in a pre-application meeting with the City and has submitted an overall site plan for the South Kirkland T.O.D. Facility and such other information as may be requested by the permitting jurisdictions and the permitting jurisdictions have issued final building permits for the Project and the Transit Center on terms and conditions which are acceptable to Landlord and Tenant.

6.8 Construction Contracts. Landlord has executed General Construction Contracts containing the Guaranteed Maximum Price which General Construction Contracts shall comply with all the requirements of this Lease and the Transit Center Project Lease, respectively.

6.9 Payment and Performance Bonds. Landlord has obtained payment and performance bonds for the Project and the Transit Center Project for the benefit of Tenant which comply with the requirements of RCW 35.42.060 issued by a surety in an amount and otherwise in a form reasonably acceptable to Tenant.

6.10 Financing Obtained. All conditions precedent to funding of any debt and equity required under the Approved Financing Plan shall have been met or waived, Landlord has provided Tenant with copies of the fully executed Deed of Trust and other Security Documents and Construction Lender has executed and delivered the Subordination Agreement to Tenant.

6.11 Transit Center Project Complete. The Transit Center Project has achieved Substantial Completion (as defined in the Transit Center Project Lease).

The foregoing conditions contained in this Section 6 are solely for the benefit of the parties. Each party shall act reasonably and in good faith in determining whether the foregoing conditions have been satisfied.

If any of the foregoing conditions set forth in Section 6.1 through 6.4 are not satisfied by the Initial Conditions Precedent Satisfaction Date, either party shall have the right to terminate its obligations under the Garage Ground Lease, this Lease, the Transit Center Ground Lease and the Transit Center Project Lease upon written notice to the other, whereupon the Garage Ground Lease, this Lease, the Transit Center Ground Lease and the Transit Center Project Lease shall terminate, and except as otherwise expressly provided herein, neither party hereto shall have any further rights, duties or obligations under the Garage Ground Lease, this Lease, the Transit Center Ground Lease and/or the Transit Center Project Lease and Landlord shall have no right to acquire the Housing Land or the Housing Easements.

If any of the foregoing conditions set forth in Section 6.1 through 6.11 are not satisfied by the Conditions Precedent Satisfaction Date, either party shall have the right to terminate its obligations under the Garage Ground Lease, this Lease, the Transit Center Ground Lease and the Transit Center Project Lease upon written notice to the other, whereupon the Garage Ground Lease, this Lease, the Transit Center Ground Lease and the Transit Center Project Lease shall terminate, and except as otherwise expressly provided herein, neither party hereto shall have any further rights, duties or obligations under the Garage Ground Lease, this Lease, the Transit Center Ground Lease and/or the Transit Center Project Lease and Landlord shall have no right to acquire the Housing Land or the Housing Easements. Once all of the conditions precedent set forth in Section 6.1 through 6.11 have been met to the satisfaction of the parties, Tenant shall deliver Landlord the Notice to Proceed which shall establish the Effective Date of this Lease.

7. Use of Premises; Permitted Use. Tenant intends to use the Premises as a public parking garage and may use the Premises for any other lawful use consistent with the provisions of this Section 7 (the "Permitted Use"). Tenant has determined to its satisfaction that the Premises can be used for the Permitted Use.

7.1 Quiet Enjoyment. Upon payment by Tenant of Monthly Rent as herein provided and upon the observance and performance of the covenants, terms and conditions on the Tenant's part to be observed and performed, Landlord represents and warrants that Tenant shall peaceably and quietly hold and enjoy the Premises for the Term hereby demised without hindrance or interruption by Landlord or any person or persons lawfully or equitably claiming, by, through or under Landlord.

7.2 No Insurance Cancellation. Tenant shall not do, bring, or keep anything in or about the Premises that will cause a cancellation of any insurance covering the Premises.

7.3 No Waste, Nuisance or Damage. Tenant shall not use the Premises in any manner that will constitute waste of the Premises or a nuisance and Tenant shall not do anything on the Premises that will cause damage to the Premises.

7.4 Compliance with Laws. From and after the Commencement Date of this Lease, Tenant shall comply with all Laws concerning the Premises and Tenant's use of the Premises, including without limitation, Environmental Laws. Tenant shall not use the Premises for the transportation, storage or generation of any Hazardous Substances in violation of Environmental Laws. From and after the Commencement Date of this Lease and to the extent permitted by law, Tenant shall hold Landlord harmless from and against any and all debts, demands, obligations, Liens, judgments, claims, liabilities, losses, damages, cleanup costs and expenses (including

reasonable attorneys' fees) now or hereafter arising in connection with the presence, transportation, storage, disposal or handling of Hazardous Substances located in, on or about the Premises or Garage Land caused by or resulting from the actions of Tenant, its agents or employees after the Commencement Date of this Lease, excluding (a) any Hazardous Substances present on the Garage Land or the Premises prior to the Commencement Date of this Lease or which migrates onto the Garage Land from property not owned by Tenant through no act or omission of Tenant; (b) any such debt, demand, obligation, Lien, judgment, claim, liability, loss, damage, cleanup cost or expense resulting from the actions or omissions of Landlord, General Contractor and their respective agents, employees, Contractors, subcontractors or invitees; or (c) any debt, demand, obligation, Lien, judgment, claim, liability, loss, damage, cleanup cost or expense resulting from Landlord's violation of any contractual obligation under the Garage Ground Lease, this Lease, or any other document executed by Landlord in connection with any Security Documents. This indemnification shall survive the Expiration Date of this Lease.

7.5 Tenant's Right to Contest Requirements of Law. Tenant shall have the right to contest, by appropriate legal proceedings, any Law, rule, order, ordinance, regulation or other Requirements of Law affecting the Premises and to postpone compliance with the same during the pendency of such contest provided that the enforcement of such Law, rule, order, ordinance, regulation or other Requirements of Law is stayed during the pendency of such contest and the contest will not subject Landlord to criminal or civil penalty or fine or jeopardize title to the Premises. Landlord shall cooperate with Tenant in such contest and shall execute any documents or provide such information as Tenant may reasonably request in furtherance of such proceedings. Tenant shall proceed diligently and in good faith to resolve such contest and shall not postpone compliance with any Law, rule, order, ordinance, regulation or other Requirements of Law if the same shall invalidate any insurance required by this Lease. If Tenant is contesting any Law, rule, order, ordinance, regulation or other Requirements of Law then so long as Tenant makes all Monthly Rent payments required under this Lease, Tenant shall not be in default under this Lease by reason of such noncompliance unless and until there is a final determination entered by a court of competent jurisdiction and all applicable appeal periods have expired or, if Tenant has duly appealed the determination and enforcement is stayed pending appeal, then until all appeals have been finally decided against Tenant and Tenant has failed to comply with the resulting decision within thirty (30) days following the issuance of such final determination.

8. Liens.

8.1 Covenant Against Liens. Landlord covenants and agrees that it shall not during the Term of this Lease suffer or permit any Liens (other than Permitted Liens) to be attached to, upon or against the Premises, or any portion thereof or any Monthly Rent payable under this Lease for any reason, including without limitation, Liens arising out of the possession, use, occupancy, acquisition, construction, repair, or rebuilding of the Premises or by reason of the furnishing of labor, services, materials, or equipment to the Premises or to Landlord. Landlord shall keep the Premises free and clear of all construction liens resulting from the construction of the Project. Landlord agrees to indemnify, protect, defend and hold Tenant harmless from and against all liabilities, losses, damages, costs and expenses (including reasonable attorneys' fees and costs) incurred in connection with any such Lien. Landlord's obligations pursuant to this Section 8.1 shall survive the Expiration Date of this Lease.

8.2 Covenant to Remove Liens. Landlord will promptly, and in all events within thirty (30) days following the attachment of same, remove and discharge any and all Liens (other than Permitted Liens) which attach to, upon or against the Premises or any portion thereof, or any leasehold interest of Tenant created under this Lease (other than liens or encumbrances arising through the actions of Tenant). Landlord reserves the right to contest the validity or amount of any such Lien in good faith provided that, within thirty (30) days after the filing of such Lien, Landlord discharges said Lien of record or records a bond which complies with the requirements of RCW 60.04.161 eliminating said Lien as an encumbrance against the Premises. In the event Landlord shall fail to so remove any such Lien, Tenant may take such action as Tenant shall reasonably determine to remove such Lien and all costs and expenses incurred by Tenant including, without limitation, amounts paid in good faith settlement of such Lien and attorneys' fees and costs shall be paid by Landlord to Tenant together with interest thereon at the rate of twelve percent (12%) interest per annum from the date advanced until paid. Landlord's obligations pursuant to this Section 8.2 shall survive the Expiration Date of this Lease.

8.3 Tenant's Covenant Against Tenant Liens. Tenant covenants and agrees that it shall not suffer or permit any lien, charge, security interest or encumbrance arising by or through Tenant (collectively, "Tenant Liens") to be attached to, upon or against the Housing Land as a result of its actions, and shall remove or bond all Tenant Liens which affect the Housing Land on or before the Closing Date.

8.4 Tenant's Disclaimer. Notwithstanding the consent or request of Tenant, express or implied, for the performance of any labor or services or for the furnishing of any materials or equipment for any construction, alteration, addition, repair or demolition of or to the Premises (or any part thereof), NOTICE IS HEREBY GIVEN THAT TENANT WILL NOT BE LIABLE FOR ANY LABOR, SERVICES, MATERIALS OR EQUIPMENT FURNISHED OR TO BE FURNISHED TO LANDLORD, GENERAL CONTRACTOR OR ANYONE HOLDING AN INTEREST IN THE PREMISES (OR ANY PART THEREOF) THROUGH OR UNDER LANDLORD OR GENERAL CONTRACTOR, AND THAT NO CONSTRUCTION OR OTHER LIENS FOR ANY SUCH LABOR, SERVICES, MATERIALS OR EQUIPMENT SHALL ATTACH TO OR AFFECT THE INTEREST OF TENANT IN THE PREMISES. Nothing in this Section 8.4 shall relieve Tenant of its obligations to pay Monthly Rent hereunder from and after the Commencement Date of this Lease.

9. Design and Construction of Project. Tenant would not have entered into this Lease but for the agreement by Landlord to undertake, at Landlord's sole cost and expense, the Project, including without limitation (i) the obtaining of financing for the Project, (ii) the acquisition of a leasehold interest in the Garage Land by way of the Garage Ground Lease, (iii) the design, development and permitting of the Project, and (iv) the construction, completion and equipping of the Garage for use by Tenant for its Permitted Use on or before the Required Completion Date. Accordingly, Landlord shall diligently cause the Project to be designed, developed, constructed and completed on or before the Required Completion Date in a good and workmanlike manner and in accordance with the provisions of this Lease, free and clear of all Liens (other than Permitted Liens) and otherwise in accordance with the requirements of this Lease and shall pay all Project Costs associated therewith. In order to assure timely communications between Landlord and Tenant during the construction process, any notice to Tenant requiring or permitting a response by Tenant shall specify the outside date by which Tenant's response must be received to be effective.

9.1 Project Design. Landlord shall cause design services to be performed by qualified and Washington state licensed architects, engineers and other professionals engaged by Landlord, and not objected to by Tenant and paid by Landlord as part of Project Costs.

(a) **Selection of Development Team for Project.** The following entities are intended to be retained in connection with the Project:

- (i) Architect: Weber Thompson
- (ii) General Contractor: [To be determined]
- (iii) Structural Engineers: DCI (D'Amato Conversano, Inc.)
- (iv) Land Surveyors: David Evans and Associates, Inc.
- (v) Mechanical Engineers: [To be determined]
- (vi) Geotech Engineers: Earth Solutions Northwest, LLC
- (vii) Electrical Engineers: [To be determined]

Tenant has no objections to the Architect that Landlord intends to retain in connection with the Project. In order to complete the Project, Landlord shall have the right to select other professionals as necessary or desirable for the design, permitting, and development of the Project. Landlord shall submit a list of proposed Development Team members (including the name of the proposed General Contractor) to Tenant for Tenant's review. Tenant shall have the right to reject any proposed Development Team member if there exists substantial and reasonable cause for such rejection. All amounts paid to the entities outlined above and any others hereinafter engaged by Landlord in connection with the performance of its duties and responsibilities under this Lease shall be paid by Landlord as part of Project Costs.

Consistent with the terms and conditions of the General Construction Contract and the architect's agreement with the Architect, there shall be no material amendment to those or any other design contract or Construction Contract which would result in a material change in work or materials from those specified in the Project Requirements or which would result in a material change in appearance, diminution in quality of the Project or increase the costs of operating and maintaining the Garage following Final Completion thereof, without the prior written consent of Tenant.

9.2 Design Process; Schedule. Landlord and Tenant acknowledge and agree that the dates set forth in the initial Project Schedule attached hereto as **Exhibit I** and by this reference incorporated herein, and as revised from time to time in accordance with the terms herein, shall serve as target dates for achieving the matters set forth therein. In order to ensure to the greatest extent practicable that the Project is completed on or before the dates set forth in the Project Schedule, Landlord and Tenant shall each proceed with all necessary due diligence and in good faith to complete such matters as require action or approval on the part of Tenant and Landlord. Tenant shall promptly and diligently respond to all questions and concerns raised by Landlord or by the Architect, Contractors, engineers or other consultants.

9.3 Plans and Specifications.

9.3.1 Preliminary Plans and Outline Specifications. As of the date of this Lease, Tenant has reviewed the Preliminary Plans and Outline Specifications and the Schematic Drawing for the Project and hereby confirms that the Preliminary Plans and Outline Specifications and Schematic Drawings are generally consistent with the Project Requirements. Following approval of the Preliminary Plans and Outline Specifications and the Schematic Drawings for the Project, Landlord shall proceed with preparation of Design Development Drawings for the Project.

9.3.2 Design Development Drawings and Construction Drawings.

(a) Design Development Drawings and Construction Drawings. Landlord and/or the General Contractor shall cause the Architect to prepare the Design Development Drawings and the Construction Drawings and Detailed Specifications for the Project, in each case for Tenant's review and Landlord's approval. The intention of the parties is to cooperate in good faith to provide a completed design which meets all Requirements of Law and is consistent with all Project Requirements and the building quality reflected therein.

(b) Factory Mutual Engineering Plan Review. Landlord shall submit to Factory Mutual Engineering Association at its Seattle Office ("Factory Mutual") for its review, the plans for design and construction of the Project. Design Development Drawings and Construction Drawings and detailed specifications for the Project shall be submitted at the 60% and 90% design phases. All Factory Mutual recommendations shall be shared immediately with the Tenant, who shall use its best efforts to submit written comments to Landlord within ten (10) days on its receipt of such recommendations. Landlord and Tenant shall work together with Factory Mutual reasonably to incorporate such recommendations into the design of the Project.

(c) ADA Compliance. Each design and Construction Contract shall include a provision requiring that upon Substantial Completion of that portion of the work covered by that design or Construction Contract, the work and the portion of the Project so constructed shall comply with the applicable ADA requirements referenced herein.

(d) Tenant's Review. Tenant may participate in all design meetings with Landlord, Architect, and other design professionals as appropriate in the course of the development of all Construction Documents in order to facilitate the approval of such Construction Documents in accordance with the terms of this Lease. Tenant shall promptly review all Design Development Drawings or Construction Drawings and Detailed Specifications submitted in accordance with this Lease and shall give Landlord written notice within ten (10) Business Days following its receipt of the Design Development Drawings or Construction Drawings and Detailed Specifications of its approval or disapproval thereof, specifying in the case of its disapproval, its reason therefor. Tenant shall only have the right to disapprove such Design Development Drawings or Construction Drawings and Detailed Specifications which: (i) do not meet the Project Requirements; (ii) are not a consistent development of the Project Requirements in all material respects; (iii) do not comply with Requirements of Law; (iv) do not comply with previous Drawings and Specifications in all material respects; (v) would violate the terms of any Permits; (vi) would cause the Project Schedule to be adversely impacted as a result

of such proposed changes; or (vii) involve proposed changes in work or materials that would result in a material change in appearance or diminution in quality of the Project. If Tenant fails to respond within such ten (10) Business Day period, Landlord shall resubmit the Design Development Drawings and/or Construction Drawings with a cover page prominently marked SECOND NOTICE and listing the date delivered and the date by which Tenant's response is due. In addition to providing notice to the parties set forth in Section 34.7, Landlord shall also provide a copy of such information and notice to (a) Kevin Desmond, General Manager, King County Metro Transit Division, at King County Street Center, Mail Stop KSC-TR-0415, 201 S. Jackson Street, Seattle, WA 98104 and by fax at facsimile (206) 684-1778 and to (b) the King County Prosecuting Attorney, 516 Third Avenue, W 400, Seattle, WA 98104, Attention: Timothy Barnes, Senior Deputy Prosecuting Attorney and by fax at facsimile (206) 296-0191. Any delay in obtaining approval of the Design Development Drawings and/or Construction Drawings beyond the initial ten (10) Business Day period resulting solely from Tenant's failure to respond shall be treated as if it were an event of Unavoidable Delay.

(e) **Resubmittals.** If written objections or comments are submitted in writing within the time frame and in accordance with the requirements set forth in the preceding subsection, Landlord shall cause the Architect to make changes in the Design Development Drawings, the Construction Drawings and/or Detailed Specifications consistent with reasonable objections or comments made by Tenant and shall resubmit the same to Tenant in accordance with the foregoing schedule for further review. The process of resubmittal and review shall continue until the submittals have been approved by all the parties. The final Construction Drawings and Detailed Specifications setting forth in detail the requirements for the construction of the Project which have been approved by Tenant shall be the Construction Documents. There shall be no material change in the Construction Documents except as set forth in Section 9.6 below.

(f) **Permit and Construction Documents.** Landlord shall cause the Architect and other design professionals to prepare Construction Documents as required for submittal of the building permit and other permit applications in accordance with Section 9.4 hereof, and as required for construction of the Project by the Contractors.

9.4 Permits; Costs; Compliance with Legal Requirements. Landlord shall secure all Permits, licenses, permissions, consents and approvals required to be obtained from governmental agencies or third parties in connection with the Project pursuant to Requirements of Law. Landlord shall submit a building application for the Project which the City of Bellevue has determined is substantially complete on or before July 2, 2012. Tenant shall have five (5) business days to review any Permit application Landlord intends to submit. Tenant's failure to object to terms or conditions of a Permit application shall not be construed as approval of the same. Tenant shall join in, or otherwise assist Landlord with, the application for such permits or authorizations whenever such joinder is required; provided, however, Tenant shall incur no expense or liability in connection therewith. Landlord shall pursue issuance of such Permits with all due diligence. All costs associated with issuance of the Permits shall be Project Costs. Landlord anticipates issuance of the Permits by all permitting authorities and Commencement of Construction within the time set forth in the Project Schedule attached hereto as **Exhibit I**. The Project Schedule shall be updated by Landlord from time to time as reasonably required to reflect the current status of the Project. There shall be no increase in Monthly Rent, the Fixed

Price or the Option Price as a result of any delay in issuance of the Permits or commencement or completion of construction of the Project.

9.5 Construction.

9.5.1 Commencement of Construction. As soon as reasonably practical following issuance of the Permits, and satisfaction or waiver of the conditions precedent set forth in Section 6 above and the completion of construction of the temporary transit center on the Housing Land and relocation or replacement of transit commuter parking elsewhere on the Land or off-site as required pursuant to the Phasing Plan, Landlord shall cause Commencement of Construction to occur and to diligently and continuously prosecute such work to Final Completion of the Project. Landlord shall coordinate the sequencing of all construction and shall cause all other Contractors to commence construction of that portion of the work covered under their respective Construction Contracts and diligently and continuously prosecute such work to Final Completion of the Project. Landlord shall cause all work on the Project to be performed in accordance with the Garage Ground Lease, this Lease and all Requirements of Law and all directions and regulations of all governmental agencies and the representatives of such agencies having jurisdiction over the Project and/or the Premises. Landlord warrants to the Tenant that materials and equipment incorporated into the Project shall be new unless otherwise specified.

9.5.2 Substantial Completion Schedule. Landlord shall cause Substantial Completion of the Project to occur on or before the Required Completion Date in a good and workmanlike manner, free from defects in work or materials and in substantial accordance with the Contract Documents, free and clear of all liens.

9.5.3 Unavoidable Delays. The existence of Unavoidable Delays of up to twelve (12) months shall excuse General Contractor and Landlord for resulting delays and changes in the Project Schedule, and shall extend the Required Completion Date by the same amount; provided, however, that there shall not be any adjustment to the Fixed Price or the Option Price (or any increase in Monthly Rent) for additional costs resulting therefrom.

9.5.4 Guaranteed Maximum Construction Contract, Payment and Performance Bonds. As part of the Fixed Price, the Project shall be constructed pursuant to the General Construction Contract, containing the Guaranteed Maximum Construction Price, between Landlord and the General Contractor. Landlord shall provide Tenant with a copy of the General Construction Contract for Tenant's information. In addition, Tenant shall have the right to view, for its own information and to determine, prior to Landlord or General Contractor entering into any Construction Contracts for the Project that such Construction Contract is consistent with the requirements of this Lease and the Project Requirements and that the Construction Contract is consistent with the Construction Documents and the bids submitted by potential Contractors and subcontractors. Landlord shall deliver payment and performance bonds which comply with the requirements of RCW 35.42.060 issued by a surety reasonably acceptable to Tenant pursuant to which Tenant shall be named as an obligee pursuant to a rider or riders reasonably acceptable to Tenant. Landlord shall be solely responsible for payment of all Project Costs.

9.5.5 Construction Contracts. Landlord shall ensure that all Construction Contracts include recitations or provisions requiring the following:

(i) Landlord and all Contractors and subcontractors employed on the Project shall comply with the Federal Transit Administration requirements set forth on **Exhibit O** attached hereto and by this reference incorporated herein, including, but not limited to all prevailing wage requirements under the federal Davis Bacon Act, 40 U.S.C. Section 276a et seq. and regulations thereunder (“**Davis-Bacon Act**”).

(ii) All Contractors and subcontractors of every tier employed on the Project shall also pay prevailing wages to workmen, laborers and mechanics as may be determined by the Washington State Department of Labor and Industries for the particular craft in the particular geographical location. In addition, all Construction Contracts shall require the Contractor to comply with all requirements set forth in Chapter 39.12 RCW, including, but not limited to, requirements relating to statements of intent to pay prevailing wages and affidavits of wages paid. Failure to meet these requirements shall entitle Landlord and/or Tenant to seek indemnification from the Contractor for any liability incurred by Landlord and/or Tenant under Chapter 39.12 RCW or the Davis-Bacon Act. This indemnification shall survive Final Completion of the Project and the Expiration Date of this Lease.

(iii) Provisions for initiating, maintaining and providing supervision of safety precautions and programs in connection with the construction of the Project.

(iv) A statement that provides: “Notwithstanding the consent or request of Tenant, express or implied, for the performance of any labor or services or for the furnishing of any materials or equipment for any construction, alteration, addition, repair or demolition of or to the Premises (or any part thereof), Tenant shall not be liable for any labor, services, materials or equipment furnished or to be furnished to Tenant, Landlord or anyone holding an interest in the Premises (or any part thereof) through or under Tenant or Landlord, and no construction or other liens for any such labor, services, materials or equipment shall attach to or affect the interest of Tenant in the Premises.”

(v) Provisions requiring that such Contractor submit verification to Landlord and Tenant that prevailing wages have been paid on the Project including copies of all documentation required by Chapter 39.12 RCW and the Davis-Bacon Act.

(vi) Provisions requiring such Contractor to indemnify Tenant for claims arising out of the negligence or willful misconduct of such Contractor and its employees, agents and subcontractors in accordance with the provisions set forth in Section 12.1 as provided in Section 12.4.

(vii) Landlord shall require the General Contractor: (a) to include the language of this section in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for identifying the contracting parties; and (b) upon written request of either the Landlord or the Tenant via the Landlord, to promptly provide documentation to the Landlord demonstrating that the subcontractor meets the subcontractor responsibility criteria set forth below. The requirements of this section apply to all subcontractors regardless of tier. At the time of subcontract execution, the General Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:

(A) Has a certificate of registration in compliance with chapter 18.17 RCW;

(B) Has a current state Unified Business Identifier (UBI) number;

(C) If applicable, has

1) Industrial Insurance (workers' compensation) coverage for its employees working in Washington, as required in Title 51 RCW;

2) A Washington Employment Security Department number as required in Title 50 RCW;

3) A Washington Department of Revenue state excise tax registration number as required in Title 82 RCW;

4) An electrical contractor license, if required by Chapter 19.28 RCW; and an elevator contractor license, if required by Chapter 70.87 RCW.

(D) Not be disqualified from bidding on any public works contract under RCW 39.06.010 or RCW 39.12.065(3).

(viii) Landlord shall ensure that General Contractor and each subcontractor regardless of tier is aware of the following apprenticeship goals and requirements.

(A) Apprentice Utilization Goal. There shall be a minimum apprentice utilization goal of 15% for construction of the Project. This means that 15% of the labor hours for the Project shall be worked by apprentices, or that best efforts have been made to meet the apprentice utilization goal.

(B) Apprentice Utilization Plan.

1) Prior to construction Landlord shall submit an apprentice utilization plan to Tenant for approval. The plan shall include the following elements:

i. An estimate of the total contract labor hours by trade or craft to be worked by the General Contractor and all subcontractors.

ii. An estimate of the total labor hours in each trade or craft to be worked by apprentices, and the anticipated dates when the work will start.

iii. A list that contains the names of all proposed subcontractors who will perform work on the Project.

iv. A percentage rate of apprentice utilization in each trade and/or craft and an overall percentage rate of apprentice utilization that is not less than the apprentice utilization goal.

v. If the overall percentage rate of apprentice utilization is less than the apprentice utilization goal, documentation demonstrating the best efforts used by the Landlord, including its General Contractor, to achieve the apprentice utilization goal.

vi. Specific steps proposed by Landlord for having its General Contractor and all subcontractors during construction achieve the apprentice utilization goal.

2) Tenant's approval of Landlord's apprentice utilization plan shall be a contingency that must be satisfied before this Lease shall be fully binding on Tenant. Failure to timely submit and receive approval of a satisfactory plan will allow Tenant to terminate this Lease without liability to Landlord. Landlord shall perform all steps set forth in its approved plan to maximize the use of apprentices on the Project, and, to the fullest extent reasonably possible, achieve the apprentice utilization goal.

(C) Apprentice Utilization Report.

1) Landlord shall require that the General Contractor submit, on a monthly basis, an apprentice utilization report for itself and all subcontractors showing apprentice utilization for the previous month. Landlord shall provide a copy of all such reports to Tenant's designated representative.

(D) Remedies for Noncompliance.

1) **Landlord Remedies.** Landlord acknowledges and agrees that it will vigorously enforce all apprentice utilization provisions for the Project. Landlord shall specifically include language in its General Construction Contract that a failure to comply with any contract provision relating to the use of apprentices on the Project, including Landlord's approved apprentice utilization plan, shall be deemed a breach of contract for which Landlord shall be entitled to all remedies at law and equity including, without limitation, to:

i. Specific performance, and the parties specifically agree that monetary damages are insufficient to make Landlord whole and that injunctive relief is therefore an appropriate remedy; and

ii. Withhold progress payments until such time as the General Contractor achieves compliance with all contract provisions relating to the use of apprentices on the Project.

2) **Tenant Remedies.** Landlord shall promptly notify Tenant of any failure by the General Contractor to comply with any contract provision relating to the use of apprentices on the Project. Landlord shall further identify the steps it intends to take to ensure that compliance is achieved. Landlord's failure to enforce all contract provisions relating to the use of apprentices on the Project shall be deemed a breach of this Lease which if not cured within the period of time, if any, provided herein, shall give Tenant the right to exercise all remedies provided under this Lease and all remedies at law and equity including, without limitation, specific performance, and the parties specifically agree that monetary damages are insufficient to make Tenant whole and that injunctive relief is therefore an

appropriate remedy. Further, Landlord's failure to enforce any contract provision relating to the use of apprentices on the Project may be considered evidence bearing on Landlord's qualification for award of future Tenant contracts leases.

(E) Definitions

"Apprentice" means a person, including, but not limited to, women, at-risk youth, disabled persons and people of color, who has signed a written Apprenticeship Agreement with and enrolled in a training program approved by the Washington State Apprenticeship and Training Council ("SAC") to learn a skilled craft or trade as an apprentice.

"Apprentice utilization goal" means the overall percentage of labor hours established for the Project to be worked by apprentices. This goal is expressed as a percentage of the total labor hours for the Project.

"Best efforts" means taking active, good faith efforts to reasonably meet the apprentice utilization goal established for the project. Such efforts may include, but are not limited to:

i. Contacting SAC-approved program sponsors to request apprentices, and, if apprentices are available, conducting a hiring process.

ii. If apprentices are not available through SAC-approved program sponsors, contacting other recruitment/referral agencies, such as the Apprenticeship Opportunities Project and Seattle Vocational Institute and request candidates for the SAC apprenticeship program. If apprentice candidates are available through these agencies, request direct entry into the SAC-approved apprentice program and conduct a hiring process.

iii. If apprentices are not available, document all requests and obtain documentation from the SAC-approved program sponsor and other recruitment/referral agencies of that fact.

"Labor hours" means the total number of projected hours or actual hours to be worked or that have been worked by workers receiving an hourly wage who are directly employed on the Project site. Labor hours shall also include hours worked by workers employed by subcontractors on the Project. Labor hours shall not include hours worked by supervisors, professionals or clerical workers.

9.5.6 Protection of Persons and Property.

(i) Landlord shall be responsible for initiating, maintaining and providing supervision of safety precautions and programs in connection with the construction of the Project.

(ii) Landlord shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to: (1) all persons working on the Project construction site and all other persons who may be affected thereby; (2) the Project and materials and equipment to be incorporated therein; (3) transit commuters; and (4) other property at or adjacent to the Land.

(iii) Landlord shall or shall cause the General Contractor and all other Contractors to give notices and comply with all applicable laws, ordinances, rules, regulations, and orders of public authorities bearing on the safety of persons and property and their protection from damage, injury or loss.

(iv) Landlord shall be liable for all damage or loss (other than damage or loss insured under the property insurance) to the Project except to the extent caused by the negligent actions of Tenant, its agents or employees.

9.5.7 Insurance During Construction. Insurance shall be provided by Landlord, Tenant, Architect and Contractors in accordance with the provisions of Sections 13 and 14 of this Lease.

9.5.8 No Disruption of Transit Center Operations. As part of its obligations under this Lease, Landlord shall comply with the Phasing Plan and Landlord shall take all actions necessary to ensure the safety of transit commuters using Tenant's transit center and commuter parking and ensure that Tenant may continue operations of the interim transit center on the Housing Land or operation of the Transit Center on the Transit Land, as applicable, without interruption and in compliance with all applicable Laws.

9.5.9 Warranties. Landlord shall cause the General Contractor to secure for the benefit of Tenant all warranties and guarantees of the work provided by Contractors, suppliers and manufacturers of components of the Project. Upon Final Completion of the Project, Landlord shall cause the General Contractor to assign such warranties to Tenant. After Final Completion of the Project and during the Warranty Period, Landlord shall assist Tenant to enforce any warranties or guarantees with respect to the Project upon request. The General Construction Contract shall provide a warranty against defective materials and workmanship for a period of two (2) years with respect to each major component of the work following Substantial Completion of the Project.

9.5.10 Correction of Work. During the Warranty Period, Landlord shall promptly correct or cause to be corrected work which is defective or fails to conform to the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct or caused to be corrected work found to be defective or non-conforming within the Warranty Period. Such costs (to the extent not borne by insurance) shall be Project Costs and shall be paid by Landlord from its own funds.

9.5.11 Progress Reports. Landlord shall submit written monthly progress reports to Tenant including information on the General Contractor and the General Contractor's work, showing percentages of completion. Landlord shall maintain at the project site for Tenant one record copy of all Construction Documents, all drawings, specifications, addenda, Change Orders and other modifications, in good order and marked currently to record changes and selections made during construction together with approved shop drawings, product data, samples and similar required submittals. Landlord shall maintain records, in duplicate of principal building layout lines, elevations of the bottom of the footings, floor levels and key site elevations certified by a qualified surveyor or professional engineer. All such records shall be made available to the Architect and Tenant upon request and, upon completion of the Project, duplicate originals shall be delivered to Tenant.

9.5.12 Inspection by Tenant. Tenant shall have the right to inspect the on-going construction of the Project and the Contract Documents upon reasonable prior notice to Landlord. In addition, Tenant shall have the right to have an independent consulting architect, engineer or other appropriate consultant inspect the Project and the Contract Documents. Tenant's agents, employees and representatives shall comply with General Contractor's work site safety requirements in connection with such inspections.

9.5.13 Stop Work by Tenant. If General Contractor fails to correct defective work as required, or persistently fails to carry out work in accordance with the Construction Documents, Tenant, by written order, may order Landlord and General Contractor to stop the work, or any portion thereof, until the cause for such order has been eliminated.

9.5.14 Landlord Default. If Landlord defaults or neglects to carry out the work in accordance with the Contract Documents which is not cured within thirty (30) days following written notice of default under Section 24.2 and fails within seven (7) calendar days after receipt of written notice from Tenant to commence and continue correction of such default or neglect with diligence and promptness, Tenant may give a second written notice to Landlord and, if Landlord fails within such second seven (7) calendar day period to commence and continue correction of such default or neglect with diligence and promptness, then Tenant may, without prejudice to other remedies Tenant may have, act to correct such deficiencies. In such case an appropriate change order shall be issued deducting from the Fixed Price (with a corresponding reduction in Monthly Rent) the costs of correcting such deficiencies. If the payments then or thereafter due Landlord are not sufficient to cover the amount of the deduction, Landlord shall pay the difference to Tenant. Such action by the Tenant shall be without prejudice to any other rights or remedies to which Tenant may be entitled under this Lease or applicable law.

9.5.15 FTA Grant Requirements. Tenant has advised Landlord that it has secured grant funding, including Federal Transit Administration funding (the "**FTA Grant**") which Tenant intends to use in part to purchase the Garage upon Final Completion of the Project in the event Tenant exercises its option to purchase the Garage. Landlord acknowledges receipt of Federal Transit Administration rules, regulations and requirements applicable to the design, development and construction of the Project, a copy of which is attached hereto as **Exhibit O** and by this reference incorporated herein (the "**FTA Requirements**") and agrees to design, develop and construct the Project in accordance with all Requirements of Law, including the FTA Requirements. It is of critical importance to Tenant that Landlord comply with the FTA Requirements in carrying out its obligations under this Lease, and Landlord acknowledges that Tenant will be damaged by any failure by Landlord to comply with the FTA Requirements which results in Tenant's loss of the FTA Grant. Accordingly, any failure by Landlord to comply with the FTA Requirements that results in a determination by the Federal Transit Administration not to fund the FTA Grant shall constitute an Event of Default under this Lease.

9.6 Change Orders.

9.6.1 Approval of Change Orders. For purposes of this provision, a "**Landlord-Initiated Change Order**" shall be a change in the Construction Documents requested by Landlord to address value engineering opportunities or unforeseen conditions in connection with the construction of the Project. A "**Tenant-Initiated Change Order**" shall be a change in the Construction Documents requested by Tenant to add or delete features and

facilities to the Construction Documents. A Change Order can increase or decrease the costs to construct the Project.

All Change Orders must be in writing. Except as provided herein, all Change Orders shall require the mutual approval of Landlord and Tenant. However, the Tenant shall not unreasonably withhold or delay its consent to a Landlord-Initiated Change Order, provided that the proposed Change Order (i) is minor in nature and does not affect overall building appearance, safety or mechanical systems and operations, and (ii) will not result in an extension of the Required Completion Date. Landlord and Tenant anticipate that there will be field orders and Change Orders that will result in changes to the scope of work. Landlord shall use its reasonable efforts to apprise Tenant of proposed changes in the work and its recommendations regarding them prior to any action being taken. Landlord and Tenant anticipate that it may not always be possible for Landlord to receive Tenant's prior approval to these changes in a timely manner. Therefore, field orders and Change Orders may be approved by the Landlord, without prior Tenant approval, but only if the changes authorized by these field orders and Change Orders do not have the effect of extending the Required Completion Date or materially altering the work. As soon as practical, Landlord shall provide Tenant with all field orders and Change Orders approved by Landlord. For the purposes of this Section a material alteration would reduce the intended quality of the Project, result in an increase of Tenant's operational costs over time, or result in a substitution of any of the systems in the Project. In the case of either a material alteration or a change that would result in failure to achieve Final Completion of the Project by the Required Completion Date, Landlord shall obtain Tenant's prior written approval before implementing any Landlord-Initiated Change Order. All Landlord-Initiated Change Orders are part of Project Costs and shall be at Landlord's sole cost and expense.

With respect to Tenant-Initiated Change Orders, Landlord agrees not to unreasonably withhold or delay its consent to such Change Orders in an amount not to exceed \$200,000 in the aggregate, provided (i) the consent of Landlord's Construction Lender is obtained in accordance with the Construction Loan; (ii) if required, the consent of the bonding company issuing the surety or completion bond is obtained; (iii) the parties describe the maximum anticipated financial impact in a writing mutually signed; and (iv) the Required Completion Date is extended, if necessary, to reflect the time required to implement the Change Order; provided, however, that Landlord is not required to consent to a Change Order which would cause Final Completion of the Project to be delayed beyond the Closing Date unless (a) the Change Order is required to comply with FTA Requirements, or (b) Landlord and Tenant have entered into an escrow completion agreement with respect to such Change Order on terms and conditions reasonably acceptable to both parties, which approval shall not be unreasonably withheld, conditioned or delayed, with respect to the construction of the Change Order (which work may be completed following the Closing Date) and Additional Rent attributable to such Change Order shall be paid upon final completion of the work associated with such Change Order.

9.6.2 Payment of Tenant-Initiated Change Orders. All costs and expenses of Tenant-Initiated Change Orders shall be the responsibility of Tenant. Costs and expenses of Tenant-Initiated Change Orders shall include any costs and expenses of the Architect and other consultants to prepare and review the Change Order, the costs and expenses incurred by Landlord to obtain, revise or amend Permits for the Change Order, the costs and expenses to construct the Change Order, any other costs or expenses chargeable by the General Contractor under the General Construction Contract in connection with the Change Order, and if the Change

Order results in an extension of the time period for construction or an increase in the amounts of funds that Landlord must borrow, any additional construction interest incurred by Landlord under the Construction Loan for the construction of the Project.

Tenant shall be responsible for the costs and expenses of Tenant-Initiated Change Orders, and such amount shall constitute Additional Rent hereunder payable in full upon the Commencement Date of this Lease, except as otherwise expressly provided herein.

Tenant hereby authorizes Tenant's Project Manager to approve all Change Orders for and on behalf of the Tenant.

9.7 Dispute Resolution Process. Tenant and Landlord agree to follow the independent resolution process set forth in this Section 9.7 and **Exhibit K** to resolve disputes regarding preparation of the Design Development Drawings and Construction Drawings and Detailed Specifications and changes to Construction Documents in an economic and time efficient manner so that such documents conform to the requirements of this Lease, the Project Schedule is not adversely impacted, and the Project as constructed will satisfy the Project Requirements. In the event that a dispute arises between Tenant and Landlord during the design or construction of the Project regarding the adequacy of any Drawings or Specifications or the responsibility for any costs associated with any design development, addition or change (e.g., whether any design development is consistent with and reasonably inferable from the Project Requirements), the parties shall attempt to resolve such dispute as expeditiously as possible and shall cooperate so that the progress of the design and construction of the Project is not delayed. If, however, the parties are unable to resolve the dispute within ten (10) Business Days, either party may, by delivering written notice to the other, refer the matter to a dispute resolution mediator as set forth on the attached **Exhibit K**.

9.8 Completion of the Project.

9.8.1 Substantial Completion of the Project. Substantial Completion of the Project shall have occurred when the events described in Section 1.79 this Lease has occurred. Notwithstanding that Substantial Completion of the Project shall have occurred, Tenant shall be entitled to provide Landlord with a Punch List in accordance with the provisions of this Section 9.8.

9.8.2 Notice of Substantial Completion. Landlord shall give notice in writing to Tenant at least thirty (30) days prior to the date upon which Landlord anticipates that the Project shall be Substantially Complete. During the fifteen (15) day period after the delivery of the estimated completion notice, Landlord, Tenant, Architect and General Contractor shall meet on one or more occasions, if necessary and tour to inspect and review the Project, as applicable, to determine whether it is Substantially Complete. The parties shall prepare the Punch List to be completed prior to Final Completion of the Project. The completion of the Punch List shall not be required in order for the Project to be Substantially Complete.

9.8.3 Completion of Punch List Items. Following Substantial Completion, Landlord shall cause all Punch List items to be completed promptly in accordance with the Contract Documents.

9.8.4 Final Completion of the Project. Landlord shall give notice in writing at least thirty (30) days prior to the date upon which the Project shall have achieved Final Completion. Final Completion of the Project shall have occurred when all of the events set forth in Section 1.32 of this Lease has occurred and Landlord has delivered the items described in Section 9.10 of this Lease.

9.9 Landlord's Representations; Warranties. Upon Final Completion of the Project, Landlord shall represent and warrant as follows:

(a) The Project has been completed in substantial accordance with the Contract Documents (as revised by Change Orders set forth in Section 9.6) and is, and at all times during the Warranty Period shall be, free from defects in workmanship and materials in connection with the construction thereof.

(b) Landlord has no knowledge of any structural defects, latent defects or building systems defects within the Project which would adversely affect the use of the Premises for its Permitted Uses.

(c) The Project has been constructed in accordance with all Project Requirements, all Permits and all Requirements of Law in effect at the time of construction of the Project.

(d) The Project is served by water, storm and sanitary sewage facilities, telephone, electricity, fire protection and other required public utilities adequate to serve the Premises at the time of Final Completion of the Project.

(e) The General Contractor, Architect, and all Contractors, suppliers, materialmen and consultants have been paid in full for work related to construction of the Project and there are no Liens, encumbrances or other defects affecting title to the Garage Land other than Permitted Liens) which have been or will be filed against the Garage Land and/or the Premises with respect thereto, or if any such Lien has been filed, Landlord and/or General Contractor shall have arranged for a bond to remove such Lien in accordance with Section 8.2.

(f) The use and operation of the Premises for public parking is permitted pursuant to the Permits.

(g) Landlord is not aware of any physical defect in the Garage Land or the Project which would prevent Landlord from leasing the Project to Tenant for the Permitted Use.

(h) To the best of Landlord's knowledge and except as disclosed in writing, there are no condemnation, environmental, zoning or other land use regulation proceedings currently instituted which could detrimentally affect the use and operation of the Project for its Permitted Use. If during the Term of this Lease any such proceedings have been instituted, Landlord shall have used its best efforts and due diligence to resolve them prior to Final Completion of the Project.

(i) Landlord has provided Tenant with prompt notice of any special assessment proceedings affecting the Land.

(j) The Project does not encroach onto adjoining land or onto any easements and there are no encroachments of improvements from adjoining land onto the Garage Land (other than those contemplated under the terms of the Housing Easements). The location of the Project does not violate any applicable setback requirements. The Garage Land is not located in a flood zone.

(k) Except as disclosed to Tenant in writing, there is no litigation pending, or to the best knowledge of Landlord, threatened, with respect to the Project for matters undertaken by Landlord under this Lease.

(l) To the best of Landlord's knowledge, there are no Hazardous Substances located in, on, under or affecting the Garage Land or the Project. No Hazardous Substances were incorporated into the structure of the Project.

(m) Prior to Final Completion of the Project, Landlord has removed or remediated and properly disposed of all known Hazardous Substances existing on the Garage Land and discovered during the construction of the Project and if applicable, Landlord has received a no further action letter from the appropriate governmental agency with respect to such Hazardous Substances, provided the foregoing shall not make the Landlord responsible for the removal or remediation of any Hazardous Substances that Tenant is obligated to remove or remediate under the Garage Ground Lease.

(n) All Permits necessary for the construction, use and occupancy of the Project have been obtained and are in full force and effect.

Each of the foregoing warranties with respect to the Project shall expire and be of no further force or effect, unless Tenant shall have made a claim based upon an alleged breach of such warranties by Landlord on or before the expiration of the Warranty Period; however such expiration shall not otherwise limit Tenant's rights and remedies hereunder. In the event Tenant alleges a breach of any of the foregoing warranties, Tenant shall give Landlord written notice of any such allegation together with a detailed explanation of the alleged breach ("**Tenant's Warranty Claim**"). Landlord shall, within thirty (30) days of receipt of Tenant's Warranty Claim, proceed to commence to cure the circumstances specified in Tenant's Warranty Claim, or provide Tenant with written notice of Landlord's dispute of Tenant's Warranty Claim. If Landlord commences a cure or correction of the matter alleged in Tenant's Warranty Claim, Landlord shall proceed reasonably diligently and promptly to complete such cure or correction, and the Warranty Period for the particular matter shall be extended for the period necessary to complete cure or correction.

Landlord makes no warranties regarding any artist-made materials included in the Project nor those recycled construction products which Tenant has directed Landlord to include in the Project over Landlord's prior written objections.

9.10 Landlord Obligations. On or before Final Completion of the Project, Landlord shall obtain and submit to Tenant, the following:

9.10.1 As-Built Plans. A complete set of final as-built plans and specifications prepared by the General Contractor for the Project will be provided on CAD.

9.10.2 Manuals. All technical and service, instruction and procedure manuals relating to the operation and maintenance of all HVAC systems and other mechanical devices and equipment installed in the Project, except insofar as relating to Tenant's personal property.

9.10.3 Warranties. An assignment and delivery of all warranties, guarantees, maintenance contracts, and machinery and equipment warranties received by Landlord from the General Contractor or any subcontractor thereof, or any supplier, materialmen or manufacturer relating to the Project; provided, however, that so long as Landlord's warranty set forth in Section 9.9 herein remains in effect, and so long as Landlord is not in default of its obligations under this Lease, Landlord reserves the right, notwithstanding the assignment and delivery of such warranties hereunder to Tenant, to fully enforce all such warranties in the place and stead of Tenant.

9.10.4 Permits and Licenses. The originals (if not posted at the Project) of all Permits, licenses and other approvals necessary for the occupation, use and operation of the Project.

9.10.5 As-Built Survey. An as-built Survey of the Garage Land showing the location of all improvements constructed thereon.

9.11 Enforcement of Warranties. Landlord shall take all actions reasonably requested by Tenant during the Warranty Period to enforce or otherwise obtain the benefit of any warranty received from General Contractor or any other Contractors or any subcontractor thereof, or any supplier, materialman or manufacturer relating to the Project. If Landlord fails to take actions reasonably requested by Tenant to enforce or otherwise obtain the benefit of any such warranty, Landlord shall, upon written notice from Tenant, assign any such warranty to Tenant for such purposes. After expiration of any applicable warranty period, Tenant acknowledges that it shall be fully responsible for the cost of the maintenance and repair of the Premises pursuant to the terms of this Lease. Upon exercise of the Option to purchase the Premises as provided in Sections 21 and 22 of this Lease, Landlord shall cause all warranties still in effect to be assigned to Tenant.

9.12 Termination of Lease. In the event that Final Completion of the Project has not occurred for any reason whatsoever including, but not limited to Unavoidable Delays, by the Outside Completion Date of December 14, 2015, Landlord shall be in default under this Lease and Tenant shall have the right to terminate this Lease, without liability to Landlord upon sixty (60) days' prior written notice to Landlord.

9.13 No Amendment of Documents. In the event Landlord desires to amend the architect's agreement with the Architect, the General Construction Contract with the General Contractor, any Contract Document, or any other document, contract or agreement entered into in connection with the Project which would result in a material change in work or materials from those specified in the Project Requirements or which would result in a material change in appearance, diminution in quality of the Project or increase the costs of operating and maintaining the Garage following Final Completion thereof, Landlord shall submit a copy of such proposed amendment to Tenant at the addresses set forth in Section 34.7 along with a statement from the Architect delineating the nature and extent of such change and a copy of the Construction Documents (in CAD) marked to show the changes for Tenant's review and

approval, which approval shall not be unreasonably withheld. In the event Tenant notifies Landlord within ten (10) Business Days following receipt of such proposed amendment of its objection to such proposed amendment, Landlord shall not enter into the proposed amendment unless Landlord first (i) responds to the concerns expressed by Tenant and (ii) any such amendment does not materially and adversely affect the Project. If Tenant fails to respond within such ten (10) Business Day period, the change shall be deemed disapproved.

9.14 Disclaimer. Notwithstanding any other provision of this Lease to the contrary, Tenant is under no obligation to design, construct or supervise construction of the Project. It is understood and agreed that Tenant's rights to inspect the Project under this Lease are for the sole purpose of protecting its interest as tenant hereunder and as the reversionary owner of fee title to the Garage Land under the Garage Ground Lease. Tenant's approval of any plans and specifications, Construction Contracts, or service contracts for the Project shall not be construed by the Tenant as a guaranty of sufficiency of the work. Tenant's right of inspection as provided in this Lease shall not constitute any representation or warranty, express or implied, or any obligation of Tenant to insure that work or materials are in compliance with the plans and specifications or any building requirements imposed by a governmental agency. Tenant is under no obligation or duty and disclaims all responsibility to pay for the cost of construction of the Project. Tenant is not responsible to the Contractors or any subcontractors under the Construction Contracts or any other third parties for any purpose whatsoever.

9.15 No Obligation to Pay for Other Improvements Located on Garage Land Which Are Not Part of Project. The parties acknowledge that for reasons of economic efficiency, Landlord may during the course of construction of the Project, elect, at its sole cost and expense, to perform site work, install utilities (including underground storm water detention vaults) or make other improvements to the Land which are not part of the Project, but constitute a portion of the Housing Project (collectively, the "**Housing Project Improvements**"). Nothing contained in this Lease requires that Landlord construct such Housing Project Improvements. In the event that there is an Event of Default by Landlord under either (a) the Transit Center Ground Lease or the Transit Center Project Lease, or (b) the Garage Ground Lease, or this Lease and the Transit Center Ground Lease, the Transit Center Project Lease, the Garage Ground Lease and/or this Lease terminates as a result of the occurrence of such Event of Default, Landlord shall not have the right to remove any such Housing Project Improvements from the Land, nor shall Tenant have any obligation to pay Landlord for the cost of such Housing Project Improvements. If requested by Tenant, Landlord shall within five (5) Business Days thereafter and for no consideration, execute a quitclaim deed conveying such Housing Project Improvements to Tenant. Tenant shall thereafter have the right to use, sell, transfer, convey, demolish or remove such Housing Project Improvements from the Land in its sole discretion and retain all proceeds, if any, associated therewith.

10. Landlord Financing of Project; Rights of Construction Lender.

10.1 Construction Loan Restriction. Notwithstanding any provision of this Lease to the contrary, Landlord shall not have the right to mortgage, pledge, encumber or assign its rights under the Garage Ground Lease, this Lease or the Premises, in whole or in part, except to Construction Lender to secure the Construction Loan. The Construction Loan shall not exceed the Fixed Price. The Construction Loan shall not be modified, altered, revised or amended in any manner which would adversely affect the rights of Tenant under this Lease including its

Option to purchase the Premises pursuant to Sections 21 and 22 of this Lease. On or before July 2, 2012, Landlord shall provide Tenant with evidence reasonably satisfactory to Tenant that it has an executed term sheet or obtained a commitment letter for the Construction Loan which satisfies the requirements of this Lease. Landlord shall provide Tenant with executed copies of any documents executed by Landlord in favor of Construction Lender to evidence or secure the Construction Loan on or before the Conditions Precedent Satisfaction Date set forth in Section 6 of this Lease. All proceeds of the Construction Loan shall be used solely to pay for Project Costs associated with the construction of the Project and shall not be used for any other purpose or applied to any other property or project. Landlord shall not encumber the Premises as security for a loan in which the Premises is jointly secured with or cross-defaulted with any real property which is not included within the definition of the Premises or the Project.

10.2 No Fee Subordination. Tenant shall not be required to subordinate its fee interest in the Garage Land to any Deed of Trust or other Security Document.

10.3 Protection of Construction Lender. Tenant upon serving Landlord any notice or demand with respect to any breach or default by Landlord of its obligations or covenants under this Lease, shall at the same time forward a copy of such notice or demand to Construction Lender at the last address of Construction Lender shown on the records of Tenant. Tenant shall cooperate with Landlord in executing estoppel certificates in favor of Landlord's Construction Lender regarding the status of this Lease and shall provide such Construction Lender other non-confidential and reasonably available information about the status of the Project.

10.4 Construction Lender Right to Cure Defaults. Construction Lender shall have the right, but not the obligation, to remedy any Landlord default or cause the same to be remedied for a period of thirty (30) days after notice from Tenant that Landlord has failed to cure such default within the cure period, if any, provided for under this Lease (or, if such default requires more than thirty (30) days to cure, such longer period as is necessary, acting diligently, including any period reasonably necessary to foreclose the Deed of Trust and take possession of the Premises) so long as Construction Lender cures monetary defaults under the Garage Ground Lease and this Lease and continues to pay Taxes, insurance premiums and other items required to be paid by Landlord under this Lease within such thirty (30) day period and commences to cure the non-monetary defaults within such thirty (30) day period and diligently prosecutes the cure to completion. Tenant shall accept such performance by or at the instance of Construction Lender as if the same had been made by Landlord. The Construction Lender shall have the right, but not the obligation, to assume the rights, duties and obligations of Landlord under the Garage Ground Lease and this Lease and shall thereafter construct or complete the construction of the Project in accordance with the terms, covenants, conditions and provisions of this Lease. However, nothing in this Lease shall be deemed to permit or authorize Construction Lender to devote the Premises or any portion thereof to any uses, or to construct any improvements thereon, other than the construction of the Project for lease or possible purchase by Tenant as required under this Lease. Nothing contained in this Lease shall be deemed to permit or authorize Construction Lender to undertake or continue the construction or completion of the Project (beyond the extent necessary to conserve or protect such improvements or construction already made) without first having expressly assumed in writing Landlord's obligations under the Garage Ground Lease and this Lease. If Construction Lender determines to proceed with the construction of the Project, Construction Lender shall notify Tenant in writing of its election to assume the rights, duties and obligations of Landlord under the Garage Ground Lease and this

Lease within ninety (90) days following the Event of Default by Landlord and shall enter into an assumption agreement (or new lease on the same terms and conditions as the Garage Ground Lease and as this Lease) in form and substance satisfactory to Tenant with respect to the completion of the Project, and thereafter Construction Lender shall have all the rights, duties and obligations of Landlord with respect to the Project. If Construction Lender elects not to assume the Landlord's rights, duties and obligations under the Garage Ground Lease or enter into a new lease on the same terms and conditions as this Lease within the time period set forth in this Section 10.4, Tenant shall have the right to exercise its rights and remedies under Section 24.2 of this Lease in the event of a Landlord Event of Default, including its right to terminate the Garage Ground Lease, this Lease, the Transit Center Garage Lease and the Transit Center Project Lease as provided in Section 24.2(a) below.

11. Maintenance and Modification.

11.1 Maintenance and Repair. Except as otherwise expressly provided herein and except for Punch List work and Warranty claims for which Landlord is responsible and except for damage caused by the negligent acts or omissions of Landlord, its officers, employees, agents, contractors and/or subcontractors of all tiers, from and after the Commencement Date of this Lease, Tenant shall, at Tenant's sole cost and expense, maintain the Premises and appurtenances and every part thereof in good order, condition and repair and will take all action and will perform all interior and exterior, structural and non-structural, foreseen and unforeseen, ordinary and extraordinary, maintenance and repairs required to keep all parts of the Premises in good repair and condition, subject only to ordinary wear and tear and damage by fire or other casualty excepted. Except as otherwise expressly provided herein and except for Punch List items which Landlord shall complete and Warranty claims which Landlord shall cure or remedy, Landlord shall not be required to pay for the cost required to maintain all or any part of the Premises in good order, condition and repair.

11.2 Landlord's Remedies. Tenant shall diligently pursue all necessary or appropriate maintenance and repairs in accordance with its obligations under Section 11.1 hereof, but failure to do so shall not constitute an Event of Default. However, if Landlord becomes aware of needed maintenance or repairs, Landlord shall provide Tenant written notice of any maintenance or repair required to the Premises. Tenant shall have sixty (60) days after receipt of notice from Landlord detailing the need for maintenance or repair, to commence to perform such maintenance and repair, except that Tenant shall perform its obligations as soon as reasonably possible if the nature of the problem presents a hazard or emergency. If Tenant does not perform such maintenance and repair within the time limitations set forth in this Section 11.2, provided written notice has been given to Tenant as provided in this Section 11.2, Landlord may, with the prior written consent of Tenant, perform such maintenance and repair and shall, in that event, have the right to be reimbursed by Tenant for the sum it actually expends in the performance of such work invoiced as Additional Rent.

11.3 Modifications, Alterations and Additions. From and after the Commencement Date of this Lease, Tenant may, at Tenant's sole cost and expense, make modifications, alterations and additions to the Premises provided that such modifications, alterations and additions do not decrease the value of the Premises, and such modifications, alterations and additions shall be expeditiously completed in a good and workmanlike manner and in compliance with all applicable Laws and the requirements of all insurance policies required to be

maintained by Tenant, without further consent from Landlord. Landlord's warranties shall automatically terminate with respect to any element of the Project modified, altered or added to by Tenant. Landlord shall, upon reasonable notice, have access to all plans and specifications relating to alterations and modifications made by Tenant to the Premises.

11.4 Construction Liens. From and after the Commencement Date of the Lease, Tenant shall pay all costs for modifications, alterations and additions done by it or caused to be done by it on the Premises as permitted by this Lease (other than the construction of the Project) and Tenant shall keep the Premises free and clear of all construction liens resulting from modifications, alterations and additions done by or for Tenant; provided, however, Tenant shall have the right to contest the correctness or validity of any such Lien by appropriate proceedings conducted in good faith with due diligence. Within thirty (30) days following written notice from Landlord, Tenant shall discharge said Lien of record or record a bond which complies with the requirements of RCW 60.04.161 eliminating said Lien as an encumbrance against the Premises if in the reasonable exercise of Landlord's judgment the protection of the Premises or Landlord's interest therein shall require such payment. In the event Tenant shall fail to so remove any such Lien, Landlord may take such action as Landlord shall reasonably determine to remove such Lien and all costs and expenses incurred by Landlord including, without limitation, amounts paid in good faith settlement of such Lien and attorneys' fees and costs shall be paid by Tenant to Landlord. Tenant's obligations pursuant to this Section 11 shall survive the Expiration Date of this Lease.

12. Indemnity/Hold Harmless.

12.1 Landlord's Indemnification. Landlord shall protect, defend, indemnify, and save harmless Tenant and its officers, officials, employees and agents, from any and all claims, demands, suits, penalties, losses, damages, judgments, or costs of any kind whatsoever (hereinafter "claims"), arising out of or in any way resulting from acts or omissions of Landlord's officers, employees, agents, Contractors and/or subcontractors of all tiers, or the negligence, willful misconduct or breach by Landlord of its obligation under this Lease, to the maximum extent permitted by law, including RCW 4.24.115, as now enacted or as hereinafter amended.

Landlord's obligations under Section 12.1 of this Lease shall include, but not be limited to:

(a) The duty to promptly accept tender of defense and provide defense to Tenant at Landlord's own expense.

(b) The duty to indemnify and defend Tenant from any such claim, demand, and/or cause of action brought by or on behalf of any of Landlord's employees, or agents. The foregoing duty is specifically and expressly intended to constitute a waiver of Landlord's immunity under the Washington Industrial Insurance Act, RCW Title 51, as respects the Tenant only, with a full and complete indemnity and defense of claims made by Landlord's employees. The parties acknowledge that these provisions were mutually negotiated and agreed upon by them.

(c) Landlord shall indemnify and defend Tenant from and be liable for all damages and injury which shall be caused to owners of property on or in the vicinity of the construction of the Project whether or not such injury or damage is caused by negligence of the Contractor(s) or caused by the inherent nature of the work specified or which shall occur to any person or persons or property whatsoever arising out of or in any way resulting from the acts or omissions Landlord's officers, employees, agents, Contractors and/or subcontractors of all tiers, or the negligence, willful misconduct or breach by Landlord of its obligations under this Lease.

(d) In the event the Tenant incurs any judgment, award, and/or costs arising from any claim to which it is entitled to be indemnified hereunder, including attorneys' fees, to enforce the provisions of this Section 12, all such reasonable fees, expenses, and costs shall be paid by Landlord.

Notwithstanding the provisions contained in this subsection 12.1, Landlord's obligation to indemnify Tenant shall not extend to any claim, demand or cause of action to the extent caused by the negligence, willful misconduct or breach of this Lease by Tenant or its officials, officers or employees.

12.2 Tenant's Indemnification. Tenant shall protect, defend, indemnify, and save harmless Landlord and its officers, officials, employees, and agents, from any and all claims, demands, suits, penalties, losses, damages, judgments, or costs of any kind whatsoever (hereinafter "claims"), arising out of or in any way resulting from the negligence or willful misconduct of Tenant's officers, officials or employees acting within the scope of their employment or office or breach by Tenant of its obligations under this Lease, to the maximum extent permitted by law including RCW 4.24.115, as now enacted or as hereinafter amended.

Notwithstanding the previous paragraph contained in this subsection 12.2, Tenant's obligation to indemnify Landlord shall not extend to any claim, demand or cause of action to the extent caused by the negligence, willful misconduct or breach of this Lease by Landlord or its agents or employees.

12.3 Notice of Claim. Any party making a claim for indemnification pursuant to this Section 12 (an "**Indemnified Party**") must give the party from whom indemnification is sought (an "**Indemnifying Party**") written notice of such claim (an "**Indemnification Claim Notice**") promptly after the Indemnified Party receives any written notice of any action, lawsuit, proceeding, investigation or other claim (a "proceeding") against or involving the Indemnified Party by a government entity or other third party, or otherwise discovers the liability, obligation or facts giving rise to such claim for indemnification; provided that the failure to notify or delay in notifying an Indemnifying Party will not relieve the Indemnifying Party of its obligations pursuant to this Section 12 except to the extent that the Indemnifying Party's ability to defend against such claim is actually prejudiced thereby. Such notice shall contain a description of the claim and the nature and amount of such loss (to the extent that the nature and amount of such loss is known at such time).

12.4 Contractors' Indemnification. Landlord and/or the General Contractor shall include a provision in all Construction Contracts requiring the Contractors to indemnify Tenant, and its officers, officials, employees and agents on terms substantially equivalent to Landlord's

indemnification obligations contained in Section 12.1 above, including, without limitation the RCW Title 51 waiver contained in Section 12.1(b).

13. Landlord's Insurance Requirements. From and after the Effective Date of this Lease, Landlord shall, at its sole cost and expense and as part of Project Costs, procure and maintain or cause to be procured and maintained, at a minimum, the following insurance against claims for injuries to persons or damages to property which may arise from, or in connection with the performance of work hereunder by Landlord, its agents, representatives, employees and/or subcontractors. Coverage shall be at least as broad as:

13.1 General Liability. Insurance Services Office form number (CG00 01) covering Commercial General Liability, including coverage for completed operations/product liability and contractual liability, with a limit of not less than \$10,000,000 combined single limit per occurrence, \$10,000,000 aggregate. Landlord shall maintain coverage for completed operations/product liability claims as part of such Commercial General Liability policy for at least one (1) year after Final Completion of the Project.

13.2 Automobile Liability. Insurance Services Office form number (CA 00 01) covering Business Automobile Coverage, symbol 1 "any auto"; or the combination of symbols 2, 8, and 9, with a limit of not less than \$1,000,000 combined single limit per occurrence.

13.3 Workers' Compensation. Workers' Compensation coverage, as required by the Industrial Insurance Act of the State of Washington, statutory limits.

13.4 Employer's Liability or "Stop Gap". The protection provided by the Workers' Compensation Policy, Part 2 (Employer's Liability) or, in states with monopolistic state funds, the protection provided by the "Stop Gap" endorsement to the General Liability Policy in the amount of at least \$1,000,000.

13.5 Builders Risk Insurance. During the period of construction of the Project, Landlord shall also provide Insurance Services Office form number (CP 00 02 Ed. 10-90) Builders All Risk Coverage Form covering all work to be done on the Premises for the full 100% replacement cost of all such improvements (except as otherwise provided below). Coverage shall be provided for (i) the perils of earth movement and flood; (ii) resultant damage from errors in design, plans, specifications, faulty workmanship, materials and construction; (iii) "extra expense"; (iv) all materials to be stored offsite and while in transit to the jobsite; (v) "cold testing" of all building systems; (vi) Landlord and Tenant's loss of use of the Project due to delays in Project completion caused by covered peril losses to the Project, including loss of income and rents and soft costs such as interest on the Construction Loan, real estate taxes and insurance premiums; (vii) the increased cost of construction, debris removal and demolition due to the operation of building laws and code upgrades; and (viii) direct physical damage to the Project and loss of use caused by an off premises power interruption. The policy shall include a waiver of subrogation provision, shall grant permission for partial occupancy of the facilities without having a detrimental effect on the coverage provided, and shall contain a separate debris removal limit of liability which is separate from, in addition to, and not part of the overall policy limit of liability. Landlord shall have the required Builder's Risk Policy in place no later than Commencement of Construction. The Builder's Risk Policy shall include Landlord, the General Contractor and their respective subcontractors, other Contractors, and Tenant as insureds in an

amount equal to their interest with a loss payable clause in favor of Construction Lender and Tenant, as their interests may appear. Landlord shall keep the Builder's Risk Policy in place from Commencement of Construction to the Commencement Date of this Lease.

13.6 Deductibles and Self-Insured Retentions. Any deductibles or self-insured retentions must be declared to and approved by Tenant. The deductible and/or self-insured retention of the policies shall be the sole responsibility of Landlord.

13.7 Other Insurance Provisions. The insurance policies required by this Lease are to contain or be endorsed to contain the following provisions where applicable:

(a) Liability Policies:

(i) Tenant and its officers, officials, employees and agents are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of Landlord in connection with this Lease.

(ii) Landlord's insurance coverage shall be primary insurance as respects Tenant and its officers, officials, employees and agents (but not necessarily as respects the General Contractor) and shall include a severability of interests (cross liability). Any insurance and/or self-insurance maintained by Tenant, its officers, officials, employees and/agents shall not contribute with Landlord's insurance or benefit Landlord in any way.

(iii) Landlord's insurance shall apply separately to each insured against whom a claim is made and/or lawsuit is brought, except with respect to the limits of the insurer's liability.

(b) All Policies. Coverage shall not be canceled until after forty-five (45) days' (ten (10) days' for non-payment) prior written notice has been given to Tenant.

(c) Acceptability of Insurers.

(i) Unless otherwise approved by Tenant, insurance is to be placed with insurers with a Best's rating of no less than A:VIII, or, if not rated by Best's, with minimum surpluses the equivalent of Best's surplus size VIII.

(ii) If, at anytime, any of the foregoing policies shall fail to meet the above minimum standards, Landlord shall, upon notice to that effect from Tenant, promptly obtain a new policy, and shall submit the same to Tenant, with certificates and endorsements, for approval.

(d) Verification of Coverage. Each party shall furnish the other party with certificates of insurance and endorsements as required by this Lease. The certificates and endorsements for each policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements for Landlord's insurance are to be on forms approved by Tenant and are to be received and approved by the Tenant prior to the Effective Date of this Lease. Tenant reserves the right to require complete certified copies of all required policies at any time.

13.8 Contractors' Insurance. Landlord shall include a provision in the General Construction Contract requiring the General Contractor to maintain insurance coverage substantially equivalent to that required to be maintained by Landlord pursuant to Section 13.1 above, including a limit of not less than \$10,000,000 combined single limit per occurrence, \$10,000,000 aggregate; provided the General Contractor shall not be required to maintain builders risk coverage to the extent Landlord maintains builders risk insurance pursuant to Section 13.5 hereof.

13.9 For All Coverages.

(a) Each insurance policy shall be written on an "occurrence" form, excepting that insurance for professional liability, errors and omissions, when required, may be acceptable on a "claims made" form.

(b) If coverage is approved (if approval is required above) and purchased on a "claims made" basis, Landlord warrants continuation of coverage, either through policy renewals or the purchase of an extended discovery period, if such extended coverage is available, for not less than three years from the date of completion of the work which is subject to said insurance.

(c) By requiring such minimum insurance as specified herein, neither party shall be deemed to, or construed to, have assessed the risks that may be applicable to the other party to this Lease or any Contractor. Each party and each Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits or broader coverage.

(d) Nothing contained within these insurance requirements shall be deemed to limit the scope, application and/or limits of coverage afforded, which coverage will apply to each insured to the full extent provided by the terms and conditions of the policy(ies). Nothing contained within this provision shall affect and/or alter the application of any other provision contained within this Lease.

14. Tenant's Insurance Requirements.

14.1 General Liability. During the Term of this Lease, Tenant shall have the right to self-insure under Section 14.2 or, at its sole cost and expense, shall obtain and keep in force a Commercial General Liability insurance policy on an-occurrence basis insuring Tenant against claims for injuries to persons and property damage liability. "**Commercial General Liability**" insurance shall mean Insurance Services Office form number (CG00 01) with a limit of not less than \$1,000,000 combined single limit per occurrence, \$2,000,000 aggregate. Tenant agrees to add Landlord and Construction Lender as additional insureds to any Commercial General Liability insurance policy.

14.2 Self-Insurance by Tenant. Notwithstanding anything herein to the contrary, Tenant may self-insure for general liability coverage, provided that Tenant maintains at all times a program of self-insurance and provides Landlord annually with a certified actuarial statement from an independent insurance consultant or actuary that such program is in full force and effect and is actuarially sound and consistent with industry standards and prudent risk management standards. Annual evidence of Tenant's program of self-insurance shall be provided to Landlord. Tenant agrees to provide Landlord with at least thirty (30) days' prior written notice of any change in Tenant's self-insured status and will provide Landlord with a certificate of self-

insurance as adequate proof of insurance. In the event Tenant fails to satisfy the condition set forth above, Tenant shall immediately procure the Commercial General Liability insurance coverage specified in Section 14.1. If Tenant elects to self-insure as set forth in this Section, Tenant acknowledges and agrees that Landlord shall have no liability for such losses or damage which would otherwise have been covered by the general liability insurance which Tenant could have provided in accordance with Section 14.1 of this Lease, nor shall Tenant's failure to obtain commercial general liability insurance have any effect on Tenant's obligations under this Lease.

14.3 Workers' Compensation. Landlord acknowledges, agrees and understands that Tenant is self-insured for all of its workers' compensation liability exposure. Tenant agrees, at its own expense, to maintain through its self-insurance program coverage for its workers' compensation liability exposure for the duration of the Term of this Lease. Tenant agrees to provide Landlord with at least thirty (30) days' prior written notice of any change in the Tenant's self-insured status and will provide Landlord with a certificate of self-insurance as adequate proof of insurance.

14.4 Property Insurance. Following the Commencement Date of this Lease, Tenant will carry or cause to be carried fire and extended coverage property insurance covering the Premises and all of Tenant's personal property in such amounts and covering such risks as Tenant may determine from time to time. Such insurance shall be carried with financially responsible insurance companies authorized to do business in the State of Washington, and may be carried under a policy or policies covering other property owned or controlled by Tenant or may be accomplished through a program of self-insurance as provided for similarly situated facilities of Tenant. Tenant shall furnish to Landlord, on or before the effective date of any such policy, certificates of insurance or self-insurance evidencing that the insurance required by this Section 14.4 is in force and effect on the specified date and that the premiums therefor have been paid. Tenant agrees that such policies shall contain a provision that the same may not be cancelled or given notice of non-renewal nor shall the terms of conditions thereof be altered, amended or modified without at least forty-five (45) days' prior written notice being given by the insurer to Landlord (ten (10) days for nonpayment of premiums).

15. Waiver of Subrogation. Landlord and Tenant agree that neither shall make a claim against or seek recovery from the other party for any loss or damage to their property, or the property of others resulting from perils for which property insurance coverage is provided, or required to be provided hereunder (or would have been provided had Tenant not elected to self-insure) and each hereby releases the other from any such claim or liability regardless of the cause of such loss or damage. Such waiver is conditioned upon the parties' ability to enter into such a waiver and is valid only to the extent allowed by their respective insurers.

16. Interim Transit Operations and Commuter Parking.

16.1 Interim Transit Center. As part of its obligations under this Lease Landlord shall, at its sole cost and expense, relocate the existing transit center facilities to a location on the Housing Land designated by Tenant, including the installation of such lighting and signage as Tenant may request so that transit services to transit commuters utilizing Tenant's South Kirkland transit facility are not disrupted. The insurance provided by Landlord under this Lease shall include the interim transit center. Landlord shall complete the relocation of the interim

transit center operations to the Housing Land prior to Commencement of Construction of the Transit Center on the Transit Center Land or the Garage on the Garage Land.

16.2 Replacement Park and Ride Facility. Until one hundred eighty (180) days following the final completion of the Housing Project, there shall be a minimum of 603 parking stalls available for use solely by transit commuters either on the Garage Land (at the location shown on the Phasing Plan) or at a Replacement Park and Ride Facility as hereafter defined except during Phase IIB of the Phase Plan when a minimum of 546 parking stalls shall be available. If Phase IIB of the construction of the Project exceeds six (6) months, then at Tenant's election, additional transit service shall be provided for Tenant's passengers at Tenant's Houghton Park and Ride facility (if available on the terms and conditions set forth in Section 16.2(b)) and Landlord shall pay Tenant Twenty Thousand Dollars (\$20,000) a month for each month or increment thereof (until the end of that particular service change which is either 16 or 20 weeks, depending on the time of year the service change is requested) that the minimum number of parking stalls are not available until the minimum 603 parking spaces are again available for use by Tenant's passengers, plus a one-time fee of Twenty Thousand Dollars (\$20,000) to compensate Tenant for additional costs incurred by Tenant to inform transit users regarding changes in transit services and transit passenger parking.

(a) As part of its obligations under this Lease, Landlord shall obtain, at its sole cost and expense, replacement parking for the minimum number of vehicles required under the Phasing Plan which cannot be accommodated on the Land under the Phasing Plan which replacement parking shall be located within one-half (1/2) mile of the Premises and suitable for use as a park and ride lot by Persons utilizing Tenant's South Kirkland transit center which site shall be approved by Tenant, which approval shall not be unreasonably withheld, conditioned or delayed (the "**Replacement Park and Ride Facility**"). Landlord shall, at its sole cost and expense operate and maintain the Replacement Park and Ride Facility in good condition and repair and in a manner consistent with the standards prevailing at other park and ride facilities owned or operated by Tenant, including the installation of lighting and signage as Tenant may reasonably request. The insurance provided by Landlord under this Lease shall include the Replacement Park and Ride Facility. Landlord shall provide Tenant with a copy of the lease for the Replacement Park and Ride Facility on or before the Initial Conditions Precedent Satisfaction Date and in any event prior to Commencement of Construction of the Transit Center on the Transit Center Land or the Garage on the Garage Land. Landlord shall assign its interest in each such lease to Tenant as additional security for the performance of its obligations under this Lease pursuant to the Assignment of Lease for Security Purposes attached hereto as **Exhibit P**.

(b) If Landlord is unable to obtain a Replacement Park and Ride Facility acceptable to Tenant to satisfy this requirement or if any lease of a Replacement Park and Ride Facility is terminated and Landlord is unable to provide replacement parking stalls available for use by transit commuters to satisfy the minimum parking stall requirement set forth under Section 16.2 above within thirty (30) days of such termination, then in addition to all other remedies available at law or equity Tenant shall have the right to increase transit service at Tenant's Houghton Park and Ride facility (if sufficient parking stalls are available to replace the shortfall in parking stalls available at the South Kirkland Park and Ride facility). Landlord shall reimburse Tenant for the cost of such replacement service at the rate of Twenty Thousand Dollars (\$20,000.00) per month or increment thereof with a minimum duration for such increased transit service for that specific service change (either 16 or 20 weeks, depending on the

time of year the service change is requested) until the minimum number of parking stalls required under Section 16.2 are available for transit passenger use, plus a one-time fee of Twenty Thousand Dollars (\$20,000.00) to compensate Tenant for additional costs incurred by Tenant to inform users regarding changes in transit services and transit passenger parking. Landlord shall reimburse Tenant for the amount of such increased transit service on or before the tenth (10th) day of the following month and any failure by Landlord to reimburse Tenant for such increased transit service shall constitute an Event of Default by Landlord under this Lease. Landlord shall provide Tenant with copies of all notices of default it receives from the landlord under each lease of a Replacement Park and Ride Facility on the same day Landlord receives such notice and shall promptly advise Tenant of the termination of a lease of a Park and Ride Replacement Facility for any reason. Tenant shall have the right to treat a lease for a Replacement Park and Ride Facility terminated for purposes of this Lease if, in the reasonable exercise of Tenant's business judgment, either (a) vandalism to transit commuter vehicles or crimes reported by transit commuters is in excess of crime statistics reported at similar park and ride facilities operated by Tenant in Kirkland and Bellevue or (b) there is towing of vehicles owned by Tenant's passengers from such Replacement Park and Ride Facility before 7 p.m. on days when the transit center at the South Kirkland Park and Ride facility is operating.

17. Damage, Destruction and Condemnation Prior to the Commencement Date of this Lease.

17.1 Damage and Destruction. After the happening of any casualty to the Project prior to Final Completion of the Project, Landlord shall give Tenant prompt written notice thereof generally describing the nature and cause of such casualty and the extent of the damage or destruction to the Project. If, prior to the Final Completion of the Project, damage or destruction occurs to the Project, Landlord shall proceed diligently to reconstruct and restore the Project in accordance with the Contract Documents and the provisions of this Lease. Landlord will assign all insurance proceeds which Landlord may be entitled to receive prior to Final Completion of Project with respect to damage or destruction to the Construction Lender if so required by the Construction Lender, or a third party insurance trustee mutually acceptable to Landlord and Tenant and such insurance proceeds shall be disbursed to Landlord to pay for the cost of restoration or repair in periodic installments based upon the percentage of completion and otherwise in accordance with standard commercial construction loan administration. All costs of such repair or restoration of the Project exceeding the amount of the insurance proceeds shall be paid by Landlord.

17.2 Condemnation. In the event of a partial condemnation of the Project prior to the Final Completion of the Project to the extent that the Project may still be constructed in accordance with the Contract Documents, or may be constructed in accordance with the Contract Documents as modified by changes acceptable to Landlord and (including any adjustment in Monthly Rent and the Fixed Price as a result of a change in the Project) Tenant, Landlord shall proceed diligently to construct the Project in accordance with the Contract Documents, as modified, if applicable. Any such partial condemnation proceeds shall be deposited with Construction Lender or third party insurance trustee mutually acceptable to Landlord and Tenant and disbursed in accordance with the provisions of Section 17.1 above. In the event of a condemnation of all of the Project or so much thereof that the Project may no longer be constructed in accordance with the Contract Documents, this Lease shall terminate, Landlord shall be paid from the condemnation award for all Project Costs incurred as of the date of such

condemnation (including costs that Landlord is obligated to pay third parties as of that date), and the parties shall have no further obligations hereunder. After Landlord has been paid in accordance with the foregoing sentence, all remaining condemnation proceeds shall be paid to Tenant.

18. Damage and Destruction After Commencement Date of this Lease. In the event the Premises are damaged or destroyed by fire or other casualty after the Commencement Date of this Lease, this Lease shall not terminate nor shall there be any abatement of the Monthly Rent otherwise payable by Tenant hereunder. If such damage or destruction occurs after the Commencement Date of this Lease, then within ninety (90) days following such damage or destruction, Tenant shall notify Landlord of its election to either exercise its Option to purchase the Premises or to rebuild the Premises. In the event Tenant elects to rebuild the Premises, there shall be no abatement of Monthly Rent otherwise payable by Tenant hereunder. Landlord shall have no obligation to repair, rebuild or restore any portion of the Premises damaged by any casualty after the Commencement Date of this Lease. Tenant shall use such portion of the insurance proceeds as may be necessary to repair, rebuild or restore all or any portion of the Premises that may have been damaged or destroyed as nearly as practicable in full compliance with all Requirements of Law and to the same condition, character and at least equal value and utility to that existing prior to such damage or destruction. If the insurance proceeds are insufficient to pay in full the cost of any repair, restoration, modification, or improvement of any component of the Premises, Tenant may, subject to appropriation of sufficient funds, complete the work and pay any costs in excess of the amount of the insurance proceeds. Tenant shall not be entitled to any reimbursement therefor from Landlord nor shall Tenant be entitled to any diminution of any Monthly Rent otherwise payable hereunder.

19. Condemnation After the Commencement Date of this Lease.

19.1 Total Condemnation. If there is a taking or damaging of all or any portion of the Premises by the exercise of any governmental power, whether by legal proceedings or otherwise, by a governmental agency with jurisdiction over the Premises or a transfer by Landlord either under threat of condemnation or while legal proceedings for condemnation are pending (a "Condemnation") such that there can be no reasonable use of the Premises by Tenant, as reasonably determined by Tenant, this Lease shall terminate on the date the condemning authority has the right to possession of the property being condemned (the "Condemnation Date") and all Rent and other payments shall be apportioned as of the Condemnation Date. The award with respect to a taking of the Premises shall be divided between Landlord and Tenant as follows:

(a) If the Condemnation occurs prior to the Commencement Date Landlord shall be paid from the condemnation award for all Project Costs incurred as of the Condemnation Date and the balance of the condemnation award shall be paid to Tenant.

(b) If the Condemnation Date occurs after the Commencement Date, then the condemnation award shall be divided between Landlord and Tenant as follows: (i) Landlord shall be paid an amount up to but not in excess of the Cash Option Price, and (ii) the balance, if any, shall be paid to Tenant.

(c) If the Deed of Trust is outstanding as of the date of Condemnation, any amounts outstanding under the Construction Loan shall be charged against Landlord's share and shall be paid to the Construction Lender to the extent of the unpaid balance, if any of the Construction Loan secured by the Deed of Trust. If Certificates have been issued as of the date of Condemnation, the Condemnation proceeds shall be paid first to the Trustee in an amount sufficient to prepay in full all Certificates outstanding as of the date of Condemnation and the balance if any shall be paid to Tenant.

(d) If the Condemnation occurs prior to the Commencement Date, Tenant shall have no obligation to convey the Housing Land or the Housing Easements to Landlord. If the Condemnation occurs after the Commencement Date, Tenant shall be deemed to have exercised the Option and Tenant shall convey the Housing Land and the Housing Easements to Landlord on the terms set forth in this Lease; provided, however, that the Closing Date shall be the Condemnation Date.

(e) Except as provided under Section 17.2 and Section 19.1 above, a Condemnation of the Housing Land and/or the Housing Easements shall have no effect on the rights, duties and obligations of the parties under this Lease and neither party shall have any right to terminate its obligations under this Lease. If Final Completion of the Project occurs after the Condemnation Landlord shall be entitled to the condemnation award payable for the taking of the Housing Land and the Housing Easements in satisfaction of Tenant's obligation to convey the Housing Land and the Housing Easements in part payment of the Option Price.

19.2 Partial Condemnation. If there is a partial taking of the Premises by Condemnation after the Final Completion of the Project, and Tenant determines that a reasonable use can be made of the Premises, then the condemnation proceeds shall be paid to Tenant and Landlord shall have no obligation to restore the Premises unless otherwise agreed upon by Landlord and Tenant. In no event shall this Lease terminate as a result of a partial taking nor shall there be any abatement of Monthly Rent otherwise payable by Tenant hereunder.

20. Prohibition Against Transfer of Interest in Landlord; Assignment of Project; Subletting.

20.1 Prohibition Against Transfers of Interest in Landlord or Assignment of Lease by Landlord. Landlord acknowledges that Tenant is relying upon the personal knowledge and expertise and experience of Gary Young, a principal in KTOD Developer, L.L.C., and Eric Evans, Director of Housing Development of Imagine Housing, the sole member of South KTOD Development LLC, the two members of Landlord, in entering into this Lease. Prior to Final Completion of the Project, neither Landlord nor any member or manager of Landlord shall (a) sell, transfer, convey or assign a Controlling Interest in Landlord or any member or manager of Landlord, (b) admit additional or substitute members in Landlord or any member or manager of Landlord which result in a change in Controlling Interest of Landlord or any member or manager, or (c) change or transfer ownership interests in Landlord or any member or manager of Landlord which result in a change in Controlling Interest of Landlord or any member or manager (except in accordance with the Approved Financing Plan) without the prior written consent of Tenant, which may be withheld by Tenant in its sole and absolute discretion. Landlord shall not assign, transfer or encumber its interest in the Garage Ground Lease, this Lease or in the Premises (except to Construction Lender) or sublease the Premises in

whole or in part without the prior written consent of Tenant, which consent may be withheld by Tenant in its sole and absolute discretion. Any request by Landlord for such consent shall be in writing which shall set forth the details as to the proposed assignment, mortgage or subletting and have annexed thereto a copy of the proposed mortgage, assignment or sublease. Except as otherwise expressly provided herein, any attempted assignment or transfer of this Lease, mortgage or encumbrance of the Premises (except to Construction Lender in accordance with the Approved Financing Plan) or subletting of the Premises without Tenant's consent shall be void and shall constitute a breach of the Garage Ground Lease and this Lease. As used in this Section 20.1, a "transfer" includes any sale, transfer, conveyance, assignment, mortgage, pledge or other disposition of a Controlling Interest in Landlord or any member or manager of Landlord, whether voluntary or involuntary, by operation of law or otherwise, including transfers in bankruptcy or appointment of a receiver or assignee for the benefit or creditors or any merger, consolidation, liquidation or dissolution of Landlord or any member or manager of Landlord. Any transfer of Landlord's interest in the Garage Ground Lease, this Lease or in the Premises as a result of merger, consolidation or liquidation which is not expressly approved in writing by Tenant shall be deemed to be a prohibited assignment within the meaning of this Section.

20.2 Assignment or Sublease by Tenant. Tenant may not assign its interest in this Lease or sublease the Premises or any portion thereof; without the prior written consent of Landlord which consent shall not be unreasonably withheld, provided that Landlord determines in the reasonable exercise of its business judgment that any such proposed assignment or sublease will not adversely affect (a) the ability of Tenant to perform any of its obligations hereunder, or (b) Tenant's ability to either (i) obtain the FTA Grant, or (ii) cause the Certificates to be issued as provided in Section 4.4 above. Any such assignment or sublease by Tenant as provided for in this Section 20 shall be in writing and shall require such assignee or sublessee to comply fully with the terms of this Lease. Tenant shall provide Landlord with written notice of any such assignment or sublease and a copy of any such assignment or sublease documentation.

21. Options To Prepay Monthly Rent And Purchase Premises.

21.1 Option to Purchase. Provided that Tenant is not in default under this Lease (including payment of any Additional Rent then due and owing), Tenant shall have the option to purchase the Premises and thereby terminate this Lease at any time on or after Substantial Completion of the Project by giving notice of its election to exercise its option and paying the Option Price as stated in this Section 21.1. The Option Price shall be an amount equal to the Fixed Price less the amount of all Monthly Rent payments made under this Lease to the date of Closing, plus an option exercise fee of one dollar (\$1.00).

21.2 Exercise of Option. Tenant shall give Landlord not less than fifteen (15) days' prior written notice of its election to exercise its option to purchase under Section 21.1 hereof. The Notice of Exercise of Option to Purchase the Premises shall be in the form attached hereto as **Exhibit L** and by this reference incorporated herein. The Option Price shall be paid from the following sources: (a) crediting the value of the Housing Land and the Housing Easements which shall be conveyed to Landlord simultaneous with closing of the purchase of the Garage, and (b) the Cash Option Price of Six Million Four Hundred Fifty Thousand Dollars (\$6,450,000) which shall be paid from the FTA Grant. The Cash Option Price shall be paid in cash or immediately available funds on the date specified in such notice (or such other date as Tenant and Landlord may mutually agree); provided, however, that in no event shall Closing occur prior

to Final Completion of the Project. Nothing herein shall be construed to require Tenant to exercise the purchase option herein granted.

21.3 Conveyance of Premises. If Tenant has exercised the Option, then at Closing, Landlord shall convey to Tenant marketable and insurable fee simple title to the Premises, by execution and delivery of a Bargain and Sale Deed to the Garage in a form reasonably acceptable to Tenant (the “**Deed**”) and assignment to Tenant of all of Landlord’s right, title and interest in the Garage Land under the Garage Ground Lease and this Lease. Evidence of delivery of marketable and insurable fee simple title to the Premises shall be the issuance by the Title Company of an ALTA extended coverage Owner’s Policy of Title Insurance (ALTA 6-17-2006) with liability in the amount of the Option Price or any lesser sum as may be approved by Tenant, in Tenant’s sole discretion (the “**Title Policy**”) insuring fee simple title to the Premises in Tenant, subject only to (i) liens and encumbrances approved by Tenant; (ii) other exceptions created or suffered by Landlord following the Effective Date that have been approved by Tenant in writing; (iii) utility easements granted by Landlord following the Effective Date required for the use of the Premises as a public parking facility; (iv) any liens, encumbrances or defects created or incurred by Tenant after the Effective Date (collectively items (i) through (iv) are the “**Permitted Exceptions**”). The Title Policy shall include such endorsements as Tenant may reasonably request. The indemnification of the Title Company by Landlord, or the General Contractor to induce the Title Company to insure over any otherwise unpermitted exceptions to title shall not be allowed except with the prior written consent of Tenant in its sole discretion after full disclosure to Tenant of the nature and substance of the unpermitted exception and the nature of the indemnity. The Title Policy shall provide full coverage against construction liens arising out of the construction of the Garage on the Garage Land.

21.4 Title to Personal Property and Intangible Property. At the Closing, Landlord shall transfer title to any personal property included as part of the Project free and clear of all liens and encumbrances whatsoever except such liens and encumbrances as Tenant may approve in writing by execution and delivery of a warranty bill of sale in a form reasonably acceptable to Tenant. Landlord shall execute and deliver to Tenant any documents that Tenant may reasonably request in order to transfer to Tenant any intangible personal property included in the Project.

21.5 Conveyance of Housing Land and Housing Easements. As part payment of the Option Price at Closing Tenant shall convey the Housing Land by quit claim deed (the “**Housing Land Deed**”) and the Housing Easements pursuant to the South Kirkland T.O.D. Easements Agreement in the form attached hereto as **Exhibit G** and shall quitclaim its interest in any Housing Project Improvements installed within the real property subject to the Housing Easements. Tenant shall not mortgage or encumber all or any portion of the Housing Land, or permit a Tenant Lien to be recorded against the Housing Land except as expressly provided herein and except for those mortgages or encumbrances or Tenant Liens as shall be released from the Housing Land as of the Closing Date. The parties agree that the fair market value of the Housing Land and the Housing Easements is Ten Million Dollars (\$10,000,000) which shall be credited against the Option Price upon Closing.

22. Closing of Purchase of Garage, Housing Land and the Housing Easements.

22.1 Closing Procedures.

(a) The Closing shall be held at the offices of Escrow Agent. The Closing Date shall be on the later of (i) fifteen (15) days following exercise of the Option, or (ii) the Final Completion of the Project. Such date may not be extended without the written approval of Landlord and Tenant except as otherwise expressly provided in this Lease. All documents shall be deemed delivered on the date the Deed, the Housing Land Deed and the Housing Easements are recorded.

(b) In the event the Closing does not occur on or before the Closing Date, Escrow Agent shall, unless it is notified by both parties to the contrary within five (5) days after the Closing Date, return to the depositor thereof items which may have been deposited hereunder. Any such return shall not, however, relieve either party hereto of any liability it may have for its wrongful failure to close.

22.2 Delivery by Landlord. On or prior to the Closing Date, Landlord shall deposit with Escrow Agent, and shall deliver copies to Tenant to the extent not previously delivered prior to the Closing, the following:

(a) Landlord shall execute and deliver to Tenant a good and sufficient Bargain and Sale Deed to the Premises in recordable form conveying good and marketable fee simple title free to the Garage and all of Landlord's right, title and interest to the Garage Land under the Garage Ground Lease and this Lease and clear of all liens and encumbrances, except for the Permitted Encumbrances, and all easements and rights appurtenant thereto together with a duly executed real estate excise tax affidavit;

(b) A certificate from the Department of Licensing of the State of Washington, the Title Company or a written search result from a Uniform Commercial Code reporting service indicating that, as of a date not more than five (5) business days prior to the Closing Date there are no filings against Landlord in the office of the Uniform Commercial Code division of the Department of Licensing which would be a lien on any of the Premises (other than such filings, if any, as are being released at Closing);

(c) Landlord shall furnish to Tenant, at Tenant's sole cost and expense, the Title Policy;

(d) Landlord shall deliver to Tenant the originals of all Permits, licenses, and approvals necessary for the occupation, use and operation of the Premises, including, without limitation, the building permits and the Certificate of Occupancy. In the event the original is required to be posted on the Premises, delivery of a duplicate shall be permitted;

(e) Landlord shall deliver to Tenant the originals of all warranties and guarantees of contractors, subcontractors, suppliers and materialmen received by Landlord in connection with the construction or installation of the Project and the acquisition of any equipment and personal property. Landlord shall deliver to Tenant a written assignment of such warranties and guarantees, in a form reasonably acceptable to Tenant and its counsel (hereinafter the "Assignment of Warranties");

(f) Landlord shall deliver to Tenant, at Landlord's expense, a complete set of final engineering plans and specifications for the Garage;

(g) Landlord shall provide, at its expense, an ALTA "as built" survey of the Premises showing all encumbrances, liens and/or defects affecting the Premises after construction of the Project and prior to Closing;

(h) Landlord shall provide a complete inventory of, and shall transfer to Tenant its interest in, any and all personal property required pursuant to Construction Documents, if any, to be located on the Premises, by warranty bill of sale in a form reasonably acceptable to Tenant and its counsel. The cost of such personal property being transferred is included in the Option Price;

(i) Landlord shall transfer to Tenant its interest in those service contracts approved by Tenant by execution and delivery of an assignment of any service contracts;

(j) Affidavit executed by Landlord which satisfies the requirements of Section 1445 of the United States Internal Revenue Code regarding foreign investors;

(k) Any reconveyance documents required to eliminate of record the Construction Loan, the Deed of Trust and any other Security Documents which are a Lien on the Garage Land and any affidavit required to eliminate the Title Company exception for construction liens and the rights of parties in possession;

(l) Confirmation of warranties made by Landlord in this Lease;

(m) Copies of books and records of Landlord which Tenant would require to operate and maintain the Garage (including applicable maintenance records), together with keys to all entrance doors to equipment and utility rooms located in the Garage, which keys shall be properly tagged for identification;

(n) Such resolutions, authorizations, certificates or other limited liability documents or agreements relating to Landlord or as shall be reasonably required by Tenant or the Title Company in connection with this transaction;

(o) Landlord shall duly execute (and acknowledge if appropriate) such other documents as reasonably necessary to effectuate this transaction; and Landlord shall deliver to Tenant all other documents required to be delivered at or prior to the Closing pursuant to the terms of this Lease.

22.3 Delivery by Tenant. On or before the Closing Date, Tenant shall deposit with Escrow Agent the Cash Option Price (less any adjustments authorized under this Lease) and shall deposit the following:

(a) Assignment of any service contracts duly accepted by Tenant;

(b) Such resolutions, authorizations, certificates or other ordinances or agreements relating to Tenant or as shall be reasonably required by Landlord or the Title Company in connection with this transaction;

(c) Tenant shall duly execute (and acknowledge if appropriate) such other documents reasonably necessary to effectuate this transaction; and Tenant shall deliver to Landlord all other documents required to be delivered by Tenant at or prior to the Closing pursuant to this Lease.

22.4 Delivery of Housing Land Documents. On or prior to the Closing Date Landlord and Tenant shall deposit the following documents relating to the Housing Land:

(a) The Housing Land Deed duly executed and acknowledged by Tenant and accepted by Landlord conveying all of Tenant's interest in the Housing Land to Landlord, together with a duly executed real estate excise tax affidavit;

(b) The Housing Easements duly executed and acknowledged by Landlord and Tenant;

(c) The Housing Covenants duly executed and acknowledged by King County, Landlord and the developers of the Market Rate Housing Community and Affordable Housing Community if a person other than Landlord; and

(d) Affidavit executed by Tenant which satisfies the requirements of Section 1445 of the United States Internal Revenue Code regarding foreign investors.

22.5 Pro-rations. All revenue and all expenses of the Premises and the Housing Land (other than real and personal property taxes), including, but not limited to rents, water, sewer and utility charges, amounts payable under service contracts which are to be assumed by Tenant, annual permits and/or inspection fees (calculated on the basis of the respective periods covered thereby) and other expenses normal to the ownership, use, operation and maintenance of the Housing Land and the Premises to the extent not otherwise payable by Tenant under this Lease shall be prorated as of the Closing Date. Because Tenant is exempt from property tax, no prorations of real and personal property taxes will be required, but Landlord shall pay all real and personal property taxes for the Premises for the period up to and including the Closing Date, and shall pay all real and personal property taxes for the Housing Land and the Housing Easements, if any, from and after the Closing Date.

22.6 Costs and Expenses. Tenant shall pay the premium for the Title Policy and all real estate excise taxes. Tenant shall pay the cost to record the Deed and any sales or use tax payable in connection with any personal property included as part of the Garage. Landlord shall pay the cost to record the Housing Land Deed, the Housing Easements and the Housing Covenants, the cost of any title insurance if elects to obtain, all costs associated with its financing and the fees and expenses of its consultants and attorneys. The escrow fees shall be borne equally by Landlord and Tenant.

22.7 Recordation. Provided that Escrow Agent has not received prior written notice from either party than an agreement of either party made hereunder has not been performed, or to the effect that any condition set forth herein has not been fulfilled, and further provided that Title Company has issued or is unconditionally prepared and committed to issue to Tenant the Title Policy, then Escrow Agent is authorized and instructed at 8:00 a.m. (or as soon thereafter as possible) on the Closing Date pursuant to joint escrow instructions to be executed by Tenant and Landlord to:

(a) (i) Record the Deed and the assignment of Landlord's interest in the Garage Land under the Garage Ground Lease and this Lease, (ii) the Housing Land Deed, (iii) the Housing Easements, and (iv) the Housing Covenants in the real property records of King County, Washington. The Housing Covenants shall be recorded in a first lien position on the Housing Land and Housing Easements and prior to financing obtained by Landlord or the housing developers to develop the Market Rate Housing Community or the Affordable Housing Community on the Housing Land;

(b) Assemble and deliver at least one fully executed counterpart of the assignment of service contracts to both Tenant and Landlord;

(c) Deliver all documents described in Section 22.2 to Tenant; and record any reconveyancing documents delivered by Landlord pursuant to Section 22.2(k) hereof.

23. Default by Tenant. The occurrence of any of the following shall constitute an Event of Default by Tenant under this Lease:

23.1 Payment. Failure (a) to make any Monthly Rent payments due under this Lease if the failure to pay is not cured within seven (7) days after written notice of such failure has been given by Landlord to Tenant, or (b) failure to make any other payment required if the failure to pay is not cured within ten (10) days after written notice of such failure has been given by Landlord to Tenant.

23.2 Other Failure to Perform. Failure to perform any other provision of this Lease if the failure to perform is not cured within thirty (30) days after written notice of such default has been given by Landlord to Tenant. If the default cannot reasonably be cured within thirty (30) days, then Tenant shall not be in default under this Lease if Tenant commences to cure the default within thirty (30) days and diligently and in good faith continues to prosecute such cure to completion.

23.3 Late Charges; Interest on Past Due Monthly Rent. Tenant acknowledges that a late payment of Monthly Rent hereunder will cause Landlord to incur costs not contemplated by this Lease, the exact amount of which is difficult to ascertain. Therefore, in the event Tenant shall fail to pay any installment of Monthly Rent due hereunder for fifteen (15) days after the date such amount is due, Tenant shall also pay Landlord a late charge equal to two percent (2%) of the amount then owing and past due together with interest on such past due amount at an interest rate of twelve percent (12%) per annum commencing ten (10) days after the date such amount is due until paid. Payment of such late charges and/or default interest shall not excuse or cure any default by Tenant under this Lease.

23.4 Remedies for Tenant Default.

(a) If Tenant commits a default under Section 23 above and fails to cure such default within the time period provided therein, then Landlord, by providing Tenant with ten (10) days' advance written notice, may cancel and terminate this Lease, evict the Tenant and re-enter the Premises, but notwithstanding such re-entry by Landlord, Tenant covenants and agrees to make good to Landlord any deficiency arising from a re-entry and reletting of the Premises at a lesser monthly rent than the Monthly Rent agreed to be paid by Tenant through the Term of this Lease, provided Landlord has taken all commercially reasonable measures to ensure that a

maximum rental rate was obtained for reletting. Landlord shall provide notice to Tenant of any amount by which rentals from such reletting are less than the Monthly Rent and the due dates of such Monthly Rent. The deficiency amount for each such Monthly Rent payment shall be paid by Tenant on or before the due date for such Monthly Rent payment. The remedies set forth in this Section 23.4(a) are the sole and exclusive remedy available to Landlord for Tenant's default and Landlord waives all other remedies available at law or equity for Tenant's default.

(b) If Tenant exercises the Option and thereafter fails without legal excuse to close the purchase of the Garage which failure is not cured within thirty (30) Business Days after written notice from Landlord to Tenant, and provided there is no default by Landlord and no event that with the giving of notice the passage of time; or both, would constitute an event of default by Landlord, Landlord shall have the right to demand and have specific performance of this Agreement as to the Cash Option Price or to cause the issuance of Certificates as provided in Section 4.4 of this Agreement and the right to demand and have specific performance of Tenant's obligation to convey the Housing Land and the Housing Easements to Landlord in payment of the balance of the Option Price as Landlord's sole and exclusive remedy for such failure. In no event shall Landlord have the right to terminate this Agreement or to recover damages resulting from any such failure.

24. Default by Landlord.

24.1 Events of Default by Landlord. The occurrence of any of the following shall constitute an Event of Default by Landlord under this Lease:

(a) If Landlord shall fail to perform any material obligation under the Garage Ground Lease or this Lease; or

(b) If Landlord has abandoned construction of the Project for a period of twenty (20) consecutive days (except for Unavoidable Delay); or

(c) If any permit required for construction of the Project shall be revoked or canceled; or

(d) If Landlord shall have assigned, delegated, pledged or encumbered its rights, duties or obligations under this Lease in violation of this Lease; or

(e) If Landlord has not Commenced Construction of the Project on or before December 1, 2012 except for Unavoidable Delay in achieving Final Completion of the Transit Center (as defined in the Transit Center Project Lease); or

(f) If Landlord persistently disregards and fails to comply with Laws, ordinances, rules, regulations or orders of a governmental authority having jurisdiction over the Project; or

(g) If there shall occur any Lien or other encumbrance on the Land, the Premises or the Project caused by Landlord or General Contractor (other than the Permitted Liens) which is not bonded and removed in accordance with Section 8 above; or

(h) If there shall have occurred defective workmanship or materials within the Project which is not cured within the time period provided under this Lease; or

(i) If Final Completion of the Garage has not occurred for any reason except for Unavoidable Delay, on or before December 14, 2014; or

(j) If Final Completion of the Project has not occurred for any reason whatsoever including Unavoidable Delay on or before the Outside Completion Date; or

(k) If there is any default by Landlord under a lease of the Replacement Park and Ride Facility which is not cured within the period of time, if any, provided for cure under any such lease or if at any time prior to one hundred eighty (180) days following the final completion of the Housing Project there are less than 603 parking spaces (or during Phase IIB of the Phasing Plan only, less than 546 parking spaces) available on the Land or at one or more Replacement Park and Ride Facilities for Persons using Tenant's south Kirkland transit center which default is not cured within the period of time provided in Section 16.2 above; or

(l) If Landlord shall file a voluntary petition in bankruptcy or shall be adjudicated a bankrupt or insolvent or shall file any petition or answer seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under the present or any future federal bankruptcy code or any other present or future applicable federal, state or other statute or law, or shall seek or consent to or acquiesce in the appointment of any trustee, receiver or liquidator of Landlord or of all or any substantial part of its properties or of the Premises, or within 60 days after the commencement of any proceeding against Landlord seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under the present or any future federal bankruptcy act or any other present or future applicable federal, state or other statute or law, such proceeding shall not have been dismissed or if, within 60 days after the appointment, without the consent or acquiescence of Landlord, of any trustee, receiver or liquidator of Landlord or of all or any substantial part or either of its properties or of the Premises, such appointment shall not have been vacated or stayed on appeal or otherwise, or if, within 60 days after the expiration of any such stay, such appointment shall not have been vacated; or

(m) If there is any default by Landlord under the Transit Center Ground Lease or the Transit Center Project Lease which is not cured within the period of time, if any, provided for cure under the Transit Center Ground Lease or the Transit Center Project Lease.

24.2 Tenant Remedies upon Landlord Event of Default. Upon any Event of Default by Landlord, Tenant shall give Landlord written notice of same, whereupon following receipt of such written notice, Landlord shall have thirty (30) days within which to commence all necessary action to cure such Event of Default; provided, however, that if such Event of Default is not a monetary Event of Default and by reason of the nature of such default, such default cannot with due diligence be cured within such thirty (30) day period, Landlord shall not be in default if Landlord commences such cure within thirty (30) days and diligently prosecutes such cure to completion, except with respect to Events of Default under Sections 24.1(b), 24.1(c) or 24.1(f), for which the cure period shall be ten (10) Business Days or Sections 24.1(e), 24.1(k), 24.1(l) or 24.1(m) for which no cure period exists beyond the time period stated herein; provided, however that there shall be no cure period for failure of Landlord to achieve Final Completion of the

Project on or before the date set forth in Section 24.1(j). In the event Landlord fails to cure such Event of Default within the time period set forth above, Tenant shall be entitled to exercise any one or more of the following remedies:

(a) Terminate the Garage Ground Lease this Lease, the Transit Center Ground Lease and/or the Transit Center Project Lease without liability to Landlord upon ten (10) days written notice; or

(b) Bring an action for damages which damages shall include all costs and expenses incurred by Tenant in leasing, operating and maintaining 603 parking stalls (or 546 parking stalls during Phase IIB of the Phasing Plan) for use as an interim park and ride facility or providing increased transit services as provided in Section 16.2 above if an Event of Default occurs under Section 24.1(k) above; or

(c) In the event Landlord fails to design, develop or construct the Project in accordance with the FTA Requirements and such failure results in a determination by the Federal Transit Administration not to fund the FTA Grant, such failure shall constitute an Event of Default under this Lease and in addition to any other right or remedy available to Tenant at law or equity, Tenant shall have the right to offset against the Option Price otherwise payable by Tenant hereunder at the Closing the amount of the FTA Grant and other transit funding in the amount of Six Million Four Hundred Fifty Thousand Dollars (\$6,450,000) as agreed liquidated damages resulting from such breach.

(d) Seek specific performance of Landlord's obligations under this Lease; or

(e) Take over and complete the work of construction of the Project (provided the Construction Lender has not elected to do so as permitted herein). Tenant is hereby irrevocably appointed attorney-in-fact (the appointment being coupled with an interest) to incur obligations, enforce contracts or agreements therefore made by Landlord and to do any and all things that are necessary and proper to complete the Project and to recover the costs thereof, together with interest thereon at the rate of twelve percent (12%) per annum from the date incurred until paid in full. In the event Tenant elects to complete the Project, Tenant shall have the right to offset against Monthly Rent all amounts incurred by Tenant in completing the Project pursuant to this Section 24.2(e).

25. Signs. Tenant shall have the right to place identification signage, other signage, advertisements, awnings, banners or other exterior decorations on the exterior of the Premises without any further consent or approval from Landlord. Any sign that Tenant has the right to place, construct and maintain shall comply with all Laws, and Tenant shall obtain any approval required by such Laws. Landlord makes no representation with respect to Tenant's ability to obtain such approval.

26. Landlord's Right to Enter the Premises. After the Commencement Date, Landlord shall have the right to enter the Premises at reasonable times during Tenant's normal business hours for the below listed purposes; provided, however, Landlord acknowledges and agrees to comply with Tenant's reasonable requests regarding security. Landlord shall conduct its activities on the Premises as allowed in this Section in a manner that will cause the least possible inconvenience, annoyance or disturbance to Tenant. Landlord shall not be liable in any manner

for any inconvenience, annoyance, disturbance, loss of business, nuisance, or other damage arising out of Landlord's entry on the Premises as provided in this Section, except damage resulting from the negligent acts or omissions of Landlord:

26.1 Condition. To determine whether the Premises are in good condition and whether Tenant is complying with its obligations under this Lease.

26.2 Notices. To serve, post or keep posted any notices required or allowed under the provisions of this Lease.

26.3 Warranty Work. To perform any repair, replacement or other work for which Landlord is responsible to perform under this Lease, including, but not limited to, work within the scope of Landlord's warranties.

27. No Encumbrances by Landlord. Except to the extent expressly authorized in Sections 10 and 20 of this Lease, Landlord shall not at any time during the Term of this Lease sell, transfer, lease (other than to Tenant pursuant to this Lease), convey, encumber, pledge, hypothecate or otherwise grant a security interest in the Premises or any portion thereof (other than to Construction Lender pursuant to the Security Documents).

28. Right to Estoppel Certificates. Each party, within fifteen (15) days after notice from the other party, shall execute and deliver to the other party, in recordable form, a certificate stating that this Lease is unmodified and in full force and effect, or in full force and effect as modified and stating the modifications. Failure to deliver the certificate within such fifteen (15) day period shall be conclusive upon the party failing to deliver the certificate for the benefit of the party requesting the certificate and any successor to the party requesting the certificate, that this Lease is in full force and effect and has not been modified except as may be represented by the party requesting the certificate.

29. Subordination, Nondisturbance and Attornment Agreement. This Lease shall be subject and subordinate at all times to the lien of the Security Documents; provide, however that subordination of Tenant's rights under this Lease shall be expressly conditioned upon delivery of the Subordination Agreement in the form attached to this Lease as **Exhibit M** and by this reference incorporated herein, duly executed by Landlord and Construction Lender. The Subordination Agreement shall be executed and delivered by Landlord and Construction Lender and delivered to Tenant prior to the Commencement of Construction. Tenant shall have the right to record such Subordination Agreement in the real property records of King County, Washington.

30. Limitation on Landlord's Liability. Notwithstanding any provision in this Lease to the contrary, Tenant agrees that it shall look solely to the estate and property of Landlord in the Land and buildings constituting the Premises, any insurance proceeds or condemnation proceeds payable to Landlord under this Lease, and any sums paid to Landlord under this Lease for the collection of any judgment requiring the payment of money by Landlord or for the enforcement of any other judgment or remedy against Landlord arising from Landlord's rights and obligations in this Lease, and no other assets of Landlord shall be subject to levy, execution or other procedure for the satisfaction of Tenant's remedies.

31. Attorneys' Fees. In the event either party requires the services of an attorney in connection with enforcing any of the terms of this Lease, or in the event suit is brought for the recovery of any Monthly Rent due under this Lease or for the breach of any covenant or condition of this Lease, or for the restitution of said Premises to Landlord and/or eviction of Tenant during said Term or after the expiration thereof, the prevailing party will be entitled to a reasonable sum for attorneys' fees, witness fees, and court costs, including costs of appeal.

32. Surrender. Landlord shall, on the Expiration Date, surrender and deliver up the Premises, including all improvements then located thereon and the appurtenances thereto, into the possession of Tenant, free and clear of all leases, subleases and other occupancies, and free and clear of all liens and encumbrances other than those, if any, created by Tenant, without any payment or allowance whatsoever by Tenant. Landlord shall execute, acknowledge and deliver to Tenant such instruments of further assurance as in the opinion of Tenant are necessary or desirable to confirm or perfect Tenant's right, title and interest in and to all of the above-described property. The provisions of this Section shall survive the expiration or termination of this Lease.

33. Brokers. Landlord and Tenant each represent to the other that neither is represented by any broker, agent or finder with respect to this Lease in any manner. Each party agrees, to the maximum extent permitted by law, to indemnify and hold the other party harmless from and against any and all liability, costs, damages, causes of action or other proceedings instituted by any broker, agent or finder, licensed or otherwise, claiming through, under or by reason of the conduct of the indemnifying party in any manner whatsoever in connection with this Lease, which indemnification shall survive the Expiration Date of this Lease.

34. Miscellaneous Provisions.

34.1 Entire Agreement. This Lease, including Exhibits A through P which are attached hereto and by this reference incorporated herein, sets forth the entire agreement of the parties as to the subject matter hereof and supersedes all prior discussions and understandings between them. This Lease may not be amended or rescinded in any manner except by an instrument in writing signed by a duly authorized officer or representative of each party hereto.

34.2 Governing Law. This Lease shall be governed by and construed and enforced in accordance with the laws of the State of Washington.

34.3 Severability. Should any of the provisions of this Lease be found to be invalid, illegal or unenforceable by any court of competent jurisdiction, such provision shall be stricken and the remainder of this Lease shall nonetheless remain in full force and effect unless striking such provision shall materially alter the intention of the parties.

34.4 Jurisdiction/Venue. In the event any action is brought to enforce any of the provisions of this Lease, the parties agree to be subject to exclusive in personam jurisdiction in the King County Superior Court for the State of Washington and agree that in any such action venue shall lie exclusively in King County, Washington.

34.5 Waiver. No waiver of any right under this Lease shall be effective unless contained in writing signed by a duly authorized officer or representative of the party sought to be charged with the waiver and no waiver of any right arising from any breach or failure to

perform shall be deemed to be a waiver of any future right or of any other right arising under this Lease.

34.6 Captions. Section captions contained in this Lease are included for convenience only and form no part of the agreement between the parties.

34.7 Notices. All notices or requests required or permitted under this Lease shall be in writing, shall be personally delivered or sent by certified mail, return receipt requested, postage prepaid, by nationally recognized overnight courier or by facsimile transmission and shall be deemed given when so delivered, received or faxed (provided the fax machine has issued a printed confirmation of receipt). All notices or requests to any party shall be sent to all other parties as follows:

If to Landlord:	Kirkland Park & Ride, LLC 11624 SE 5 th Street, Suite 200 Bellevue, WA 98005 Attn: Gary A. Young Facsimile: (425) 586-7700
With copies to:	Oseran Hahn Spring Straight & Watts, P.S. 10900 NE 4 th Street, Suite 1430 Bellevue, WA 98004 Attn: Matthew B. Straight Facsimile: (425) 455-9201
	Imagine Housing 10604 NE 38 th Place, Suite 215 Kirkland, WA 98033 Attn: Eric Evans Facsimile: (425) 576-5194
If to Tenant:	King County Property Services Division 500 King County Administration Building 500 Fourth Avenue Seattle, WA 98104 Facsimile: (206) 205-5070
With a copy to:	Manager, Design and Construction King County Metro Transit Division King Street Center Mail Stop KSC-TR-0435 201 Jackson Street Seattle, WA 98104 Facsimile: (206) 684-1803

Any party may change the address to which notices shall be sent by notice to the other party in the manner and with the effect set forth in this Section 34.7. A copy of any notice shall also be sent to the Construction Lender, if any.

34.8 Binding Effect. Subject to the provisions of Sections 10 and 20 hereof, this Lease shall be binding upon, and inure to the benefit of, the parties hereto and their respective successors and assigns. No permitted assignment of this Lease or Tenant's rights hereunder shall be effective against Landlord unless and until an executed counterpart of the instrument of assignment shall have been delivered to Landlord and Landlord shall have been furnished with the name and address of the assignee. The term "Tenant" shall be deemed to include the assignee under any such permitted assignment. The term "Landlord" shall include any successors to or assigns of the Landlord's interest in the Premises following any foreclosure of the Security Documents, including Construction Lender or any purchaser at a trustee's or sheriff's sale of the Premises.

34.9 Gender and Number. As used in this Lease, the masculine shall include the feminine and neuter, the feminine shall include the masculine and neuter, the neuter shall include the masculine and feminine, the singular shall include the plural and the plural shall include the singular, as the context may require.

34.10 Nondiscrimination. Landlord and Tenant each agree it will not discriminate in employment at the Premises on the basis of race, color, religion, sex, national origin, veteran status, sexual orientation or physical and mental disability in regard to any position for which the prospective employee is qualified, nor will Landlord or Tenant maintain facilities which are segregated on the basis of race, color, religion, sex or national origin at the Premises.

34.11 Recording; Memorandum of Lease. Neither Landlord nor Tenant shall record this Lease without the written consent of the other; provided, however, that Tenant shall have the right to record a Memorandum of this Lease in the form attached hereto as **Exhibit N** and by this reference incorporated herein upon the Effective Date. Such Memorandum of Lease shall be amended by the parties and a new Memorandum recorded once (a) the short plat has been completed to exclude the Transit Center Land and the Housing Land from the definition of the land demised under the Garage Ground Lease and this Lease, and (b) once the Commencement Date and Expiration Date of this Lease has been determined.

34.12 Time Is of the Essence. Time is of the essence in the performance of each party's obligations under this Lease. Each party will carry out its obligations under this Lease diligently and in good faith.

34.13 Authority. Landlord is a limited liability company, duly organized, validly existing and in good standing under the laws of the State of Washington. Tenant is a political subdivision of the State of Washington. By execution of this Lease, Landlord and Tenant each represent to the other that it has authority to enter into this Lease and perform its obligations hereunder.

34.14 Nature of Relationship. The relationship between Landlord and Tenant under this Lease shall be solely that of landlord and tenant of real property. It is not intended by this Lease to, and nothing contained in this Lease shall, create any partnership, joint venture or other arrangement between Landlord and Tenant. No term or provision of this Lease is intended to be, or shall be, for the benefit of any other person, firm, organization or corporation, nor shall any other person, firm, organization or corporation have any right or cause of action hereunder.

34.15 No Third Party Rights. The provisions of this Lease are intended solely for the benefit of, and may only be enforced by, the parties hereto, and their respective successors and permitted assigns. None of the rights or obligations of the parties herein set forth (or implied) is intended to confer any claim, cause of action, remedy, defense, legal justification, indemnity, contribution claim, set-off, or other right, whatsoever upon or otherwise inure to the benefit of any Contractor, Architect, subcontractor, worker, supplier, mechanic, architect, insurer, surety, guest, member of the public, or other third parties having dealings with either of the parties hereto or involved, in any manner, in the Project.

34.16 Accounting, Inspection and Audit. Landlord shall keep such full and detailed accounts as may be necessary for proper financial management under this Lease. Tenant may, at its sole discretion, from time to time whether before or after purchase of the Premises if it elects to purchase the Premises, inspect all books and records of Landlord or any Contractor relating to the Project, make copies of all such books and records and/or elect to have an audit conducted to verify Project Costs. If Tenant so elects to conduct such an audit, it shall give notice to Landlord, and such audit shall be conducted as soon thereafter as is reasonably feasible. Such audit shall be conducted by an auditor selected by Tenant, and Tenant shall, except as hereinafter provided, pay the cost of such audit. Landlord agrees to cooperate with the auditor and make available for examination at its principal office all of its books, records, correspondence and other documents deemed necessary to conduct the audit by the auditor. This Lease shall be considered a public document and this Lease and all books and records of Landlord or any Contractor relating to the Project will be available for inspection and copying by the public in accordance with the Public Records Act, chapter 42.56 RCW (the "Act"). If Landlord considers any portion of any record provided to Tenant under this Lease, whether in electronic or hard copy form, to be protected under law, Landlord shall clearly identify each such portion with words such as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET." If a request is made for disclosure of such portion, Tenant will determine whether the material should be made available under the Act. If Tenant determines that the material is subject to disclosure, Tenant will notify Landlord of the request and allow Landlord ten (10) Business Days to take whatever action it deems necessary to protect its interests. If Landlord fails or neglects to take such action within said period, Tenant will release the portions of record(s) deemed by Tenant to be subject to disclosure. Tenant shall not be liable to Landlord for inadvertently releasing records pursuant to a disclosure request not clearly identified by Landlord as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET." If the audit reveals a variation of three percent (3%) or more of the Project Costs, Landlord shall pay the costs of the audit. Landlord shall preserve all records for a period of six (6) years after Final Completion of the Project hereunder; provided, however, if at any time prior to the expiration of seven (7) years after Final Completion of the Project, Landlord proposes to dispose of any Contract Documents related to the Project, Landlord shall deliver the same to Tenant for disposition by Tenant.

34.17 Fair Construction. The provisions of this Lease shall be construed as a whole according to their common meaning and not strictly for or against any party and consistent with the provisions contained herein in order to achieve the objectives and purposes of this Lease. Each party hereto and its counsel has reviewed and revised this Lease and agrees that the normal rules of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be construed in the interpretation of this Lease. Each agreement, term and provision of this Lease to be performed by Landlord or Tenant shall be construed to be both a covenant and a condition.

34.18 Non-Waiver of Governmental Rights. Nothing contained in this Lease shall require Tenant to take any discretionary action relating to development of the improvements to be constructed on the Land as part of the Project, including, but not limited to environmental review, zoning and land use approvals, approval of applications to vacate public streets, permitting, design review or any other governmental approvals.

34.19 Disclosures and Waivers. Pursuant to RCW 64.06.010(7), Tenant hereby waives receipt of the Seller Disclosure Statement otherwise required under Chapter 64.06 RCW with respect to the Housing Land and the Housing Easements; provided, however that Tenant shall deliver the seller Disclosure Statement to the extent required to do so under RCW 64.06.010(7).

34.20 Counterparts. This Lease may be executed in counterparts, each of which shall constitute an original and all of which constitute but one original.

IN WITNESS WHEREOF, the parties hereto have executed this Lease as of the date and year set forth below.

LANDLORD:

KIRKLAND PARK & RIDE, L.L.C.,
a Washington limited liability company

By: KTOD DEVELOPER, L.L.C.,
a Washington limited liability company,
Its Manager

By: _____
Name: _____
Title: _____

Date _____, 2012

TENANT:

APPROVED AS TO FORM:

KING COUNTY, a political subdivision of the
State of Washington

By: _____
Senior Deputy Prosecuting Attorney

By: _____
Name: _____
Title: _____

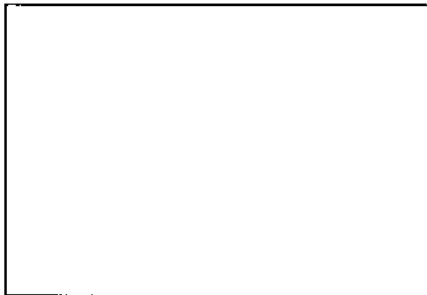
Date _____, 2012

Date _____, 2012

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the _____ of KTOD DEVELOPER L.L.C., a Washington limited liability company, Manager of KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

GIVEN UNDER MY HAND AND OFFICIAL SEAL this ____ day of _____, 2012.



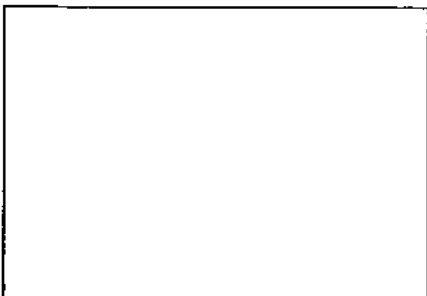
(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that _____ signed this instrument, on oath stated that _____ was authorized to execute the instrument and acknowledged it as the _____ of KING COUNTY, a political subdivision of the State of Washington, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

GIVEN UNDER MY HAND AND OFFICIAL SEAL this ____ day of _____, 2012.



(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

EXHIBIT A
Schedule of Monthly Rent¹

Due date	Garage Lease Payments	Balance due
	Monthly lease payment	
		\$

¹ *Note: Monthly Rent commences upon the Commencement Date (as defined in Section 1.11 of the Project Lease). If the Commencement Date is a date other than [•], the due date of Monthly Rent payments will be adjusted accordingly.

South Kirkland Garage Lease Payments

<u>Month</u>	<u>Monthly lease payment</u>	<u>Balance due</u>
		\$15,450,000
1	\$51,500	\$15,398,500
2	\$51,500	\$15,347,000
3	\$51,500	\$15,295,500
4	\$51,500	\$15,244,000
5	\$51,500	\$15,192,500
6	\$51,500	\$15,141,000
7	\$51,500	\$15,089,500
8	\$51,500	\$15,038,000
9	\$51,500	\$14,986,500
10	\$51,500	\$14,935,000
11	\$51,500	\$14,883,500
12	\$51,500	\$14,832,000
13	\$51,500	\$14,780,500
14	\$51,500	\$14,729,000
15	\$51,500	\$14,677,500
16	\$51,500	\$14,626,000
17	\$51,500	\$14,574,500
18	\$51,500	\$14,523,000
19	\$51,500	\$14,471,500
20	\$51,500	\$14,420,000
21	\$51,500	\$14,368,500
22	\$51,500	\$14,317,000
23	\$51,500	\$14,265,500
24	\$51,500	\$14,214,000
25	\$51,500	\$14,162,500
26	\$51,500	\$14,111,000
27	\$51,500	\$14,059,500
28	\$51,500	\$14,008,000
29	\$51,500	\$13,956,500
30	\$51,500	\$13,905,000
31	\$51,500	\$13,853,500
32	\$51,500	\$13,802,000
33	\$51,500	\$13,750,500
34	\$51,500	\$13,699,000
35	\$51,500	\$13,647,500
36	\$51,500	\$13,596,000
37	\$51,500	\$13,544,500
38	\$51,500	\$13,493,000
39	\$51,500	\$13,441,500
40	\$51,500	\$13,390,000
41	\$51,500	\$13,338,500
42	\$51,500	\$13,287,000
43	\$51,500	\$13,235,500
44	\$51,500	\$13,184,000
45	\$51,500	\$13,132,500
46	\$51,500	\$13,081,000
47	\$51,500	\$13,029,500
48	\$51,500	\$12,978,000
49	\$51,500	\$12,926,500
50	\$51,500	\$12,875,000
51	\$51,500	\$12,823,500
52	\$51,500	\$12,772,000

South Kirkland Garage Lease Payments

<u>Month</u>	<u>Monthly lease payment</u>	<u>Balance due</u>
53	\$51,500	\$12,720,500
54	\$51,500	\$12,669,000
55	\$51,500	\$12,617,500
56	\$51,500	\$12,566,000
57	\$51,500	\$12,514,500
58	\$51,500	\$12,463,000
59	\$51,500	\$12,411,500
60	\$51,500	\$12,360,000
61	\$51,500	\$12,308,500
62	\$51,500	\$12,257,000
63	\$51,500	\$12,205,500
64	\$51,500	\$12,154,000
65	\$51,500	\$12,102,500
66	\$51,500	\$12,051,000
67	\$51,500	\$11,999,500
68	\$51,500	\$11,948,000
69	\$51,500	\$11,896,500
70	\$51,500	\$11,845,000
71	\$51,500	\$11,793,500
72	\$51,500	\$11,742,000
73	\$51,500	\$11,690,500
74	\$51,500	\$11,639,000
75	\$51,500	\$11,587,500
76	\$51,500	\$11,536,000
77	\$51,500	\$11,484,500
78	\$51,500	\$11,433,000
79	\$51,500	\$11,381,500
80	\$51,500	\$11,330,000
81	\$51,500	\$11,278,500
82	\$51,500	\$11,227,000
83	\$51,500	\$11,175,500
84	\$51,500	\$11,124,000
85	\$51,500	\$11,072,500
86	\$51,500	\$11,021,000
87	\$51,500	\$10,969,500
88	\$51,500	\$10,918,000
89	\$51,500	\$10,866,500
90	\$51,500	\$10,815,000
91	\$51,500	\$10,763,500
92	\$51,500	\$10,712,000
93	\$51,500	\$10,660,500
94	\$51,500	\$10,609,000
95	\$51,500	\$10,557,500
96	\$51,500	\$10,506,000
97	\$51,500	\$10,454,500
98	\$51,500	\$10,403,000
99	\$51,500	\$10,351,500
100	\$51,500	\$10,300,000
101	\$51,500	\$10,248,500
102	\$51,500	\$10,197,000
103	\$51,500	\$10,145,500
104	\$51,500	\$10,094,000
105	\$51,500	\$10,042,500

South Kirkland Garage Lease Payments

<u>Month</u>	<u>Monthly lease payment</u>	<u>Balance due</u>
106	\$51,500	\$9,991,000
107	\$51,500	\$9,939,500
108	\$51,500	\$9,888,000
109	\$51,500	\$9,836,500
110	\$51,500	\$9,785,000
111	\$51,500	\$9,733,500
112	\$51,500	\$9,682,000
113	\$51,500	\$9,630,500
114	\$51,500	\$9,579,000
115	\$51,500	\$9,527,500
116	\$51,500	\$9,476,000
117	\$51,500	\$9,424,500
118	\$51,500	\$9,373,000
119	\$51,500	\$9,321,500
120	\$51,500	\$9,270,000
121	\$51,500	\$9,218,500
122	\$51,500	\$9,167,000
123	\$51,500	\$9,115,500
124	\$51,500	\$9,064,000
125	\$51,500	\$9,012,500
126	\$51,500	\$8,961,000
127	\$51,500	\$8,909,500
128	\$51,500	\$8,858,000
129	\$51,500	\$8,806,500
130	\$51,500	\$8,755,000
131	\$51,500	\$8,703,500
132	\$51,500	\$8,652,000
133	\$51,500	\$8,600,500
134	\$51,500	\$8,549,000
135	\$51,500	\$8,497,500
136	\$51,500	\$8,446,000
137	\$51,500	\$8,394,500
138	\$51,500	\$8,343,000
139	\$51,500	\$8,291,500
140	\$51,500	\$8,240,000
141	\$51,500	\$8,188,500
142	\$51,500	\$8,137,000
143	\$51,500	\$8,085,500
144	\$51,500	\$8,034,000
145	\$51,500	\$7,982,500
146	\$51,500	\$7,931,000
147	\$51,500	\$7,879,500
148	\$51,500	\$7,828,000
149	\$51,500	\$7,776,500
150	\$51,500	\$7,725,000
151	\$51,500	\$7,673,500
152	\$51,500	\$7,622,000
153	\$51,500	\$7,570,500
154	\$51,500	\$7,519,000
155	\$51,500	\$7,467,500
156	\$51,500	\$7,416,000
157	\$51,500	\$7,364,500
158	\$51,500	\$7,313,000

South Kirkland Garage Lease Payments

<u>Month</u>	<u>Monthly lease payment</u>	<u>Balance due</u>
159	\$51,500	\$7,261,500
160	\$51,500	\$7,210,000
161	\$51,500	\$7,158,500
162	\$51,500	\$7,107,000
163	\$51,500	\$7,055,500
164	\$51,500	\$7,004,000
165	\$51,500	\$6,952,500
166	\$51,500	\$6,901,000
167	\$51,500	\$6,849,500
168	\$51,500	\$6,798,000
169	\$51,500	\$6,746,500
170	\$51,500	\$6,695,000
171	\$51,500	\$6,643,500
172	\$51,500	\$6,592,000
173	\$51,500	\$6,540,500
174	\$51,500	\$6,489,000
175	\$51,500	\$6,437,500
176	\$51,500	\$6,386,000
177	\$51,500	\$6,334,500
178	\$51,500	\$6,283,000
179	\$51,500	\$6,231,500
180	\$51,500	\$6,180,000
181	\$51,500	\$6,128,500
182	\$51,500	\$6,077,000
183	\$51,500	\$6,025,500
184	\$51,500	\$5,974,000
185	\$51,500	\$5,922,500
186	\$51,500	\$5,871,000
187	\$51,500	\$5,819,500
188	\$51,500	\$5,768,000
189	\$51,500	\$5,716,500
190	\$51,500	\$5,665,000
191	\$51,500	\$5,613,500
192	\$51,500	\$5,562,000
193	\$51,500	\$5,510,500
194	\$51,500	\$5,459,000
195	\$51,500	\$5,407,500
196	\$51,500	\$5,356,000
197	\$51,500	\$5,304,500
198	\$51,500	\$5,253,000
199	\$51,500	\$5,201,500
200	\$51,500	\$5,150,000
201	\$51,500	\$5,098,500
202	\$51,500	\$5,047,000
203	\$51,500	\$4,995,500
204	\$51,500	\$4,944,000
205	\$51,500	\$4,892,500
206	\$51,500	\$4,841,000
207	\$51,500	\$4,789,500
208	\$51,500	\$4,738,000
209	\$51,500	\$4,686,500
210	\$51,500	\$4,635,000
211	\$51,500	\$4,583,500

South Kirkland Garage Lease Payments

<u>Month</u>	<u>Monthly lease payment</u>	<u>Balance due</u>
212	\$51,500	\$4,532,000
213	\$51,500	\$4,480,500
214	\$51,500	\$4,429,000
215	\$51,500	\$4,377,500
216	\$51,500	\$4,326,000
217	\$51,500	\$4,274,500
218	\$51,500	\$4,223,000
219	\$51,500	\$4,171,500
220	\$51,500	\$4,120,000
221	\$51,500	\$4,068,500
222	\$51,500	\$4,017,000
223	\$51,500	\$3,965,500
224	\$51,500	\$3,914,000
225	\$51,500	\$3,862,500
226	\$51,500	\$3,811,000
227	\$51,500	\$3,759,500
228	\$51,500	\$3,708,000
229	\$51,500	\$3,656,500
230	\$51,500	\$3,605,000
231	\$51,500	\$3,553,500
232	\$51,500	\$3,502,000
233	\$51,500	\$3,450,500
234	\$51,500	\$3,399,000
235	\$51,500	\$3,347,500
236	\$51,500	\$3,296,000
237	\$51,500	\$3,244,500
238	\$51,500	\$3,193,000
239	\$51,500	\$3,141,500
240	\$51,500	\$3,090,000
241	\$51,500	\$3,038,500
242	\$51,500	\$2,987,000
243	\$51,500	\$2,935,500
244	\$51,500	\$2,884,000
245	\$51,500	\$2,832,500
246	\$51,500	\$2,781,000
247	\$51,500	\$2,729,500
248	\$51,500	\$2,678,000
249	\$51,500	\$2,626,500
250	\$51,500	\$2,575,000
251	\$51,500	\$2,523,500
252	\$51,500	\$2,472,000
253	\$51,500	\$2,420,500
254	\$51,500	\$2,369,000
255	\$51,500	\$2,317,500
256	\$51,500	\$2,266,000
257	\$51,500	\$2,214,500
258	\$51,500	\$2,163,000
259	\$51,500	\$2,111,500
260	\$51,500	\$2,060,000
261	\$51,500	\$2,008,500
262	\$51,500	\$1,957,000
263	\$51,500	\$1,905,500
264	\$51,500	\$1,854,000

South Kirkland Garage Lease Payments

<u>Month</u>	<u>Monthly lease payment</u>	<u>Balance due</u>
265	\$51,500	\$1,802,500
266	\$51,500	\$1,751,000
267	\$51,500	\$1,699,500
268	\$51,500	\$1,648,000
269	\$51,500	\$1,596,500
270	\$51,500	\$1,545,000
271	\$51,500	\$1,493,500
272	\$51,500	\$1,442,000
273	\$51,500	\$1,390,500
274	\$51,500	\$1,339,000
275	\$51,500	\$1,287,500
276	\$51,500	\$1,236,000
277	\$51,500	\$1,184,500
278	\$51,500	\$1,133,000
279	\$51,500	\$1,081,500
280	\$51,500	\$1,030,000
281	\$51,500	-\$978,500
282	\$51,500	\$927,000
283	\$51,500	\$875,500
284	\$51,500	\$824,000
285	\$51,500	\$772,500
286	\$51,500	\$721,000
287	\$51,500	\$669,500
288	\$51,500	\$618,000
289	\$51,500	\$566,500
290	\$51,500	\$515,000
291	\$51,500	\$463,500
292	\$51,500	\$412,000
293	\$51,500	\$360,500
294	\$51,500	\$309,000
295	\$51,500	\$257,500
296	\$51,500	\$206,000
297	\$51,500	\$154,500
298	\$51,500	\$103,000
299	\$51,500	\$51,500
300	\$51,500	\$0

EXHIBIT B

Schedule of Preliminary Plans and Outline Specifications

Exhibit B

**SOUTH KIRKLAND
TRANSIT ORIENTED DEVELOPMENT
PARKING GARAGE AND TRANSIT CENTER**

1324-11RLD

Design Criteria and Performance Specifications

April 2012



King County

Department of Transportation
Transit Division



King County

**Metro Transit Division
Department of Transportation**

**S. Kirkland TOD
Parking Garage and Transit Center**

Design Criteria and Performance Specifications

April 2012

S. Kirkland TOD Parking Garage and Transit Center Performance Criteria

Design Criteria

April 2012

**King County
Department of Transportation
Metro Transit Division
201 South Jackson Street
Seattle, WA 98104-3856**

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- APPENDIX B King County Metro Transit Division 'Standard Single Unit Comfort Station'.
- APPENDIX C King County Metro Transit Power & Facilities 'Standards for Transit Facility Design & Maintenance'.
- APPENDIX D King county Metro Transit Power & Facilities 'Paint Standards'.

1 Introduction

Requirements for the S. Kirkland TOD Parking Garage facility are described in two parts: Design Criteria and Performance Specifications.

The Design Criteria is the Construction Programming for this facility. It provides a general description of the elements required, their functions, and the general design requirements of those functions and elements.

The Performance Specifications provide technical requirements that the Developer must adhere to in order to accomplish the construction of a finished facility per the Design Criteria. Performance Specifications include:

- Summary of the application, or allowed application of the Section to this facility.
- Required submittals.
- Quality assurance requirements.
- Reference specifications.
- Technical performance requirements of materials.
- Material requirements and allowances.
- Recommendations for execution of the Work of the Section.

The Performance Specifications follow the Construction Specifications Institute (CSI) format, organized by Divisions 1 through 33.

King County Metro Transit TD&C Engineering shall be provided with 30%, 60%, and 90% design review packages during design for comment and to confirm that the proposed facility design meets the requirements of these Design Criteria and Performance Specifications and that Metro Transit program requirements are being met to its satisfaction.

1.1 Project Description

King County Metro Transit desires to provide a parking garage facility and transit center on a portion of the existing S. Kirkland Park and Ride lot. The new garage facility should provide parking available to Metro Transit patrons at all times. The transit center shall provide additional elements including two-way street and one-way busway between 108th Avenue NE and NE 38th Place with adequate area for bus loading and layover, ADA van parking, and transit plaza with pedestrian circulation areas.

1.2 Project Requirements/Program

The Transit Oriented Development (TOD) Developer (hereafter referred to as "Developer") shall provide a parking garage and transit center complying with these Documents including Design Criteria and Performance Specifications as defined above. The project is to provide a parking structure facility that is functional and high quality construction (50 year design life). The project shall comply with all applicable building codes including the International Building Code (IBC) and the Bellevue City Code (BCC). It is the responsibility of the Developer to ensure that the project complies with, or is accepted by conditional compliance, all applicable land use and building codes and regulations.

King County has requirements for the use of sustainable building practices and materials which are included as preferences in the Design Criteria and Performance Specifications. Preferences include the selection of materials with high recycled content, which are locally sourced to the extent feasible to reduce the environmental effects of transport, and which have low VOC contents for both interior and exterior use. Materials which are extracted or manufactured within 500 miles of the project are preferred; plants should be sourced within 250 miles. Particularly heavy materials should be sourced within 50 miles.

Consider whether the garage roof is an appropriate location to utilize solar photovoltaic arrays for building use or contribute to the grid. The Developer shall coordinate with the local utility providers to ensure maximum participation in their energy efficiency programs, rebates, etc.

The new building shall be designed for a minimum of a fifty (50) year useful life. This is defined as the period of time over which the building components perform in meeting the purposes to which they were designed, provide durability against the wear and tear of normal use, and protect against the degradation effects of the forces of nature and exposure to the elements. Useful life depends in part on the proper maintenance and operations procedures by the Owner and may include the replacement of wearing surface materials such as paint, sealants, floor coverings, etc. These materials shall conform to the criteria stated in the Building Construction Chapter and in the Performance Specifications.

- Exterior Enclosure System 50 years
- Interior Construction 50 years
- Floor Construction 50 years
- Concrete Pavement 30 years
- HVAC Systems 25 years
- Plumbing Systems 25 years
- Electrical Systems 50 years
- Power and Transformer 25 years
- Lighting Systems 15 years
- Interior Doors and other Operable Elements: 15 years

In addition to the environmental basis for materials selection stated above, all materials shall be selected for durability, suitability to function, and low-maintenance characteristics.

The net floor areas given in this document shall be provided as minimum free-and-clear area within each program space. "Free-and-clear" shall be the floor areas that are unobstructed by walls, columns, and the like from finished floor to the applicable clear height given in 2.1.2.

1.3 Code References

1.3.1 Codes

Siting and Structure shall comply with all applicable local, state, and federal codes and regulations including but not limited to:

- 29 CFD Part 36, ADA Standards for Accessible Design, as a transportation facility
- 29 CFR 1920; 1997 Occupational Safety and Health Standards, as a work place.
- Americans with Disabilities Act Accessibility Guidelines (ADAAG) and local amendments
- ICC/ANSI 117.1 and local amendments
- State building code.
- State elevator code.
- International Building Code, most recent edition adopted by the State and the authority having jurisdiction.
- Regulatory requirements of the authority having jurisdiction (Bellevue City Code – BCC) which incorporate and/or amend the following:
 - Zoning Code
 - Land Use Code
 - Storm Water, Grading, and Drainage Control Code
 - Fire Code
 - Energy Code

Occupancy: International Building Code classifies the building as an open parking garage occupancy containing Group S-2 uses.

King County will accept variances granted by the City of Bellevue. Provide all documentation of variance approval.

Compliance with development rules, requirements and guidelines issued by the governing local jurisdiction(s) specifically for this development is required.

Electrical design codes are provided in the Electrical section of this document.

1.3.2 Standards

The following standards and guidelines shall be consulted for the design of this project

- MUTCD (Manual on Uniform Traffic Control Devices)
- King County Ordinance 16147, requiring the use of green building and sustainable development practices in all capital projects that the County plans, designs, constructs, remodels, renovates, and operates or to which the County lends or grants funds enabling construction or executes long-term leases or other legal financial instruments causing the construction of capital projects, as long as certain financial requirements are met; and adding new sections to KCC Chapter 2.95
- King County Ordinance 16027, relating to achieving greater energy efficiency as well as reductions in greenhouse gas emissions in capital improvements projects; and adding a new section to KCC chapter 4.16
- 2010 King County Energy Plan
- CPTED (Crime Prevention through Environmental Design).

1.4 Acronyms

ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
BCC	Bellevue City Code
CFR	Code of Federal Regulations
CPTED	Crime Prevention through Environmental Design
EACS	Electronic Access Control System
HVAC	Heating Ventilation and Air Conditioning
ICC/ANSI	International Code Council/American National Standards Institute
KCMT	King County Metro Transit
KMC	Kirkland Municipal Code
NFPA	National Fire Protection Association
PTZ	Pan, Tilt, Zoom Cameras
SCS	Security Call System
SMC	Security Monitoring Center
VSS	Video Surveillance System

2 Functional Requirements

Provide elements as required to fulfill needs described in the project program and quality described in the performance specifications.

The complete facility is comprised of the following elements:

- **Substructure:** Includes elements below grade and in contact with the ground.
- **Shell:** Includes the superstructure, exterior enclosure and the roofing.
- **Interiors:** Interior construction, stairs, finishes, and fixtures.
- **Services:** Conveying, plumbing, HVAC, compressed air, fire protection, electrical, control, communications and specialized services.
- **Site work:** Transit Center, bus way, site improvements and modifications, and utilities.

2.1 Building/Garage Functional Requirements

The purpose of this project is to provide a parking garage facility and Transit Center on a portion of the existing S. Kirkland Park and Ride lot. The new facility should provide parking available to Metro Transit patrons at all times. The Transit Center shall provide additional parking described under 2.2.

The structure height is limited by the BCC, or a maximum three levels.

The building will include the rooms and spaces listed below. The criterion for these rooms and spaces is located in Section 3.1 of this document.

- Custodial Room
- Mechanical Room
- Main Electrical Room
- Emergency Power Room
- Electrical Closets
- Elevators
- Elevator Machine Room
- Fire Suppression/Sprinkler Room
- Security/Communications Room
- Stairs

2.1.1 Parking Spaces

Parking stalls, access aisles, and numbers and size of compact, regular and ADA stall mix shall be applied per local jurisdictional requirements. ADA stalls shall be located as close to the Transit Center and Garage elevators as design allows.

Provide charging stations for electric vehicles with proper directional and stall signs. Locate the charging stations on the first and second levels to be controlled by the electrical panel in the main electrical room. Preferred parking, closest to transit center, shall be provided for electric vehicles (ADA parking has first priority).

- **Parking Spaces** Quantity shall be per agreement with King County DOT Transit Budget & Finance. Reference documents include King County's Request For Proposals and the Developer's Proposal.
- **Standard:** In compliance with local jurisdictions.
- **ADA** Per state, local and federal requirements.
- **Electric Vehicle** Capacity for 9 electric vehicle charging stations as follows:
 3 complete installations, ready for use
 4 locations pre-wired, fixture-ready for future use
 2 locations with conduits and raceways in place for future installations.

2.1.2 Internal Vehicular Access/Circulation

Vehicle Entrance: Provide vehicle entrance with sufficient set back from roadway to allow a three car queue into the garage.

Vehicle Exit: Provide vehicle exit close to vehicle entrance.

Vehicle Emergency : Provide vehicle exit for emergency use as required by Bellevue Fire Department.

Clear Height: Clear height is defined as the clear distance to structure and all other potential interferences such as piping, lighting, and signage. Design shall comply with local jurisdictional code requirements, at a minimum. Vertical clearance warning bars shall be set at 4" below the minimum structure height.

Ramp Slope: Maximum slope may not exceed 5.45% on ramps with parking stalls.

2.1.3 Internal Pedestrian Access/Circulation

Basic Function: Provide access to all levels of garage.

Pedestrian Entrances/Egress: Provide entrance/egress quantity and spacing per governing codes, at a minimum. Provide entrance/egress from the Garage in the direction of the Transit Center loading platform, and in the direction of the park and ride lot. Locate pedestrian entrance/egress points adjacent to stair towers and elevators. Provide exterior entrance/egress from Garage with canopy structure(s) to provide shade and weather protection. Pedestrian access, egress, and circulation throughout the site shall promote convenient and safe connectivity.

Stairs: Provide stair access/egress quantity and spacing per governing codes, at a minimum. Provide protection from inclement weather without compromising CPTED.

Elevators: Provide two elevators, 2500# per elevator. Locate near Main Entrance, Transit Center, and ADA parking.

2.1.4 Future Fare Collection

The parking structure vehicular entrance shall be designed with provision to implement fare collection in the future.

The fare collection island shall be 5'-0" wide and 14'-0" long between the entrance and exit lanes; provide power and communication conduits (2" diameter minimum each) and foundations for future fare gates.

2.2 Site Functional Requirements

2.2.1 Transit Center Functional Requirements

- Bus Bays
- Passenger Loading
- Shelter Foundations
- Trash Receptacles
- Bike Lockers
- Space Allocated for Newspaper Boxes

2.2.2 Transit Bus Zone/Layover Facilities (Transit Center)

Provide continuous curb space for two bus bays on the same passenger loading platform. They shall have adequate space between each bay to allow 60-foot-long articulated buses to pull in and out of the bay independently. In addition, provide an independent layover space for up to two 40-foot buses. The layover space shall be located to allow independent operation from the live bays. Design of the layover space shall allow buses to enter the space independently but leave on the basis of first-in-first-out. Layout of the bus bays and layover space (hereinafter "bus lane") shall provide adequate sight distance for crosswalks between the TOD project and the park-&-ride, which includes both the surface parking and the parking garage.

2.2.3 Passenger Facilities

The width of the passenger platform shall not be less than 12 feet. Metro will provide amenities for passengers which include the following:

- Four passenger shelters (5 ft x 17 ft)
- Shelter benches
- Bus signs

Construct reinforced foundations for the passenger shelters per King County Metro's standard shelter footing design plans and details. Passenger shelters shall be internally lighted. Provide electrical connection and associated hand-hole to each shelter foundation. Metro will supply both shelter foundation and conduit design details.

Provide a minimum of 3 benches within the pedestrian connector ways between passenger loading bays. Benches can be installed directly on sidewalk without reinforced footing.

A bus sign will be installed at the head of each bus live bay. Construct a 5 ft x 5ft x 9 inch deep reinforced foundation at each head of the bus zone for installation of a large bus bay marker/sign.

Coordinate locations of landscaping and site furniture, including passenger amenities and newspaper vending machines, to allow unimpeded flow of passengers boarding and alighting buses and clear pathway for visually and physically impaired pedestrians and transit patrons.

Passenger platform shall be lighted per the requirements defined in 6.4 Electrical. Refer to electrical and site lighting design sections for design criteria.

2.2.4 Driver Amenities

Construct a unisex toilet (comfort station) for exclusive use by transit operators. The comfort station shall allow access by transit operators 365/24/7. Design this facility as a part of the Garage structure, in compliance with the requirements of local jurisdictions, ADAAG/ANSI, and conforming to the requirements of 'KC Metro Transit Standard Single-Unit Comfort Station', Appendix C to this Design Criteria. The Comfort Station room shall conform to the functional, construction, material and finish requirements of Appendix C's plans, details and specifications, applied to the Garage installation.

2.2.5 Onsite Pedestrian Circulation

The project site shall be pedestrian friendly with safe and visible pedestrian pathways from the Transit Center to the Parking Garage and Parking Lot. Pedestrian ways shall comply with the Standards set forth in Paragraph 1.3.2 of this Design Criteria, and the following:

- Pedestrian connector ways that lead to adjacent streets from the Transit Center and Garage shall be a minimum of 5' wide by 4" thick.
- Pedestrian ways connecting passenger loading bays to each other and to the Garage shall be a minimum of 8' wide by 4" thick.

Layout of furniture and landscaping items on the passenger platform shall allow easy flow of pedestrians and transit patrons. Site furniture shall be aligned to avoid unnecessary congestion to pedestrian circulation. Parking lot shall be striped and signed for both efficient parking layout and with pedestrian pathway leading to the transit loading platform. Crosswalks stenciled with DuraStrip shall be installed to designate pedestrian access paths between the Transit Loading Platform, the Parking Garage and surface parking.

2.2.6 Site Furniture and Amenities:

Shelters: Metro will furnish, transport and install up to four prefabricated Standard Metro Style F52 passenger shelters with shelter benches.

Foundations: The Developer shall provide and install the shelter foundations for the provided shelters, conforming to Metro's Standard Drawings and Specifications.

Benches: Metro will provide and install the associated shelter benches.

Litter Receptacles: The Developer will provide and install two litter receptacles at the passenger loading platform and one at the elevators; to be anchored directly into the concrete sidewalk.

News Vending: Provide a place for newspaper vending machines adjacent to a common high-volume pedestrian path within the facility. The machine and supporting pedestal will be supplied by Seattle Times. Configuration of the vending machines shall be 2 stacks high and 3 boxes wide sitting on top of a single pedestal.

Bicycle Storage: The Developer will install wall-mounted bike racks provided by Metro, in Garage's Bike Room.

Relocate existing bike storage lockers. Allocate space for existing and planned lockers as described in the Division 12 'Site Furnishings' Section of the Performance Specifications. Provide space with sufficient clearances for locker use and access, in a well lit and visible area.

2.2.7 On-Site Vehicular Circulation

Transit vehicles shall enter the facility from 108th Ave. NE, counter-clockwise via the access road, and exit at the NE 38th Ave. driveway. The lane fronting the passenger loading platform shall be designated, marked and signed for transit buses only. Driveway/vehicle traffic lanes: 12'-0" lane width for entrance, 12'-0" lane width for exit, 6" thickness, broom finish concrete with curb and gutter matching City of Bellevue standards.

Vehicular accesses and garage circulation system/flow capacity shall be designed for peak hour traffic and to avoid creating backup traffic spilling onto adjacent streets, i.e. provide garage entrance setback sufficient to provide adequate holding capacity to store three vehicles waiting to enter the garage.

2.2.8 Landscaping and Screening

Install landscaping as required to meet or exceed City of Bellevue and City of Kirkland land use codes, including at transit loading platform. The Developer shall comply with or exceed all screening and landscaping requirements of the applicable land use code, while providing a balanced design that addresses environmental enhancement and safety at all areas affected by the Work..

The landscape design shall be coordinated with site lighting and site signage so as to not obscure either as the landscaping matures. Use landscaping to shield and enhance parking lot design as well as to maintain openness of plaza to achieve CPTED goals.

The streetscape will be landscaped adjacent to curb and sidewalk improvements in compliance with the requirements of the local jurisdiction.

Landscaping shall be irrigated with an automated, freeze protected, irrigation system. Place exterior freeze-protected hose bibs at 50' spacing around the perimeter of the garage. Drip irrigation is preferred to minimize overspray.

2.3 General Elements

2.3.1 Signage/Wayfinding

Metro will install bus zone informational signs at the pre-determined locations. Other regulatory signs shall be furnished and installed by the developer. Provide the following four categories of signage sufficient to communicate essential information to the users:

1. Traffic information (directional, one way, exit etc)
2. Pedestrian information (location of stairways, elevators, way finder sign to transit center and other land marks etc)
3. Regulatory information (identify compact, ADA parking, electric vehicles, vertical clearance etc, Metro will provide usage regulation contents)
4. General information (hours of operations etc, Metro will provide content)

Provide color-coding, numbering, visual cues to locate your vehicle for easy retrieval.

Locate signs in areas where driver can read in a timely fashion.

Provide clear, simple, and direct messages.

Signage should locate major internal pedestrian access points as well as external major roads and buildings.

2.3.2 Lighting

Energy efficient lighting is very important in garages to provide safety and security but can pose problems with spillage out of the garage onto neighboring properties. A balance between daylighting, interior lighting and exterior control should be addressed. It is recommended to consider consultation with the City of Seattle Lighting Design Lab to ensure the latest in lighting technology and practices are considered. Lights should be vandal resistant and easy to maintain. For purposes of re-lamping, lights on roof of parking structure to be accessible without the use of lifts, ladders, or other equipment. See 6.4 Electrical Lighting for requirements.

2.3.3 Security

Design the facility using Crime Prevention Through Environmental Design (CPTED) principles throughout, including but not limited to: open views, adequate lighting, minimize hiding places, co-located facilities, etc. Engage the services of a certified CPTED professional to conduct the evaluation and provide criteria for the design.

Provide complete and fully functional security system matching the systems at other King County KCMT Transit (KCMT) structured parking facilities, and interconnect and fully integrate the new system with the exiting monitoring and control system at KCMT's existing Security Monitoring Center (SMC). The security system consists of a Video Surveillance System (VSS), and Security Call System (SCS), and Electronic Access Control System (EACS). Design and construct the security system to meet these minimum standards.

- VSS Cameras (Interior of Garage): Install VSS cameras on the ceiling on each level (except top floor) near the corners and not along the driveway centerlines, such that they are not subject to vehicle strikes. Mount cameras at spacing of no greater than 100-feet throughout the structure and ensure each camera has a free and unobstructed view of the parking level. Mount the top floor cameras on poles or elevated structures at spacing and views as described for the lower floors. In addition, install cameras such that a minimum of two cameras have a clear view of each panic station and each interior and exterior door, elevator doors, and pedestrian and vehicle doors/gates. Cameras shall be pan-tilt-zoom.
- VSS Cameras (Exterior of Garage): Install VSS cameras on Polevators at each corner of the garage, located no closer than 10-feet from the structure, no lower than 20-feet above ground surface, at spacing of no greater than 200-feet around the exterior of the structure. Cameras shall be pan-tilt-zoom.
- VSS Cameras (Inside Elevators): Install VSS camera in each elevator car oriented to provide a complete view of the inside of the car. Install the cameras in vandal-resistant enclosure. Cameras shall be fixed view.

- **Emergency Call Stations** Install emergency call stations such that a station is visible from every location in the garage, on all levels, in each elevator car and in the exterior passenger loading area. Integrate emergency call stations shall with and communicate directly with KCMT's SMC via the integrated VOIP system, and shall be integrated with the VSS camera system such that when the call station is activated, the nearest two VSS cameras automatically move to preset positions viewing the call station. Emergency call stations shall match the call stations installed in other KCMT structured parking garages.
- **Electronic Access Control System (EACS):** Install EACS consistent with other KCMT structured parking garages, on each door and gate, including but not limited to pedestrian entries, communication and electrical room door, vehicle entry gates, and pedestrian entry gates. The EACS on each door shall at a minimum include card reader, electronic lock, remote connection to King County KCMT's access control system and SMC. Each door/gate shall also be equipped with a keyed lock, and each door/gate shall be remotely unlocking from the SMC. Vehicle entries shall be equipped with an electric-operated roll-down gate, activated locally with a key, and remotely controlled from the KC Metro Transit Security Monitoring Center.

2.3.4 Fire Protection

Provide dry type sprinkler system with down-turned sprinkler heads. Sprinkler system to be compression air charged. Provide suitable-sized, high quality air compressor. The fire protection system shall be designed by a State of Washington licensed sprinkler system designer. The sprinkler system shall meet the requirements of applicable codes including meeting the fire suppression requirements of the City of Bellevue Fire Department and seismic bracing requirements per NFPA-13, latest adopted edition. The fire sprinkler system shall conform to Metro Transit requirements and shall be constructed of Schedule 40 galvanized steel pipe.

Provide standpipes in stairwells and per code.

Provide stainless steel fire extinguisher cabinets with fire extinguishers, on each level in sufficient quantity and locations to comply with the requirements of NFPA 10. Fire extinguishers shall be located conspicuously, along normal paths of travel, including exits. Provide a minimum of two spare extinguishers.

2.3.5 Telecommunication Services

Furnish a complete and fully functional King County INET telecommunications connection to the facility. Fully coordinate with King County's Information Technology Division to establish requirements for the connection, including connection to existing INET in the vicinity of the project site, routing to the project site and into the designated telecommunications room in the facility, and required devices, software, configuration services, wiring, and all materials and services necessary for a complete and fully functional INET connection. Implement and demonstrate connectivity between the project site and King County Metro's Security Monitoring Center.

3 Construction Requirements

Construction shall have no adverse impact to bus and park and ride traffic in the vicinity. Provide replacement parking either on-site or off-site to maintain no net loss of existing parking capacity. Off-site parking shall be along or in the vicinity of the existing routes served by South Kirkland P&R and locations shall be approved by Metro. Provide a functional passenger loading platform at all time at the existing South Kirkland P&R during construction. Buses will be able to circulate through the park-and-ride facilities to load and unload passengers. Loading platform shall meet general ADA guidelines. Provide safe pathway between the parking lot and the loading platform. Install adequate temporary signage to direct both general population and transit vehicular traffic during construction at all times. Provide pedestrian way-finding signs and construction barriers to keep pedestrians safe from any construction activities. If construction falls in rainy season, coordinate with Metro for its crew to install a temporary passenger shelter that requires no permanent concrete foundation.

3.1 Building Construction

3.1.1 Rooms/Spaces/Interiors

Basic Function: Provide appropriately finished interiors for all spaces indicated in the program, equipped with interior fixtures as required to function properly for specific occupancies.

Physical Separation: Provide physical separation between spaces, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, olfactory, and atmospheric isolation as necessary to maintain desirable conditions within each space.

Impact Resistance: Provide impact resistant walls at least four feet above finish floor in areas adjacent to vehicle pavement. Interior cladding over walls other than concrete or masonry shall be medium density fiberboard on metal furring.

Interiors comprise the following assemblies: All elements necessary to subdivide and finish spaces enclosed within the building including all elements attached to interior construction that add functionality to enclosed spaces. Provide appropriately finished interiors for all spaces required by the program. Interior construction comprises the following elements:

- **Partitions:** All types of space dividers, including demountable and operable partitions.
- **Interior Doors:** All interior doors, including hardware and frames, except for elevator doors.
- **Other Interior Openings:** Interior utility openings such as hatches and access panels, louvers and vents.
- **Stairs and Ramps:** Those interior and exterior stair and ramp elements not part of the superstructure or exterior construction.
- **Interior Fixtures:** Interior fixtures are elements attached to interior construction that add functionality to the enclosed spaces except for elements classified as equipment or service fixtures.
- **Provide finishes for interior surfaces that are appropriate for the functions of each space and meet the requirements of the program and performance technical specification. Finishes shall be as described in this document.**

- Provide interior construction and fixtures that will not be damaged by ordinary cleaning and maintenance operations and are suitable in durability for the degree and type of traffic anticipated.
- Vandal Resistance: Provide interior construction and fixtures that are inherently vandal resistant or designed to be difficult to access or damage. Provide graffiti coating on exterior and interior walls of structure and enclosure (concrete, masonry, brick).
- Equipment clearance shall be as required by BCC and other codes.
- Egress: Provide egress from all interior spaces in accordance with the governing code.
- Fire Resistance: Provide a design and select materials that provide fire resistance in accordance with the governing codes.

Room enclosures (general)

- Interior – Metal studs with insulation per code, concrete or reinforced concrete masonry
- Exterior – Brick veneer, concrete masonry, concrete panel, metal ribbed siding
- Hollow metal doors, metal jambs, painted finish, commercial hardware, deadbolt lock, wired for future card access locks.
- Floor – troweled concrete
- Ceiling – exposed concrete
- Conditioned areas – provide insulation for conditioned spaces in accordance with the Washington Energy Code.

3.1.1.1 Janitor's Closet (Custodial Room)

Space Requirements

- Floor scrubber and accessory storage
- Sink
- Access
- 10' by 10' minimum room size

Fixtures

- Water heater
- Floor sink, vitreous china
- Wall-mounted faucet
- Pail hook

Furnishings

- Storage shelving, industrial, 48" wide x 72" high, 5-6 shelves

Finishes

- Walls – Unpainted concrete or waterproof finish to 3' above sink
- Floor – Sealed concrete
- Ceiling – Exposed

Number of rooms: 1

Window: No

Adjacency: Elevator

Utilities: Hot and cold water supply, floor drain

HVAC: Heated to a minimum of 50°F. Provide an exhaust fan suitable for a minimum of 1 cfm/sf. The fan shall be engaged when the light is turned on and shall operate for a period of at least 15 minutes every two hours to provide ventilation of cleaning materials. Heating should be on the generator power circuit for freeze protection.

3.1.1.2 Mechanical Room

Finishes

- Walls – Sealed concrete or MDF
- Floors – Sealed concrete
- Ceiling – Exposed

Configuration requirement: 100 SF minimum, 1st Level

HVAC: Heated to a minimum of 50°F and as required to maintain temperature compatible with the operation of enclosed equipment.

Provide telephone jack.

3.1.1.3 Main Electrical Room

Finishes

- Walls – Sealed concrete or MDF
- Floors – Sealed concrete
- Ceiling – Exposed

Configuration requirement: 100 SF minimum, 1st Level

Provide telephone jack and service.

HVAC: Provide an exhaust fan capable of maintaining an electrical room temperature no higher than 15°F above ambient. Fan shall operate with an increase of room temperature. Fans shall be on the generator power circuit.

3.1.1.4 Emergency Power Room

Finishes

- Walls – Sealed concrete or MDF
- Floors – Sealed concrete
- Ceiling – Exposed

Configuration requirement: 100 SF minimum

HVAC: Provide an exhaust fan capable of maintaining a room temperature no higher than 15°F above ambient. Fan shall operate with an increase of room temperature. Fans shall be on the generator power circuit.

Provide telephone jack.

3.1.1.5 Electrical Closets

Finishes

- Walls – Sealed concrete or MDF
- Floors – Sealed concrete
- Ceiling – Exposed

Configuration requirement: 15 SF minimum, location and number as required for even distribution of load throughout the facility. Comply with all Code requirements, and the following Metro Transit constraints:

- The electrical distribution panelboard shall not be more than one floor or one level away from any given load. The electrical panelboard shall be located in an electrical closet, sized as specified in these design criteria documents. The Main Electrical Room shall be located on the 1st floor, with an electrical closet one floor below the top parking level.

HVAC: Provide an exhaust fan capable of maintaining a room temperature no higher than 15°F above ambient. Fan shall operate with an increase of room temperature. Fans shall be on the generator power circuit.

3.1.1.6 Elevator & Elevator Machine Room

Capacity: 2500# per elevator

Number: Two, side by side

Location: Close to Main Entrance and ADA garage parking.

Type: Energy efficient, geared, traction elevator preferred. If hydraulic elevators are provided, hydraulic posts must be located above ground. Selection of less toxic hydraulic fluid is recommended.

Elevator Machine Room: If required by elevator manufacturer, and manufacturer's service staff, on 1st Floor.

Machine Room Finishes:

- Walls – Sealed concrete or MDF
- Floors – Sealed concrete
- Ceiling – Exposed

HVAC: Provide exhaust fan and intake louvers capable of maintaining room at less than the maximum temperature recommended by the elevator equipment manufacturer. Provide a dedicated air conditioning system in lieu of an exhaust fan if required by the elevator equipment manufacturer. If air

conditioning is required, provide dual level temperature control, first stage exhaust fan, with split AC set to maintain temperature per WAC 296-96-02465. Provide telephone service and jack.

Elevator Lobby: 50 sf minimum for each elevator for waiting passengers.

3.1.1.7 Fire Suppression/Sprinkler Room

Finishes

- Walls – Sealed concrete or MDF
- Floors – Sealed concrete
- Ceiling – Exposed

Configuration requirement: 80 SF minimum, 1st Level

HVAC: Heated to a minimum of 50°F and as required to maintain temperature compatible with the operation of enclosed equipment. Heating should be on the generator power circuit for freeze protection and life safety.

Exterior entrance required. Knox box required for fireman entry.

3.1.1.8 Security/Communication Room

Location: Ground floor. Comply with the requirements of Appendix A to this Design Criteria, "King County Physical Infrastructure Standards" for location and proximity guidelines.

Size: 12' by 12' by 12' minimum net, and as necessary to conform to size, configuration and clearance requirements of Appendix A to this Design Criteria, "King County Physical Infrastructure Standards".

Door: Net door clearance minimum shall be 3'-8". Provide with electronic access control and manual key override.

Finishes

- Walls – Sealed concrete or MDF; wall mounting backboards for security equipment as required.
- Floors – Sealed concrete
- Ceiling – Exposed

HVAC: Provide an HVAC system sized to maintain temperature at between 65 to 70 degrees F based on the heat load calculations of the equipment located in the room.

Utilities: Provide emergency power circuits for loads within and providing service to this room.

Services: Furnish a complete and fully functional King County INET telecommunications connection to this room. Provide telephone and internet (I-NET) service and jacks to operate all security and communication systems. Provide three duplex electrical wall outlets on the walls as well as electrical power supply for all equipment.

3.1.1.9 Stairs

Configuration and Space Requirements: Design shall comply with the Standards set forth in this Design Criteria: International, Federal, State, and Local Codes, with amendments.

Stairways and elevators shall be designed with CPTED (Crime Prevention through Environmental Design) provisions. Exterior stair walls shall be enclosed with a tempered glass wall system.

Material: Concrete or Steel stair with concrete treads.

Finishes:

- Walls – Sealed concrete or reinforced concrete masonry; tempered glass systems at exterior walls; prefinished metal panel and/or screen systems.
- Floors – Sealed concrete
- Ceiling – Exposed

3.1.1.10 Exterior and Interior Building Finish

Select paints and coatings which are low-emitting with low VOC content. Comply with King County Power and Facilities Maintenance Paint Color Scheme standards as follows:

Exterior: Three maximum colors selected from KC P&F Maintenance's standard range of nine exterior generic colors.

- Building walls and any roof enclosures
- Doors and jambs
- Roof trim and caps

Interior: One base color (linen white) and up to two accent colors selected from KC P&F Maintenance's standard range of six interior generic colors.

3.1.1.11 Comfort Station Room

Washroom Accessories, Plumbing Equipment and Electrical Requirements shall be per current edition King County Metro Transit Design & Construction Standard Single-Unit Comfort Station Drawings. Interior elements: architectural configurations, hardware and fixtures; plumbing and plumbing fixtures; electrical wiring, devices and electrical fixtures; and wall & ceiling surfacing apply, at a minimum.

Wall finish: Fiberglass reinforced plastic panel system.

3.1.2 Directional Signage

The configuration shall at a minimum comply with the Standards set forth in this Design Criteria: International, Federal, State, and Local Codes, with amendments.

The finish shall comply with MUTCD and King County Power & Facilities Maintenance Paint Color Scheme standards as applicable.

3.1.3 Security Features

System: Provide complete and fully functional security system as described herein, designed and integrated into the construction of the garage. Include under this contract power, INET, WAN/LAN and uninterruptible power supply on emergency circuit power to security equipment.

Power and Communication Lines: Integrate and construct power and communication cast into concrete structures as opposed to surface mount to the maximum extent practical.

Protective Devices: Provide vandal-resistant fixtures and provide bollards and other protective devices to protect the security equipment from vehicle damage.

Configuration: Locate the equipment to avoid impeding pedestrian and vehicle ways and to minimize loss of parking spaces. Provide adequate lighting to enable camera functionality and equipment maintenance.

Coordinate Security Features with the requirements of Performance Specifications Divisions 05, 08, and 28 requirements.

3.1.4 Safety Features:

Safety Criteria shall be reviewed by King County Metro's Safety Office (Mike Lemeshko) at designated milestones. Criteria includes, but is not limited to the following:

Communication: Emergency communication stations as described herein, for the Garage and the Transit Center passenger loading platform. These stations must have telephone access, and allow 24 hour-surveillance. Placed in accordance with CPTED guidelines, at readily accessible locations that are a maximum distance of 100 feet from any point in the Garage or the Transit Center loading platform. Surveillance shall include all corners and potentially hidden areas of all public access areas. Comply and coordinate with the configuration requirements of 2.3.3 'Security' of this Design Criteria.

Access: Design access points to avoid excessive queuing of vehicles and interference with transit functions, and in compliance with 2.1.2 'Internal Vehicle Access/Circulation' and 3.2.3 'Site Improvements' of this Design Criteria. Separate pedestrian, bus and car traffic to the greatest extent possible.

The garage and its pedestrian and vehicular accesses shall be designed to allow security lockdown and/or shut down during non-operating hours. Garage shall be capable of remote lockdown by King County's central monitoring and access control (SMC).

Configuration: Pedestrian pathways shall be designed to be separated from car/bus traffic to the greatest extent possible. Emphasis is placed on areas where vehicles and pedestrians will congregate in high volume, particularly the loading platform, and pedestrian and vehicular entrances/exits. Pedestrian pathways should be wide and clear of slip/trip hazards – the surface being treated for a high non-slip coefficient of .7-.8, in accordance with 3.2.3 'Site Improvements' and 3.1.6 'Floor Surfaces' of this Design Criteria.

Pedestrian pathways shall be provided a low level of continuous lighting but not so bright as to create glare or visual obstruction to the bus operator. Comply with the requirements of 3.1 'Building Construction', 3.2 'Site Construction' and 6.4 'Lighting' of this Design Criteria.

Provide metal security screens at first floor for vandalism prevention and lockdown ability. Eliminate potential hiding places, such as under open stairs. Provide accessible routes and parking with close proximity to stair and elevators and in accordance with Standards put forth in 1.3 'Code References' of this Design Criteria.

Landscaping: Trees, shrubs and landscape materials at their mature sizes shall be designed to avoid visual and physical obstruction in the bus pathway. Where a mixture of deciduous and evergreen materials are used, small leafed plants, trees and shrubs are required. Do not use large leaf plants, trees or shrubs.

Landscaping design between pedestrian and motor areas shall be low in height but densely arranged to prevent pedestrian short-cutting outside the intended path.

Wayfinding: Provide a plan for review by King County Metro Transit Safety that demonstrates the intended path of the pedestrian from their vehicle to the platform, taking advantage of both landscape and architectural elements to prevent pedestrians from intruding on the pathway of the bus.

Provide designated pedestrian access routes through parking lot and at crossings of vehicular travel ways. Coordinate Safety Features with the requirements of Performance Specifications Divisions 05, 08, and 28 requirements.

3.1.5 Structure Materials

The parking structure shall be of precast or cast-in-place concrete and shall be a minimum of Type II Construction. Parking garage is an exposed structure and must be designed to withstand all aspects of environmental conditions.

3.1.6 Floor Surfaces

Garage floor surfaces: Provide the following characteristics.

- 1/4" amplitude broom finish
- Minimum 1%, maximum 3% slope, 2% preferred. Accessible paths must conform to the Standards referenced in this Design Criteria.
- Drains at all low points
- All floors exposed directly to rain and weather shall have waterproof concrete
- All closure strips, construction joints, and expansion joints exposed directly to rain shall be sealed with an approved flexible joint sealer or other appropriate waterproofing product.

Ramp floor surfaces: Provide the following characteristics.

- 1/4" amplitude broom finish
- Full-length trench drains at base of all ramps exposed to rain
- All floors exposed directly to rain and weather shall have waterproof concrete

3.1.7 Exterior Wall Panels

Permanent Enclosure: Provide a permanent enclosure for all functional areas shown in the project program, unless otherwise indicated.

Exterior façade: Minimize direct illumination of abutting properties and adjacent streets from headlights and interior garage lighting. Provide security screening at the first floor and at all openings less than 8' above the adjacent exterior ground level for vandalism prevention and lockdown ability. See Security Features, above.

Fire Resistance: All walls shall comply with applicable code and zoning requirements for the specific site and type of building.

Ambient Temperature Change: Allow for daily expansion and contraction within and between elements caused by temperature range from most extreme low temperature to 70 degrees F greater than the most extreme high temperature, in any year, without causing detrimental effect to components and anchorage.

Water Penetration: Design, select and provide materials to prevent water penetration into the enclosed areas of the garage including elevator shafts, mechanical and electrical rooms, and other interior spaces.

Weather Resistance: Design, select, and provide materials to minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, atmospheric pollutants, materials tracked in by pedestrians and automobile tires, mold and mildew.

Impact Resistance: Exterior cladding shall be either cast-in-place concrete or pre-cast concrete panels. Use tension cabling to separate levels and ramps; subject to compliance with constraints presented by this Design Criteria, the Performance Specifications, applicable Codes, and Jurisdictional authorities. Tension cables may be acceptable at openings, subject to compliance with constraints presented by this Design Criteria, applicable Codes and Jurisdictional authorities at exterior walls.

Auto Impact: Provide concrete panels at exterior walls as a minimum structural barrier for auto safety in the garage, design per IBC. Tension cables may be acceptable as noted above.

3.1.8 Ventilation/Screening of Wall Openings

Ventilation: Provide Natural ventilation. Install mechanical ventilation only if required by code.

Screening: Screen Wall openings to comply with the following, and with the requirements of Exterior Wall Panels, Safety Features and Security Features, above.

- First Level and any opening within 8' of exterior ground level: Provide vandal-proof architectural screens to allow lockdown of facility.
- Upper Levels: Screening as required by BCC and to be architectural compatible with first level of garage and surrounding developments.

3.1.9 Doors (Vehicle)

Garage Entrance and Exit doors shall have exterior lighting. Door locking system and electronic controls must be coordinated with the requirements of Metro Transit Power & Facilities.

Entrance and Exit Door characteristics:

- 12'-0" wide, 9'-0" high
- Jambs protected by bollards
- Overhead coiling
- Anodized aluminum

Basic Function: Overhead Coiling Doors providing access to facility from the exterior shall be motorized with key switch and equipped with emergency stop sensors. Doors shall be capable of remote operation by King County's Central Monitoring and Access Control.

3.1.10 Main Pedestrian Entrance and Elevators

Basic Function: The main pedestrian entrance provides a single entryway for facility users. Locate close to the Transit Center. There shall be an accessible route of travel, as defined by ADAAG, from the main entrance to the Transit Center.

Materials and Size: The main entrance of the facility shall be as required by code for exiting. Provide canopy as required for weather protection and lighting as required for security.

3.1.11 Doors (Man)

3.1.11.1 Exterior Man Doors

Basic Function: Provide exterior doors necessary for the proper functioning of the facility and as required by code. Provide canopy as required for weather protection and adequate lighting for security.

Material and Size: Exterior doors, except the building main entrance, shall be 3'-0" wide by 7'-0" high, insulated, painted metal doors in painted hollow metal frames. Provide power and communication conduits from doors to security rooms for future card entry.

Exterior doors shall be capable of being remotely locked and unlocked by King County Central Monitoring and Access Control.

3.1.11.2 Interior Man Doors

Basic Function: Provide interior doors necessary for the proper functioning of the facility and as required by code.

Material and Size: Interior doors shall be 3'-0" wide by 7'-0" high, painted metal doors in painted hollow metal frames. Provide power and communication conduits from doors to rooms for future card entry system. Interior doors shall have card readers installed with electric locks and hinges.

3.2 Site Construction

3.2.1 Transit Bus Zone/ Layover Facility Pavement Design

Pavement design shall be per AASHTO Guide for Design of Pavement Structures and Performance Specification Section 321313 for Portland Cement Concrete Paving, and the following criteria.

- Design life: 30 years
- Number of articulated three-axle buses/Month: 1,000 each way
- Annual growth rate: 3%
- Axle weight/vehicle (kips): 3 axles @ 12.40, 18.00 and 23.30 respectively
- Pavement type: Unreinforced portland cement concrete panels of 12' x 12' maximum dimensions
- Pavement section: As resulting from design by AASHTO Guide but not less than 10" thick concrete over 4" of CRS over subgrade at 95% relative compaction

- Panel joints: With 1-1/2" diameter x 18" long dowels at 12" OC in both directions. Use for both construction and control joints
- Curbs: Doweled concrete 6" wide x 6" high minimum and 8" high maximum. Dowel with #4 rebars
- Manholes lids & catch basin gratings on vehicular traffic areas: Surrounded at surface with 12" minimum width x 12" minimum thickness reinforced concrete slab with isolation joint to separate from pavement
- Crack control joints: At all angle points less than 160°
- Pavement on the bus lane stenciled with DuraStrip "BUS ONLY"
- Curb shall be painted to designate for bus use only
- Design review: Submit to Metro at 30%, 60% and 90% completion.

3.2.2 Street Improvements

The Developer shall be responsible for negotiation of all costs of all adjacent off-site street improvements and mitigation measures, as well as onsite improvements required for the Transit Center. The Developer shall comply with local jurisdiction codes and regulations that may require streets adjacent to the project to be improved. This includes improvements of traffic control devices, street lights, architectural features, curbs, sidewalks, planting strips, and (when required by land use code) street trees and associated irrigation. Offsite mitigation measures and improvements shall be adequate for the proposed facilities to be granted occupancy permit. With the construction of new street improvements, drainage facilities will be required in compliance with local drainage ordinances. Offsite mitigation may be required including intersection and signal improvements. All street improvement elements will meet or exceed the site improvement material requirements.

3.2.3 Site Improvements

The Developer shall provide a Geotechnical Report to evaluate existing site conditions including soil borings and identified design limitations. The report shall present design recommendations for new construction and identify existing subsurface hazardous materials and groundwater conditions, along with Level I and Level II Environmental assessment reports and recommended remedy methodology.

The Developer shall also provide the following plans:

- A Boundary Survey of the property prepared, stamped and signed by a licensed Professional Land Surveyor. The Boundary Survey shall include property boundaries, easements, and benchmarks.
- An Existing Site Plan survey including 100-year floodplain, construction limits, topography, existing driveway(s) and pavement(s), existing building and structures, spot elevations, existing utilities, and utility invert elevations. The survey shall include all surface features on adjacent properties or rights of way within 25 feet of the property line, or to the extent needed to accurately describe the site and its adjacent environment.
- The Development's Architectural Site Plan including current land use code setback requirements, surface and subsurface features, utilities and other information as required by jurisdictional authorities for approval of the site development.
- A Grading and Paving Design shall be prepared, stamped and signed by a licensed professional Civil Engineer. Layout of the site and driveways shall conform to the requirements of all

applicable local, state and federal jurisdiction and be approved by Fire Marshal and planning department of the local jurisdiction.

Layout of the site shall allow safe pedestrian access from surface parking and the Parking Garage to the Transit Center and neighboring sidewalks. The Developer's design plans shall take into account and provide record of current land use code requirements and the existing surface and subsurface features affected by and involved in the Development, including but not limited to adjacent buildings, pavement curbs, sidewalks, street appurtenances, drainage control structures, and other utilities.

Vehicle entry off the busway shall be coordinated with alignment of driveways to maximize the efficient flow of traffic, especially during rush hour. Any variance request shall be reviewed and approved by the City of Bellevue and King County Metro Transit. The garage driveways shall be located to prevent the queue from spilling over to 108thth Avenue NE.

The garage shall be set back from property lines and meet City of Bellevue perimeter landscaping setback requirements. Sidewalks shall be provided between the garage and surface parking areas. The vehicular access shall be wide enough for two-way traffic.

Emergency vehicle access shall be provided as required by the Bellevue Fire Department.

3.2.4 Site Utilities

On-site and off-site utility service and revisions required by the garage development shall be designed to connect to existing utility systems including sewer, water, storm water, electrical, gas, traffic signal, telecommunication/data service, and I-net. Design shall be in strict compliance with all local, state, and federal codes (provided in Section 1.3 of this document). In the Final Construction Documents, it is the Developer's responsibility to discover and demonstrate all existing, proposed, and as-constructed utilities, structures, appurtenances, and easements on the site and within the limits of the work, and to provide for the protection of items not to be disturbed by the project. The Developer shall be responsible for all utility coordination including payment of all fees until project acceptance is complete.

Underground utility structures, including stormwater and sanitary, with their hatch doors, metal gratings and manholes shall be designed to withstand H-20 loading. Location of access doors shall be off from heavy bus wheel paths to avoid fatigue failure of hatch door structure and hinges. Unevenness around structures and adjacent pavement may create undesirable ground-borne vibration to adjacent development. Ensure proper compaction prior to setting underground structures.

3.2.4.1 Water System

The water system shall use ductile iron pipe, with a single tap (or tapping sleeve) and gate valve at the main located in the street. The private water main shall service the building site and hydrant installation(s) as required, given the use of sprinklers within the garage. To combine fire flow and domestic uses in a single pipeline, a detector check valve installation is acceptable to King County, and the system can be split into fire and domestic lines in the mechanical room of the building. An additional split of the domestic line is required for separate metering of domestic and irrigation uses.

Alternative existing water system materials may be allowed if they meet the requirements stated below. All piping under building slab shall be ductile iron.

Expansion or replacement of portions of existing system facilities shall conform to the requirements of the specification for new design and construction with a performance evaluation by a licensed professional engineer of the existing system required. The evaluation shall include public utility records or new fire flow and residual pressure testing to evaluate the capacity of the existing system to meet fire code requirements and shall evaluate the existing system for compliance with applicable local jurisdiction codes, and determine the capability of the system to provide uninterrupted service over a 50 year useful life assuming normal operation and maintenance, and the capacity to deliver flow and pressures throughout the proposed structure.

All existing site valves and hydrants to be inspected, exercised, and if required, serviced or replaced. New fire hydrants shall meet requirements of and be approved by the local governing officials. All existing site valve boxes to be inspected, serviced, and adjusted to finish grade. Existing water meters shall be upgraded, if necessary, to meet water demand per the building program.

Provide exterior hose bibs at all corners of garage. Provide sufficient hose bibs to water building perimeter landscaping with maximum 50' length hoses.

Provide freeze-protection heat tape and insulation for all pipes subject to freezing.

3.2.4.2 Gas Service

Required for emergency generator. Developer shall be required to coordinate with Puget Sound Energy, for providing new service to the garage structure.

3.2.4.3 Sanitary Sewer Systems

A sanitary sewer shall receive the sanitary drains from the building at a location nominally 5-feet outside the building envelope. Beginning at the transition, the sewer shall be a 6-inch minimum PVC SDR 35 line from the building to the sewer main in public right-of-way. To service and maintain the facility over time, cleanouts for 6-inch sewers and manholes for 8-inch or larger sewers are required at all changes in pipe material or pipe diameter, all vertical grade breaks, and all horizontal alignment changes. All piping under slab shall be ductile iron.

3.2.4.4 Storm Sewer Systems

For the purposes of this document, a surface stormwater detention area equal to 10 percent of the impervious site area and a Landscaping Factor equal to 5 percent of the total site area have been estimated. It is the Developer's responsibility to make the proper provisions for on-site storm water detention, water quality facilities, and landscaping.

Storm drain and/or water quality facilities shall include a runoff conveyance system consisting of Type 1 catch basins and corrugated polyethylene (double wall) storm pipes, water quality structures, and detention facilities as specified in the BCC. Detention shall be below grade and meet all of the requirements of the local jurisdiction, King County, and the Department of Ecology. Locate underground vaults, catch basins, or other water retention/drainage structure outside facility footprint.

Detention and water quality systems shall be accessible and designed for minimum maintenance by King County staff. Any hatch doors for vault access shall be H-20 rated. Access shall be located outside of

parking spaces and accessible for service by an "eductor" or "vactor" truck. The structures shall be maintenance accessible and equipped with built-in ladder access.

Provide stormwater system for the Transit Garage separate from the system required for the future TOD development.

All catch basins that drain to the storm sewer shall be labeled as "Dump No Waste Drains to Creek."

3.2.4.5 Site Electrical and Communication

Developer shall be required to coordinate with Puget Sound Energy (PSE), King County I-net and local phone company for providing new services to the garage structure.

Provide all work for a complete and fully operational electrical service for the garage and all 50 EV charging stations. Coordinate with PSE and extend power circuits from the interface point.

Provide all work for a complete and fully operational telecommunication service. Coordinate with local phone company and extend copper and fiber from the interface point.

Provide all work for a complete and fully operational King County INET (I-net) service. Coordinate with I-net and extend fiber from nearest INET service interface point as identified by Comcast or King County. Locate in an underground conduit path between the I-net service interface point and the Communication Room of the as specified below.

Developer to provide and install:

- minimum (1) 4" underground conduit connection between the Communication Room of the new garage and the nearest Comcast/I-net fiber access point, as located/required by the utility;
- a new Communication vault (min. inside dimension of 36"X36"x36") as located/required by the utility;
- a 4" underground conduit crossing to the new vault and the existing Comcast/I-net vault as located/required by the utility;
- (2) 4" conduit runs between the new Communication vault and the utility's communications vault as located by the utility;
- (2) 4" conduit runs between the new Communication room of the garage and the existing Communication vault as located/required by the utility;
- (1) 24 strand single-mode fiber between the COMM room of the garage and the existing Comcast/INET vault;
- (1) 24 strand multimode fiber and/or copper trunk cables between the COMM room of the garage and the platform if needed.

Provide all raceway, wiring and materials, equipment and services as required to totally conform to serving utility requirements.

3.2.5 Curb and Pavement

The driving surfaces outside the parking structure shall consist of concrete slab, 6" minimum thickness. Concrete slab shall comply with the recommendations of the Developer's Geotechnical Report.

All driving surfaces are to be fully paved with curbed edges. Acceptable curb installation types are integrated cement concrete curb and gutter or integrated cement concrete curb and sidewalk. No extruded curb will be allowed.

4 Structural

4.1 Design Code

Design shall be in accordance with the current Edition of the International Building Code, as adopted by the City of Bellevue, Bellevue City Code, City of Kirkland, and Kirkland Municipal Code and all Amendments, and all applicable referenced codes of Design Standards.

4.2 Foundation Design

Foundation design shall be based on the recommendations of a licensed geotechnical engineer. Long term settlement of foundations and slabs on grade shall be limited to no more than 1 inch. Differential settlement shall be limited to ½ inch over 50 feet.

Footing may not extend over the property line.

Provide sealant at slab joints and wall junctures.

Provide Foundation drains as recommended in the soils report.

4.3 Levels Directly Exposed to Weather

Provide waterproof concrete.

Prevent leaks to structure below. All closure strips, construction joints, and expansion joints exposed directly to rain shall be sealed with an approved flexible joint sealer or other appropriate waterproofing product.

Install durable and vandal-proof bird deterrent system on building parapets, light fixtures, and any potential perching area.

4.4 Minimum Live Loads

4.4.1 Vertical

- Parking Floor: 40 psf + concentrated load provisions per ASCE 7-10.
- Stairs: 100 psf
- Sidewalks, Driveways: 250 psf
- Light Storage: 125 psf
- Top Level: 40 psf + 25 psf snow + rain (2" / hour for roof drainage design)
- Design to support future exterior paneling having 10 psf dead load
- Design for the maximum loading of above criteria or per ASCE 7-10.

4.4.2 Wind

- Basic wind speed: ASCE 7-05
- Exposure: To be determined by engineer of record

- Importance Factor: 1.0

4.4.3 Seismic

- Importance Factor: 1.0
- $S_{ms} = 1.277$ (to be verified)
- $S_{m1} = 0.740$ (to be verified)
- Site Class D (to be verified)

4.5 Concrete

4.5.1 Codes and Specifications

- Design: ACI 318
- Construction: ACI 301
- Project Technical Performance Specifications

4.5.2 Minimum Strength

- Cast-in-place, $F'_c = 4000$ psi, 28 days
- Precast, $F'_c = 5000$ psi, 28 days

4.5.3 Other Criteria

- Concrete water / cement ratio not greater than 0.45.
- Calcium chloride additives not acceptable.
- Wall thickness to be 8 inches minimum.
- Cement concrete mix shall meet ASTM C33. Use water-reducing additives (per ASTM C494) to reduce water content of cement mix. Use corrosion inhibitors such as calcium nitrite to slow corrosion of unprotected mild steel reinforcement.
- Slab Reinforcement and reinforcement within top 4" of horizontal structural members shall be epoxy coated to prevent corrosion. (This includes slabs, stirrups, top layer of flexural steel at beams.) In lieu of epoxy coated rebar, contractor may utilize a concrete mix for all slabs, beams, and horizontal members, containing manufacturer's recommended amounts of a corrosion inhibiting admixture approved by King County. such as calcium nitrite, Eucon BCN by Euclid Chemical Co, DCI or DCIS by Grace Construction Products, Conplast DN by Fosroc.
- Maintain 2 inch minimum coverage over reinforcement. Use sealants to keep water out of joints.
- Slab on grade minimum thickness = 6 inches. Reinforce for temperature and shrinkage

4.6 Steel

4.6.1 Codes and Specifications

- Steel construction shall conform to the specifications and standards as contained in the latest edition of the AISC Manual of Steel Construction.
- Project Technical Performance Specifications

4.6.2 Material

- Structural shapes: ASTM A 992, ASTM A 36, or ASTM A572 Grade 50
- Plates, bars and sheets: ASTM A 36
- Bolts: ASTM A 325 or ASTM F 1852

- Anchor bolts: ASTM A 307

4.7 Masonry

Masonry is to be used only for non-structural, non-load bearing elements.

4.7.1 Codes and Specifications

- Masonry Construction shall conform to the latest editions of ACI 530 and ACI 530.1
- Project Technical Performance Specifications

4.7.2 Material

- Concrete masonry units conforming to ASTM C 90, normal weight.
- Mortar Type S
- Minimum $F'm = 1500$ psi
- Minimum grout strength 2,000 psi
- Solid grout all cells
- Minimum rebar size to be #4
- Maximum reinforcement spacing = 24 inches, horizontal and vertical

4.8 Building Systems

Foundations shall consist of continuous or isolated concrete footings bearing on competent native soil or structural fill per the recommendations of the geotechnical engineer. The ground floor shall be a 6-inch minimum thickness concrete slab on grade. All slabs on grade shall be reinforced with a minimum of 0.2 percent shrinkage and temperature reinforcement in both directions with slab reinforcement spaced at a maximum of 12 inches on center. Control joints shall be provided at a spacing of no more than 40 feet on center.

The gravity load carrying system shall be constructed of concrete. Acceptable systems include concrete slabs supported by concrete columns and/or concrete walls. Drive aisles shall be free of vertical elements. Elevated floor slabs shall be constructed of reinforced concrete or post-tensioned concrete slabs. Live load deflection of the floor system shall be limited to span divided by 480.

The lateral load resisting system for the building shall consist of concrete shear walls and / or concrete moment frames.

Exterior walls along all areas subject to vehicular traffic shall have either cast-in-place or precast reinforced concrete vehicle barriers, or cable vehicle restraint systems. Interior spaces shall be protected by bollards or curbing or tension cabling. Design vehicle barrier capable of withstanding 6,000 # concentrated force.

5 Mechanical Systems

5.1 HVAC Design Criteria

Provide ventilation to avoid carbon monoxide build-up. Ventilation to be supplied shall meet IBC and Washington State ventilation code with CO2 sensors for capacity control. Ventilation equipment shall

be enclosed in protected mechanical space or to be vandal proof. An Indoor Air Quality Management plan is recommended during construction to ensure that HVAC ducts remain covered until start up.

Enclosed spaces (rooms) shall be provided with ventilation per IBC. Heat all rooms to maintain a temperature level of 50 degrees Fahrenheit minimum and as required to maintain a temperature compatible with the operation of the enclosed equipment. Provide fixed temperature sensors or vandal-resistant, lockable thermostats. Security/communication room to be minimally heated and air conditioned as required to maintain a temperature compatible with the operation of the enclosed equipment.

5.2 Plumbing

Provide 2 hose bibs at every level, at opposite ends of the parking structure. Hose bibs to be freeze-proof, with heat tracing and jacketed insulation.

Provide floor area drains at every low point to maintain a minimum of 1% slope, 2% preferred, with a maximum of 3% slope. Provide trench drains with cast iron covers at vehicle entrance/exit and at the base of each ramp that is not covered. All piping under building slab shall be ductile iron.

Provide sand and oil/water separator at all storm drain discharge points. Provide oil/water separators exterior to the structure, accessible by cleaning truck.

Provide integral vacuum breakers on all plumbing fixtures at point of potable water service.

Provide plumbing fixtures as outlined in this document.

Provide trap primers for floor sinks and drains where required by code.

5.3 Sprinkler

The facility is to be fully sprinkled. Areas subject to freezing are to be provided with a dry-pipe sprinkler system.

Fire sprinkler system shall be designed in accordance with the IBC, NFPA, and City of Bellevue requirements by a fire suppression system designer licensed in the State of Washington. All piping and fittings shall be Schedule 40 galvanized steel pipe.

Coordinate routing of sprinkler pipes and location of sprinklers with other trades.

6 Electrical

6.1 Electrical Design

6.1.1 General Requirements – Standards and Codes

The design shall conform to the latest editions of the following standards and codes:

- ANSI American National Standards Institute
- ANSI C2 National Electrical Safety Code
- ANSI C136-15-1986 High Intensity Discharge and Low Pressure Sodium Lamps in Luminaires – Field Identification

- ASTM American Society for Testing Materials
- IBC International Building Code
- ICEA Insulated Cable Engineers Association
- IEEE Institute of Electrical and Electronics Engineers
- IES Illumination Engineering Society
- IESNA Illumination Engineering Society of North America
- NECA National Electrical Contractors Association
- NEMA National Electrical Manufacturers Association
- NETA International Electrical Testing Association Inc.
- NFPA National Fire Protection Association
- NFPA 70 National Electrical Code as amended and administered by the State of Washington
- NFPA 72 National Fire Alarm Code
- NFPA 101 Life Safety Code
- NREC Washington State Non-Residential Energy Code
- OSHA Occupational Safety and Health Act
- UL Underwriters Laboratories
- WISHA Washington Industrial Safety and Health Agency
- WAC 296-46B Electrical Safety Standards, Administration, and Installation
- WAC 296-45 Safety Standards for Electrical Workers
- Chapter 19.28 RCW Electricians and Electrical Installations

Where the requirements of more than one code or standard are applicable, the more stringent shall govern.

Conform will all applicable requirements of the current King County Metro Transit Electrical Design Standards.

6.2 Utilities

Provide electrical utilities as required for a complete and operational facility. Coordinate with the serving utilities to verify specific scope of electrical provisions for points of connection. Electrical services shall include: power and telecommunications. Provide additional services as required in support of unique project program requirements.

6.3 Power

6.3.1 Primary Power

Existing primary power will be tied into PSE's distribution system. Reliable and safe power will be provided to support building lighting, mechanical, and general loads.

6.3.2 Secondary Power

The facility shall receive power from Puget Sound Energy (PSE) and be metered at 480Y/277V, 3-phase 4-wire. The main switchgear shall have one (1) Service Disconnect/Main Circuit Breaker serving the site. The service switchboard shall be sized in accordance with applicable codes and shall include planned occupancy plus 20 percent spare capacity for unplanned additional loads. The switchboard shall be free-standing, floor-mounted unit consisting of a single main breaker and feeder breakers as required.

Provide a minimum of two 3-pole 200A spaces and four 3-pole 100A spaces for future loads. Provide switchboard capacity for 50 charging stations including separate utility metering.

Overcurrent protective devices will be fully rated for the available symmetrical fault current. Series-rated overcurrent protective devices will not be considered adequate protection against fault current damage to equipment.

6.3.3 Emergency Power

Provide a natural gas powered engine-generator set together with all required operating accessories assembled to give a complete and operational power generation system.

The generator set will be new, latest production model factory assembled and tested prior to delivery to job site. Size the generator to provide power for elevators, lighting, fire alarm and security.

The engine and alternator will be the product of one manufacturer or a combination of two manufacturer's equipment regularly assembled by the supplier as a complete package in this size and configuration.

Generator to be in generator room. Entire unit shall be self-contained. Provide all necessary controls and accessories.

The security / communications room electrical system shall be equipped with an uninterruptable power system to provide continuous power, in the event of a power failure, until generator supplied power comes online.

6.3.4 Power Distribution

Power distribution, large electrical loads, and motors sized at ½ HP and larger will be served by 480V power. Motors 1 HP and above will be equipped with NEMA standard magnetic starters. Power factor correction will be required for motors above 25 HP. Minimum power factor will be 95-percent. Lighting circuits will be served at 277V. Receptacles and small convenience loads will be served at 120V.

Dry-type step down transformers with 480V primary to 208Y/120V secondary shall be located in spaces that provide adequate ventilation per manufacturer's requirements and current edition of NEMA TP-1.

All electrical branch circuit panels will utilize bolt-on circuit breakers, and have copper bussing. Make provisions for 15 percent spare breakers plus 15 percent space for additional branch circuits in each panelboard. Fill each spare position with a 20A, single-pole spare circuit breaker device. Provide 120/208V, 3-phase, 4-wire panels in locations as required to power loads without excessive voltage drop. Conductors for 20A branch circuits will be upsized to #10 AWG if over 100 feet for 120V circuits and over 230 feet for 208V circuits. Surface mount panels in unfinished spaces; others in finished spaces will be flush mount. Interrupting ratings of panels will be per short-circuit and protective device coordination study.

All panelboards not located within the same space as their source panel, shall be provided with a Main Circuit Breaker.

6.3.5 Electric Vehicles

Nine electric vehicle charging stations shall be installed or prepared for, as described in paragraph 2.1.1 of this Design Criteria, 'Parking Spaces'. Each complete installation of a charging station shall provide Listed and Labeled Electrical Vehicle Service Equipment (EVSE) that provides Level 1 and Level 2 charging capacity.

The Charging stations provided under this Project shall be as supplied under an existing purchasing contract with the City of Seattle, as follows

1. Charge NW: Existing City of Seattle Contract #0000002867. Contact-Jason Edens, 206-733-9583, Jason.edens@seattle.gov.
2. Eaton Corporation: Existing City of Seattle Contract #0000002797. contact-Jason Edens, 206-733-9583, Jason.edens@seattle.gov.

6.3.6 Receptacles

Provide duplex receptacles along the perimeter of elevator and equipment rooms at 12 feet on center as wall space permits. Provide convenience receptacles at 25 feet on-center spacing in other areas.

Provide convenience outlets in the following areas: Mechanical Room, Main Electrical Room, Emergency Power Room, Elevator Pit, Elevator Machine Room, Fire Suppression/Sprinkler Room, and Security/Communications Room. Receptacles will be ground fault circuit interrupting (i.e., GFCI) type where required by code.

Provide dedicated equipment receptacles for any fixed equipment loads.

Provide one outdoor weatherproof GFCI receptacle near each exterior entry door. Provide one outdoor weatherproof GFCI maintenance receptacle within 25 feet of each rooftop air handling unit. Also, provide similar receptacles for air handling units in other areas.

The maximum number of convenience receptacles on any one circuit will be limited to eight. The maximum number of receptacles on any single 20A circuit used for computer terminal power outlets will be limited to four duplex devices.

6.3.7 Miscellaneous Equipment Connections

Provide electrical power connections to all electrified equipment as required for proper operation. Provide either hard-wired connections or special equipment receptacles as needed per manufacturers' instructions.

6.3.8 Required Calculations

The Developer shall submit the following Calculations:

1. Load Calculations – Showing the sizing of the service for the site, as required by the applicable Electrical Codes (NEC, WAC, All Cities Electrical Code Supplement, etc).
2. Short Circuit/Fault current Calculations – Include the documentation from the utility (PSE) indicating the available fault current from PSE a the Service.

3. Coordination Study – Provide documentation showing coordination of code required elements on Emergency Power Distribution system.
4. Arc Flash Calculations – indicating the potential incident energy at each panel (Cal/cm²), the AF Category of arc rated clothing required and the Arc Flash Boundry (feet/inches).

These calculations shall be done with SKM Software and ALL electronic files used for these calculations shall be delivered to the King County Project Representative, for use in the Electrical Engineering Section.

6.4 Lighting

6.4.1 Interior

Illumination in parking garage spaces will conform to normal practices appropriate to daytime and extended nighttime use. Illumination levels will be as prescribed in the IES (Illumination Engineering Society) Handbook. Interior foot-candle levels will be calculated by the IES “Lumen” method using room cavity ratios, manufacturer published Coefficients of Utilization (CU) and the following default reflectance values for unfinished spaces (unless other specific reflectance information is available): Ceilings: 70%; Walls: 30%; Floors: 10%; and Maintenance Factor: 0.6.

Minimum maintained illumination levels shall be per IES RP-20-98 Lighting for Parking Facilities.

Interior fixtures shall be metal halide, fluorescent or LED. All lighting will conform to the Washington State NREC (Non-Residential Energy Code) requirements for Lighting Power Allowance (LPA) and King County Ordinance.

Provide a UL 924 exit and emergency egress lighting system in accordance with NFPA 101 and circuit to the Emergency Power Source. Keep temperatures in room below 86°F (for any batteries), provide ventilation as required.

Luminaires shall be selected for energy efficiency and suitable placed to minimize disability-glare and discomfort-glare.

6.4.2 Exterior

Provide exterior lighting at each exterior building entry door, all exterior egress pathways and stairwells, and roof level. Additionally, provide connection to an exterior illuminated sign at the main parking garage entry point.

Light spill onto adjacent properties shall be controlled by design, with the use of cut-off fixtures, house-shields and similar devices. Uniformity ratios will, in general, be Avg:Min no greater than 3.5:1, with a Max:Min ratio no greater than 12:1 based on the calculated initial horizontal footcandle levels values. Lighting for the parking structure will be based on the enhanced security levels of the IES (RP-20-1998 Lighting for Parking Facilities).

Exterior lighting will be LED, metal halide (MH) or high pressure sodium (HPS) and will conform to the IES standards. All illumination for the site shall not rely on municipal street lighting

Provide a handhole in each light pole on the roof with ground tied to the handhole lid, the ground lug in the light pole and to the code-sized equipment grounding conductor required to be run in the conduits with the circuit conductors. The light pole foundation shall also be connected to the ground system. A #4 AWG bare copper ground conductor shall be exothermically connected to the rebar in the pole foundation with enough conductor extending up the center of the foundation to provide connection to the grounding lug in the pole handhole.

Rooftop lighting fixtures shall be designed to enable convenient maintenance and replacement as needed without special tools or access, such as by lowering mast heads to the rooftop level.

6.4.3 Egress

Emergency pathway lighting fixtures will be provided as required by the most recent edition of the International Building Code (IBC). This requirement can be met by circuiting pathway fixtures from the emergency power supply.

Supplemental emergency lighting will be included to illuminate the main electrical room and electrical distribution equipment therein.

All light fixtures on the emergency power system will be marked in such a manner as to be easily identified from floor level. The fixtures shall be permanently identified with an identification plate that is substantially orange in color as described in WAC 296-468-700-009 Emergency systems – equipment identification in a manner that will not interfere with the illumination of the space the fixtures are serving.

6.4.4 Interior Control

The control of lighting shall be configured such that reliable lighting and a suitable level of light is provided at all times. The system will be energy efficient and in compliance with the latest codes in Washington State and IESNA Document RP-20 and Standard 90.1, latest editions. The lighting control system will control the time and duration of lighting in all areas with both days and hours of lighting field adjustable.

All areas shall be illuminated during all hours that the facility is open for public use. The programming of the lighting management portion of the EMS will be coordinated with Power Distribution, Transit Operations, and Transit Maintenance groups.

6.4.5 Exterior Control

Exterior and roof lighting will be extinguished between daybreak and dusk. Days and hours or reduced lighting will be field adjustable.

Lighting control will be by a combination photocell and time clock arrangement operating output contactors by relay. Circuits will provide a maintenance function hand-off-auto manual control that includes a two-hour off-delay feature in the hand position (NREC requirement). The time clock will have a method of keeping time, in the event of a short outage.

6.4.6 Circuiting

Lighting branch circuits will be loaded to no more than 12A on any single 20A circuit.

6.5 Fire Alarm and Detection

Provide an addressable-analog fire alarm system with manual and automatic alarm initiation, complete and fully operational as required by AHJ enforced codes. Specific design criteria for fire alarm and detection systems will comply with applicable sections of NFPA 72. System will be capable of offsite third-party monitoring and will include an annunciator located at the point of fire department response. System will include initiating devices (i.e., pull stations, fire protection monitoring devices, duct detectors, etc.) and annunciation devices (i.e., horns and horn/strobes) in conformance with ADA requirements.

King County Metro Transit has standardized on the Edwards System Technology EST-3, no substitutions; and conform to all other Metro Transit requirements.

6.6 Communications

Provide all data communication station wiring (CAT 5E) between the computer workstation (or remote terminal location as applicable) RJ-45 interface jacks and patch panels at the Main Distribution Frame / Intermediate Distribution Frame (MDF/IDF) location.

Provide voice telecommunication station wiring using CAT-5E unshielded twisted pair (UTP) and RJ-45 modular interface jacks.

Incoming Telecommunications service to the facility will be per King County Information and Telecommunications Services (ITS) Division requirements.

6.7 Security and Access Control

Provide a remote panel to King County Metro's existing Andover Parking Central Monitoring System Access Control System, including computer software, sub-control panels, intelligent field interface panels, card readers, door position indicators, request-to-exit devices, access cards, power supplies for electric strikes and locks, electrical connections, and wire and cable. Interface with the CCTV Digital Video Recorder. Provide all raceways, wiring, components, devices, and power for complete and operable access control system. Provide interface with elevator(s). Provide keypad access controls and induction loops for each motorized vehicle gate location, along with a power connection for the gate operator.

Provide Panic Alarm and Intercom system per King County facility standards. Provide wall and pedestal mounted Panic Alarm stations for visible and audible emergency annunciation and communication at four locations minimum on each level of the garage.

Security and access control systems shall conform to King County Metro Security Standards and Details. See Paragraph 6.9 for obtaining security documents.

6.8 CCTV

Provide a closed circuit television (CCTV) monitoring system including cameras (incl. mounts and lenses for garage, canopy and elevator), digital video recorder, UPS and equipment rack.

Provide cameras, wiring, and associated equipment to enable analog camera connectivity, including video signal, camera power, camera PTZ control signals, and environmental requirements at the

equipment rack located in the garage communication room. Provide all raceway, cabling, power supplies, equipment, and other material necessary for a complete, functioning CCTV system ready for connection to networked surveillance equipment by others.

When a panic alarm is activated, cameras shall provide viewing of panic station.

6.9 Security Documents

The Security Contractor shall request and be required to complete and submit a sensitive security information (SSI) non-disclosure agreement (NDA) before King County Metro Security Standards documents are released. Security sensitive information and drawings are subject to King County security policies. The Security Contractor shall coordinate with King County.

Security and access control systems shall conform to King County Metro Security Standards and Details.

7 Submittals

7.1 Preconstruction

Provide 30%, 60%, and 90% design review packages to King County during design for comment. Provide 100% Construction Documents and Specifications. Submittals should include construction drawings, material submittals, shop drawings, equipment submittals, structural calculations, drainage calculations, lighting calculations, copy of building permit, geotechnical report, boundary survey, grading and paving plan.

Subsequent to each of King County's 30%, 60%, 90% reviews, the Developer shall not continue the design until King County has received either proof that the review comments have been incorporated, or the Developer has provided sufficient evidence, to the satisfaction of King County, that the comments will be incorporated prior to the next review.

7.2 During Construction

During construction provide inspection reports, testing reports, equipment testing with photos. During preparation for paving, submit certified test results of subgrade density to Metro prior to placing base material and concrete pavement. Metro's acceptance of subgrade construction will be necessary prior to placement of base and pavement sections.

7.3 Post-Construction

After completion, provide As-built construction drawings (one hard copy plus one CAD copy provided in AutoCAD 2012), equipment documentation and operation manuals, and certificate of occupancy.

Provide transferable equipment warranties.

APPENDIX A

KING COUNTY PHYSICAL INFRASTRUCTURE STANDARDS



Information Technology Governance Standards

Title PHYSICAL INFRASTRUCTURE STANDARD	Document Code No. Revision draft 1.0 05-15-2008 (twm)
Chief Information Officer Approval _____ Date _____	Effective Date _____

1. PURPOSE:

This standard establishes the approved requirements for the installation and maintenance of Network infrastructure in King County Facilities for the King County Wide Area Network (KC WAN). The county will benefit from a structured and well documented Network infrastructure. King County's Network infrastructure must support a wide variety of needs at a broad range of physical locations within the county.

2. APPLICABILITY:

This standard is applicable to all King County Workforce Members, including those personnel responsible for the design, specifications, construction, procurement, or installation of Network infrastructure in new and major renovations or remodeling of existing King County Facilities. It is intended to be used early and throughout the design, planning, and construction phases of the remodeling of existing buildings, the construction of new King County Facilities, or as the county looks at leasing new spaces.

3. REFERENCES:

- 3.1. 5-STD-607-A-2002 Commercial Building Grounding and Bonding Requirements for Telecommunications
- 3.2. ANSI/TIA/EIA-568
- 3.3. IEEE STD-1100 (IEEE Emerald Book) IEEE Recommended Practice for Powering and Grounding Electrical Equipment
- 3.4. TIA-942 Telecommunications Infrastructure Standard for Data Centers
- 3.5. Information Technology Policy and Standards Exception Request Process
- 3.6. Network Equipment Standard

4. DEFINITIONS:

- 4.1. **AMP:** Ampere is a measurement of electrical current in a circuit. Contrast with "volts," which is a measure of force, or pressure, behind the current. Multiplying amps times volts derives "watts," the total measurement of power. One amp is 6,280,000,000,000,000 (6.28 x 10¹⁸) electrons passing by the point of measurement in one second.
- 4.2. **ANSI:** American National Standards Institute

PHYSICAL INFRASTRUCTURE STANDARD

- 4.3. **Category 5 Cable:** Commonly known as “Cat5”, is an unshielded, twisted pair type cable designed for high signal integrity. The actual standard defines specific electrical properties of the wire, but it is most commonly known as being rated for its Ethernet capability of 100 Mbit/s. Its specific standard designation is EIA/TIA-568. Cat5 cable typically has three twists per inch of each twisted pair of 24 gauge copper wires within the cable. The twisting of the cable reduces electrical interference and crosstalk. Another important characteristic is that the wires are insulated with a plastic (FEP) that has low dispersion, that is, the dielectric constant of the plastic does not depend greatly on frequency. Special attention also has to be paid to minimizing impedance mismatches at connection points.
- 4.4. **County Enterprise Network:** The network commonly used to conduct county business that provides transport of data within and between county facilities and other agencies of county government. This definition also refers to the network used to transport data between the county, other government agencies and the Internet. It does not refer to networks built for the sole purpose of meeting special operations needs of county business units which include, but are not limited to, process control and supervisory control networks. Nor does it refer to the King County Institutional Network (I-Net) which is required to meet contractual obligations with I-Net customers and the local cable utility.
- 4.5. **Data:** Any form of information whether on paper or in electronic form. Data may refer to any electronic file no matter what the format: database data, text, images, audio and video. Everything read and written by the computer can be considered data except for instructions in a program that are executed (software). A common misconception is that software is also data. Software is executed, or run, by the computer. Data are “processed.” Thus, software causes the computer to process data.
- 4.6. **Data and Telecommunications Area:** (Hereafter referred to as the “Data/Telecommunications Area”, “MDF” or “IDF”) The MDF/IDF is the termination point for all station wiring for the building and floor. This area should also house any data networking and telecommunication equipment required for the facility.
- 4.7. **Data Closet:** See Data and Telecommunications Area above.
- 4.8. **Data Tail Cable:** A hardwired cable from a switch to a remote cross-connect panel.
- 4.9. **EIA:** Electronics Industries Association.
- 4.10. **EMF:** Electromagnetic Field.
- 4.11. **ETL:** Electrical Testing Laboratories.
- 4.12. **FCC:** Federal Communications Commission.
- 4.13. **Home Run:** A cable that begins at a central distribution point, such as a hub or PBX, and runs to its destination station without connecting to anything else.
- 4.14. **HVAC:** Heating, Ventilation and Air-Conditioning
- 4.15. **IDF:** Intermediate Distribution Frame. A wiring rack located between the MDF (main distribution frame) and the intended end user devices (telephones, routers, PCs, etc.). Cables run from the outside world to the MDF and then to the IDFs.
- 4.16. **King County Facilities:** Any space King County owns, leases, rents or occupies.

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- 4.17. **Large Site:** This typically refers to multi-story or campus environments where 100 or more county staff reside in multiple locations.
- 4.18. **MDF:** Main Distribution Frame. A wiring rack that connects outside lines with internal lines. It is used to connect public or private lines coming into the building to internal Networks. In a telecom central office (CO), the MDF is generally in close proximity to the telephone switch.
- 4.19. **Network:** A system that transmits any combination of voice, video, and/or data between users. The network includes the network operating system in the client and server machines, the cables connecting them and all supporting hardware in between; such as bridges, routers and switches. In wireless systems, antennas and towers are also part of the network.
- 4.20. **Network Infrastructure Equipment:** Equipment that enables network connections for a facility, group or individual to other points on the County Enterprise Network. This definition includes LAN switches, routers and wireless access points serving each facility and those used to aggregate and distribute data destined to other parts of the network. It also includes appliances used to control network traffic and secure the network from unauthorized access. The appliances include, but are not limited to; network traffic shapers, network firewalls, VPN concentrators and network intrusion sensors.
- 4.21. **Non-infrastructure Server:** Servers that are not part of the Network's basic fundamental structure such as; video, voice and wireless controllers and servers.
- 4.22. **Organization:** Every county office, every officer, every institution, whether educational, correctional or other; and every department, division, board, and commission.
- 4.23. **SC:** "Stick and Click" or Subscription Channel. This is a type of fiber cable connector.
- 4.24. **Small Site:** This typically refers to environments in which less than 100 county staff reside in a single location.
- 4.25. **TGB:** Telecommunications Grounding Bus-bar.
- 4.26. **TIA:** Telecommunications Industries Association.
- 4.27. **TMGB:** Telecommunications Main Grounding Bus-bar.
- 4.28. **UPS:** Uninterruptible Power Supply.
- 4.29. **VAC:** Volts Alternating Current
- 4.30. **Workforce Member:** Employees, volunteers, and other persons whose conduct, in the performance of work for King County, is under the direct control of King County, whether or not they are paid by King County. This includes full and part time elected or appointed officials, employees, affiliates, associates, students, volunteers, and staff from third party entities who provide service to King County.
- 4.31. **Work Stations:** Any place a person may work. This includes reception areas, conference rooms, lunch rooms, day rooms, copier rooms, printer rooms, etc.

PHYSICAL INFRASTRUCTURE STANDARD

5. **STANDARDS:**

5.1. **General Requirements:**

- 5.1.1. Management of all Data Closets is the responsibility of the Office of Information and Resource Management (OIRM). No equipment shall be installed in the closet without prior approval from OIRM.
 - 5.1.1.1. Access to Data Closets shall be restricted to OIRM approved Workforce Members.
 - 5.1.1.2. Temporary access to a Data Closet may be granted by the OIRM Network Engineering Supervisor or his or her delegate.
 - 5.1.1.3. OIRM reserves the right to remove any unauthorized cables, connections, and/or hardware. The affected Organization's LAN Administrator and Technology Management Board (TMB) representative shall be notified of OIRM's intentions five (5) business days prior to removal. This timeframe will allow the effected Organization sufficient time to acknowledge the removal.
- 5.1.2. All county owned facilities and non-county owned facilities shall use Category 5e or better, unshielded twisted pair cable.
- 5.1.3. For Large Sites and business critical buildings, a minimum of two (2) separate fiber paths shall enter the site from different directions.
- 5.1.4. A four foot (4') deep hand hole or vault shall be installed at ground level for each fiber entry at the property line.
- 5.1.5. Each hand hole or vault shall contain a minimum of four (4), four inch (4") electrical conduits to the interior of the building.

5.2. **Workstation Wiring Requirements:**

- 5.2.1. Each Workstation shall have a minimum of three (3) RJ-45 Cat5e (or better) jacks on a four (4) jack faceplate.
- 5.2.2. A minimum of three (3) Category 5e (or better) unshielded twisted pair cables shall be run to each faceplate.
- 5.2.3. The jacks shall be labeled as "A", "B" & "C", prefaced by the communications faceplate numbering scheme proposed for the building.
- 5.2.4. All RJ-45 jacks shall be "universal", allowing voice or Data to be used in any combination.
- 5.2.5. All termination equipment shall be rated at Cat5e or better.
- 5.2.6. All Network cabling available in public areas shall be electronically or physically secured.
- 5.2.7. The wiring shall conform to EIA/TIA 568B standards.
- 5.2.8. The wiring must be certified to operate at cable rating specifications.

PHYSICAL INFRASTRUCTURE STANDARD

- 5.2.9. Cable length shall not exceed ninety (90) meters of installed cable from the Workstation jack to the IDF patch panel.
- 5.2.10. Wall or rack mounted connecting blocks shall be Systimax VisiPatch 360 System with vertical and horizontal wire management throughout.
- 5.2.11. Wire management for the VisiPatch wall field shall be required and specified with backboard elevations.
- 5.2.12. The backboard shall contain VisiPatch units for Workstation cable termination, VisiPatch units for future Workstation cable termination, VisiPatch units for copper PBX extensions, and space for VisiPatch units for future use. The VisiPatch units for the Workstation terminations and the copper PBX extensions shall occupy the bottom two thirds (2/3) of the VisiPatch field, with space left for future VisiPatch units at the top one third (1/3).
- 5.2.13. The top one third (1/3) of the VisiPatch field is to be used for Data Tail Cables from the rack mounted Network equipment.
- 5.2.14. Data shall be served from Network equipment, within Data Closets, ordered through OIRM and installed by OIRM in accordance with the **Network Equipment Standard**.
- 5.2.15. Data and telephone patch cables shall be Avaya Systimax VisiPatch on each end, manufactured by Systimax. Data patch cables shall connect the upper one-third (1/3), the Data tail terminations, to the lower two-thirds (2/3), the station terminations. Telephone patch cables shall connect the copper PBX extensions to the station terminations.
- 5.2.16. Each floor's IDF shall have a copy of its "as built" documentation, including a floor map showing all Data jacks and wire runs.

5.3. **Data Tail Cabling Requirements:**

- 5.3.1. King County OIRM shall approve the quantity and length of the installed patch and Data Tail Cables utilized inside the Data Closets.
- 5.3.2. Each Data Tail Cable shall be cut to length and terminated with an RJ-45 connector dressed neatly and tested to Workstation cable standards.
- 5.3.3. Service loop(s) shall be left in the Data Tail Cables to provide seismic isolation of the racks from the backboard and cable trays.
- 5.3.4. Data Tail Cables shall be supported in a manner consistent with seismic survivability, including slack.
- 5.3.5. An MDF/IDF may have the voice/Data Workstation wiring on rack or wall mounted RJ-45 patch panels to match previously installed cabling.
- 5.3.6. Each termination shall be uniquely labeled in accordance with the labeling scheme proposed for the building.

PHYSICAL INFRASTRUCTURE STANDARD

5.4. **Cable Requirements:**

- 5.4.1. All cable shall be rated at Cat5e or better.
- 5.4.2. All cable shall be rated for the plenum and air space in which it is to be installed.
- 5.4.3. All cable shall be installed to Cat5e installation standards (EIA/TIA).
- 5.4.4. All cable shall be marked with a unique identifier at each end, as well as one foot (1') in from the end, at a minimum.
- 5.4.5. With the exception of cable conduit and junction box installations, there shall be one foot (1') of slack in the installed cable.
- 5.4.6. All cables and terminations shall be tested, at the minimum, to Cat5e standards.
- 5.4.7. All cable shall be routed to the Data/telecommunications area in the MDF/IDF using approved cable trays or communication cable support materials. The cable shall use the most direct route.
- 5.4.8. A cable tray shall be installed to carry the Workstation cable from the central corridor cable tray to the backboard in the Data/Telecommunications Area.
- 5.4.9. Cable bundles shall be supported at intervals of not less than four feet (4').
- 5.4.10. Support points can not bend with less than a four inch (4") radius or pinch into jackets of the cables.
- 5.4.11. Cable bundles shall be tied together neatly, wherever possible, using only Velcro style material.
- 5.4.12. Ensure cables installed under the access flooring do not come in contact with any electrical conduits, electrical equipment, mechanical equipment, or ducts.
- 5.4.13. Fire suppression shall be used as required by local, county, state, and federal fire codes.
- 5.4.14. Cable installation, routing, and dressing shall be done following all applicable local, regional, and national codes, as well as industry best practices.

5.5. **Data and Telecommunications Areas (MDF/IDF):**

- 5.5.1. All MDF and IDF designs, including layout, elevations, and VisiPatch designs shall be pre-approved by OIRM.
- 5.5.2. A dedicated, secured Data/Telecommunications Area shall be available. In the case of smaller sites where the MDF/IDF can not be fully secured, every effort shall be made to protect and promote the security of the MDF/IDF space as completely as possible. In no case shall the public have unescorted access to the space.
- 5.5.3. This area shall contain the terminations for all Workstation wiring, equipment racks for any rack mounted equipment, PBX, and Data equipment.
- 5.5.4. Non-infrastructure Servers shall not be located in the MDF/IDF.

PHYSICAL INFRASTRUCTURE STANDARD

- 5.5.5. The MDF shall have fire-proofed, three quarter inch (¾") primed and painted plywood backboard installed. It shall be large enough to accommodate the Data/Telecommunication terminations. This backboard shall cover, at a minimum, eight by four feet (8' x 4'). This standard is meant to ensure that local, state, and federal codes are met.
- 5.5.6. The backboard shall be exclusively used for Data/Telecommunication terminations.
- 5.5.7. All Network equipment shall be installed on standard nineteen inch (19") form factor racks.
- 5.5.8. Each installed equipment rack shall be nineteen inches by a maximum of seven feet (19" x 7') aluminum, open frame equipment racks (Chatsworth 46353-503), and shall be installed in the area, aligned to the backboard, and bolted to the floor. These racks shall be installed to the standards stated for the remainder of the room. In cases where it is not possible to drill into the flooring, the equipment racks shall be stabilized in a manner that meets with OIRM and building owner approval.
- 5.5.9. Standard nineteen inch (19") cabinet enclosures may be used with OIRM approval.
- 5.5.10. The double-sided racks shall have a double sided vertical wire manager (Chatsworth 11729-503 or Panduit PatchRunner PRV6, PRV8 or PRV12) installed on each side.
- 5.5.11. The racks shall be installed in a way that allows future expansion and access to all sides. Install with a minimum of forty-eight inches (48") of clear space in front and thirty-six inches (36") in the back.
- 5.5.12. There shall be a twelve inch (12") cable runway above the rack and extending to the backboard. This rack and cable runway shall be used for Data networking equipment and patch cables. This cable tray may require seismic transitions to the backboard and/or racks.
- 5.5.13. In some instances and configurations, the rack and associated equipment may require additional seismic bracing. This bracing shall be installed in a way that does not interfere with accessibility or installation of equipment in the open frame rack.
- 5.5.14. A TMGB or TGB shall be available for equipment grounding.
- 5.5.15. The rack(s) and associated equipment shall be grounded and bonded to the TMGB or TGB.

5.6. **Main Distribution Frame (MDF) to Intermediate Distribution Frame (IDF) Requirements:**

- 5.6.1. Each IDF shall have a single, complete path to the MDF, also known as a "Home Run" path.
- 5.6.2. Primary wiring from the MDF to the IDF shall be twenty four (24) strands of multi-mode fiber.
- 5.6.3. Fiber optics shall be terminated in Fiber Distribution Units (FDU) large enough to terminate all fibers.

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- 5.6.4. For new construction, fiber optics shall be terminated with SC or LC flat polished connectors, or as approved by OIRM.
 - 5.6.5. For existing facilities, the fiber shall be matched to the existing fiber, as approved by OIRM.
 - 5.6.6. Fiber optic panels shall be labeled in a consistent manner with descriptive and unique labels indicating “to” and “from” on each end. Individual fiber connectors shall be labeled with the same label on each end.
- 5.7. **Conduit and Riser Core Drill Requirements For Infrastructure or Larger Buildings:**
- 5.7.1. Three (3) separate four inch (4”) conduits or sleeves shall be a “Home Run” from the MDF to each IDF.
 - 5.7.2. At least one conduit or riser core drill shall be provided on any MDF to IDF run, to be open and available for future expansion.
 - 5.7.3. Conduits shall not be successive or “daisy chained”. Each cable path shall be separate.
 - 5.7.4. Riser core drills, where required, shall be five inches (5”) in diameter, with a four inch (4”) sleeve and fire-stopped.
 - 5.7.5. In buildings under five (5) floors in height, the riser core drills shall be grouped at a minimum of three (3) dedicated cores for each floor.
 - 5.7.6. Buildings of five (5) floors and above shall have a riser core plan approved by King County OIRM.
- 5.8. **Conduit and Riser Core Drill Requirements For Workstations:**
- 5.8.1. The minimum size for Workstation conduit is three-quarter inch (¾”).
 - 5.8.2. Conduits shall not have a bend radius of less than one foot. * Note: If conduit is not necessary, there shall be at least a hole cut in the sheet rock with a mud ring installed at each Workstation. A pull string shall be installed and tied off to the ceiling above the highest point to which the sheet rock extends.
 - 5.8.3. Each conduit or mud ring installed shall have a pull string/tape/rope with no less than twelve inches (12”) excess at each end of the pull cord.
- 5.9. **Main Distribution Frame (MDF) Requirements:**
- 5.9.1. **MDF General Requirements for Larger Sites:**
 - 5.9.1.1. The MDF shall be secured by a card key or combination lock.
 - 5.9.1.2. The Main Data Closet shall have Cross Zone Detection and fire suppression.
 - 5.9.1.3. Non-infrastructure Servers shall not be housed in the MDF.

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- 5.9.1.4. The MDF may contain the IDF wiring for the ground floor. This wiring shall be in separate racks.
- 5.9.1.5. Wall mounted punch down connection blocks shall be Systemax VisiPatch 360 System with integrated vertical and horizontal wire management throughout.

5.9.2. MDF General Requirements for Small Sites:

- 5.9.2.1. The Small Site MDF shall be either electronically or physically secured. There shall be no unescorted public access.
- 5.9.2.2. The Main Data Closet shall have Cross Zone Detection and be supplied with a fire extinguisher. The fire extinguisher shall be checked annually, with the LAN Administrator's sign-off, to verify it is at the appropriate level and in proper working condition.
- 5.9.2.3. The MDF may contain the IDF wiring for the ground floor. This wiring shall be in separate racks.
- 5.9.2.4. Wall mounted punch down connection blocks shall be Systemax VisiPatch 360 System with integrated vertical and horizontal wire management throughout.

5.9.3. MDF Space Requirements:

- 5.9.3.1. The space shall not be located below grade.
- 5.9.3.2. The space shall not be located below water or drain pipes, bathroom or kitchen facilities, with the exception of fire suppression systems.
- 5.9.3.3. The space shall not be located adjacent to the elevator equipment, control room, or any EMF generating sources.
- 5.9.3.4. The space shall not have external windows.
- 5.9.3.5. The space shall be a highly secure location with 24 hour secure access, seven (7) days a week.
- 5.9.3.6. For security reasons, the space shall be identified only by a room number.
- 5.9.3.7. One thousand square feet, at a minimum, is required for large (greater than 100 employees) buildings.
- 5.9.3.8. At least 150 square feet of storage room is required. The storage room shall be as close to the MDF as possible.
- 5.9.3.9. At least 400 square feet, in or near the MDF, is required for UPS and HVAC equipment.
- 5.9.3.10. No ceiling tile is preferred. Ceilings may be suspended acoustical tile.
- 5.9.3.11. Flooring shall be antistatic tile or sealed concrete.
- 5.9.3.12. Four (4) 10 x 12 foot equipment/work areas are required for each MDF.
- 5.9.3.13. The space should contain six (6) standard 72 x 19 inch racks.

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- 5.9.3.14. The back of each rack requires a minimum three feet (3') of clearance from the wall.
- 5.9.3.15. Each rack requires a minimum of four feet (4') of clearance in front.
- 5.9.3.16. Racks may be mounted in one or more rows with three feet (3') of clearance at either end of the row.
- 5.9.3.17. Racks shall be secured in a manner consistent with the seismic requirements for the facility.
- 5.9.3.18. "Clearance space" from the racks shall not overlap in these areas.
- 5.9.3.19. There shall be no less than 8 x 20 feet of backboard, with four feet (4') of clearance in front for the placement of punch down blocks and other wall mounted terminations.

5.9.4. MDF Cable Tray Requirements:

- 5.9.4.1. Overhead, twelve inch (12") open cable tray or ladder racks, dependant upon the final room shape, are required.
- 5.9.4.2. Cable trays shall be installed from the rack group to each work area.
- 5.9.4.3. Cable trays shall be installed between all racks.

5.10. Intermediate Distribution Frame (IDF) Requirements:

5.10.1. IDF General Requirements:

- 5.10.1.1. The IDF shall be secured by a card key or combination lock.
- 5.10.1.2. Cabling between IDF and Workstations shall not exceed 90 meters.
- 5.10.1.3. IDF wiring for the first floor may be located in the MDF, but shall be on separate racks.
- 5.10.1.4. The IDFs shall be shared between Data and voice and shall distribute service to the desktop.
- 5.10.1.5. All voice/Data Workstation wiring for a floor shall be terminated on that same floor, regardless of the cable path.
- 5.10.1.6. Each floor shall have a single IDF.
- 5.10.1.7. Primary phone wiring, from the MDF to each IDF, shall be designed or pre-approved by OIRM.

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5.10.2. IDF Space Requirements:

- 5.10.2.1. The IDF shall not be located below grade.
- 5.10.2.2. The space shall not be located below water or drain pipes, bathroom or kitchen facilities, with the exception of fire suppression systems.
- 5.10.2.3. It shall not be located adjacent to the elevator equipment, control room, or any EMF generating sources.
- 5.10.2.4. The space shall not have external windows.
- 5.10.2.5. The IDF shall be a highly secure location.
- 5.10.2.6. The IDF requires at least 150 square feet of floor space.
- 5.10.2.7. The ceiling preference is no ceiling tile. Ceilings may be suspended acoustical tile.
- 5.10.2.8. The flooring shall be antistatic tile or sealed concrete.
- 5.10.2.9. The IDF should contain racks that are seven feet by nineteen inches (7'x 19").
- 5.10.2.10. Each rack requires a minimum 36" rear clearance from the wall.
- 5.10.2.11. Each rack requires a minimum of 48" front clearance or as designed or pre-approved by OIRM. In no case shall there be less than three feet (3') of front clearance.
- 5.10.2.12. There shall be no less than eight by four feet (8'x 4') of backboard, with four feet (4') of clearance in front, to allow for the placement of punch down blocks and other wall mounted terminations.

5.11. Power Requirements:

- 5.11.1. Electrical service for the racks shall be from panels that are separate from any large electrical loads, such as elevator or HVAC motors.
- 5.11.2. Circuits shall be terminated above the racks and shall be of the dedicated and isolated ground types.
- 5.11.3. There shall be a minimum of two (2) 20 amp, 120 VAC circuits, with 4-plex outlets (5-20R).
- 5.11.4. A 20 Amp, 120 VAC dedicated circuit, isolated ground with four (4) 20 Amp outlets (5-20R) shall be installed near the backboard. These outlets shall be located at each end of the backboard and no closer than twelve inches (12") from any copper telecommunications cable or termination.
- 5.11.5. A 30 Amp, 110 VAC dedicated circuit, with an isolated ground (LS-30R) and a 20 Amp dedicated circuit, with isolated ground with four (4) 20 Amp outlets (5-20R), shall be installed above each rack located in the MDF/IDF. These outlets shall be located no closer than twelve inches (12") from any copper telecommunications cable or termination.
- 5.11.6. The above circuits shall be on generator power and marked as such.

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PHYSICAL INFRASTRUCTURE STANDARD

5.11.7. Larger installations may have specific individual requirements that supersede those above.

5.12. Air Conditioning Requirements:

5.12.1. Air conditioning for the Large Site MDF/IDFs shall be supplied from units separate from the general building HVAC.

5.12.2. The HVAC requirements of the MDF shall be pre-approved by OIRM for each individual room.

5.12.3. The HVAC requirements of the IDF shall be pre-approved by OIRM for each individual room.

5.12.4. The HVAC systems for Large Site MDF/IDF room(s) shall be required to operate 7 x 24 x 365.

5.12.4.1. Relative humidity shall be between 45% and 51%. The recommended set-point is 48%, +/- 3%, with hi/lo alarms set at 20% and 70% respectively.

5.12.4.2. The temperature shall be between 64 and 75 degrees Fahrenheit (18-24 Celsius) year round.

6. EXCEPTIONS:

6.1. Any Organization seeking an exception to this standard must follow the Information Technology Policy and Standards Exception Request Process using the Policy and Standards Exception Request form. This form can be found on the Office of Information Resource Management policies and procedures Web page at <http://kcweb.metrokc.gov/oirm/policies.aspx>.

7. RESPONSIBILITIES:

7.1. King County OIRM shall be the approval authority for the layout of the MDF/IDF room(s) in relation to Data/Telecommunication layouts and backboard elevations.

7.2. King County OIRM shall be the approval authority for the riser core plan where required.

7.3. King County OIRM shall be the approval authority for the submittals of all materials used in the cable plant installation.

7.4. King County OIRM shall be the approval authority for the electrical and HVAC designs for the MDF/IDF room(s).

7.5. The Chief Information Officer (CIO) is the approval authority for the **Physical Infrastructure Standard**.

7.6. OIRM Network, Systems, and Operations is the steward of the Network infrastructure and is responsible for providing all transport services across the KC WAN. As such, OIRM will become the owners of the Network policies, standards, and guidelines.

PHYSICAL INFRASTRUCTURE STANDARD

- 7.7. OIRM is responsible for the operations and maintenance of all Network Infrastructure Equipment connected to the King County Enterprise Network. OIRM is not responsible for Network Infrastructure Equipment that operates solely with a department **and** that OIRM has previously determined neither connects to, nor affects the operation of the County Enterprise Network.
- 7.8. OIRM is responsible for protecting the integrity of the County Enterprise Network. To meet this responsibility OIRM shall ensure compliance with the terms detailed in the **Physical Infrastructure Standard**.
- 7.9. OIRM is responsible for the security of the County Enterprise Network. Policies, standards, guidelines, and associated oversight relating to Network security are established and maintained by the Chief Information Security and Privacy Officer (CISPO). Managers in charge of information technology within each Organization or IT Service Delivery Managers are responsible for ensuring that devices, systems and applications under their control are in compliance with the **Physical Infrastructure Standard**.
- 7.10. King County departments/agencies are responsible for informing their employees of this policy.
- 7.11. The **Physical Infrastructure Standard** will be reviewed annually, or as needed, by OIRM.

8. **STANDARDS GUIDELINES:**

- 8.1. When vacating a leased space, the cabling and equipment disposal is dependent upon the Facilities Management Division's (FMD) lease agreement. King County policy dictates that the county may not gift to private enterprise. Please consult FMD about their agreement on the disposal or removal of equipment.

APPENDIX B

KING COUNTY TRANSIT POWER & FACILITIES

STANDARDS FOR TRANSIT FACILITIES DESIGN & MAINTENANCE

**STANDARDS
FOR
TRANSIT FACILITY
DESIGN & MAINTENANCE**

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I. INTRODUCTION

PURPOSE OF STANDARDS

Power & Facilities Transit's Power & Facilities section is responsible for the management, maintenance and repair of operating and support facilities, and passenger facilities exclusive of bus shelter stops and trolley-related utilities.

This document is intended to:

1. Serve as a systems, products and materials resource for facility managers, supervisors, chiefs, facility service parts specialists and crews.
2. Guide site and facility development for capital project managers, physical plant inspectors and architectural and engineering consultants.

This document does not substitute for a technical specifications manual, however, it identifies, where appropriate, preferred or specific materials that P&F have found to perform well in its maintenance work. When manufacturers are listed, these should be considered resources that P&F staff is familiar with.

This document provides guiding principles for those involved in the planning, design, construction, operation and maintenance of transit facilities:

- Develop facilities that are cost effective and efficient to maintain.
- Build-in flexibility so facilities can adjust to change and growth.
- Select durable materials, finishes and furnishings that require minimal maintenance.
- Adhere to standardize parts and materials to sustain product and system reliability.
- Proactively involve key P&F staff during planning and design phases to lend foresight into maintenance and operating issues.


I. INTRODUCTION

HOW TO USE THIS DOCUMENT

- Application** Many of the design issues and considerations noted in this document primarily apply to operating and operational support facilities, although some basic guidelines could apply to passenger facilities.
- Organization** Sections I – II outlines general design expectations from the standpoint of facility maintenance. In addition, this part provides guidelines for P&F involvement during each phase of a building project's progress from planning through closeout. The intent is to assist project managers in developing plans and is not intended to be a project management guide. Section III consists of the technical sections that follow the 2004 CSI MasterFormat numbering sequence. Only the divisions that relate to maintenance issues are included. We use six descriptive categories that range from broad design guidelines to specific products or product brands:

1. Design guidelines to guide site and building designs that would impact maintenance.
2. Industry standards define the accepted values or requirements recognized by the construction industry.
3. Performance standards define how products should work.
4. Acceptable manufacturers and product brands, when listed, are product sources used by P&F and considered tried and true. Some product brands are preferred for maintenance consistency and ease of ordering replacements or parts on the operating side. For capital construction projects, as long as performance standards are met, other manufacturing sources can be used or added to develop technical specification documents. When a specific product brand must be used, this is identified in the next two categories.
5. Sole product brand names a specific product brand, no substitutes.
6. Proprietary product is a product owned, made and sold by a single manufacturer or vendor.

In each technical sub-section, only the relevant categories are used. Where available, manufacturer's web addresses are hyperlinked to its websites. Easy to spot icons indicate references to additional information:

 A reference to engineering design criteria and/or a source of specification information from Transit Design & Construction section.



A sustainable material or product that may apply to green building criteria.



Indicates available programming room data or templates.

I. INTRODUCTION

GENERAL REQUIREMENTS FOR SERVICEABILITY

- Vehicle Access** At least one on-site parking stall for service vehicles is needed near a service entry area for each primary building. These parking stalls can be jointly used by other service personnel and vendors.
- A vehicle circulation plan should be carefully considered, taking into account waste, recycling and delivery movements without diminishing the intended circulation needs of the site or facility.
- Roof Access** Access to rooftop HVAC equipment should be restricted to the Building Operating Engineers (BOE) and engineering inspectors.
- If parapets are below the minimum 3ft height required by L&I (WISHA, WAC Chapter 296-24), fall protection must be strategically sited based on recommended standards developed by P&F. Additionally, skylights and air wells also require protective devices.
- Service Areas** Service areas and loading docks shall be programmed to accommodate the various maintenance functions as well as vendor deliveries. Weather protection may be required.
- Recyclables area** Make available for custodial use a room or area near a service entrance sized to accommodate up to three 46" x 32" bins to hold recyclable materials and a large container to transfer garbage loads. The canvas bins are provided by SeaDruNar, Transit's current contractor for recycled paper and cardboard.
- For staff use, provide containers grouped as a station for depositing recyclables to be located in lunch or break rooms. A typical station has separate bins for glass, mixed paper, plastic and aluminum. Depending on the occupancy of the building and size of the room, off the shelf containers located as stand-alones or contained in built-in casework to control clutter are acceptable.
- Exterior windows** A facility's exterior windows are washed approximately twice a year. The design of facility windows must consider amount, height, complexity and special glass features that may add to the operating costs of this service.
- Mechanical rooms** An adequately sized mechanical room will allow for efficient operation, servicing, repair and removal of equipment. The room must have sound insulation to mitigate mechanical noise. A minimum 60sf of workspace shall be provided adjacent to the HVAC controls.

I. INTRODUCTION

GENERAL REQUIREMENTS FOR SERVICEABILITY

- Electrical rooms** Electrical rooms must be located separately from other utility closets with adequate space for the proper management of the electrical utilities and its distribution within the facility. Adequate ventilation must be provided.
- Custodial closets** A minimum 80sf to be located near restrooms, one per floor. The room shall include storage space for cleaning supplies and materials. The space is to include a floor sink.
- An accessory supply storage room dedicated for custodial use is required if the areas to be maintained and/or the distance between areas are distinct from one another, e.g. different custodial needs in Operations vs. Vehicle Maintenance in an attached or co-located building.
- Custodial equipment** Provide adequate area and clearances for floor scrubbers and/or housekeeping carts, along with 110V outlets for charging equipment batteries. There are 1 to 3 scrubbers located at each Base and at key operating facilities. See Division 11 Equipment for more information.

END OF SECTION

I. INTRODUCTION

GENERAL REQUIREMENTS FOR EXTERIORS

- Employee safety** Many transit operating facilities are industrial in nature. Careful consideration in siting, circulation, vehicular traffic and heavy equipment work areas must be planned and reviewed at every opportunity to prevent employee accidents. Facility planning shall consider safety concepts through the interplay between the site environment and buildings refer to "Crime Prevention Through Environment Design" – CPTED.
- Garbage dumpsters** Small dumpsters sized for 1 - 4 cubic yards or large dumpsters sized for 8 – 30 cubic yards are to be sited near a service access entryway, separate from bus, or staff vehicle access and circulation, where possible.
- Cardboard recycling dumpster** A recycling service for those facilities with Stores or warehousing functions, a dumpster with front-loading capability, 6ft x 3ft, shall be provided for cardboard waste.
- Water supply & drainage** The quantity and location of hose bibs will be based on the site plan, including type and amount of landscaping. Areas intended for the wash-down of equipment or tools are to be augmented with surface drainage.
- Exterior storage** Provisions for the containment and unloading of scrap metals, non-paper recyclables, hazardous wastes and other materials are to be included in the site design. Circulation for loading and unloading by staff and service vendors is to be designated by safety markings or other means to avoid conflicts with other vehicle and bus traffic.
- Landscaping** Beyond code and site requirements, all landscaping plans need to follow guidelines outlined in the P&F Integrated Pest Management Program (IPM) and Crime Prevention Through Environment Design (CPTED) – see Division 32.



IPM principles begin, literally, from the ground up – through such factors as soil types, grading and slope, drainage, proximity to sensitive areas and selection of the right plants for the right places. It promotes healthy plant growth through appropriate maintenance practices that prioritizes non-chemical pest weed, insect, and vermin control, and determines tolerance thresholds for pests in the most labor efficient manner.

CPTED looks at landscapes in two ways: 1) Plants as potential deterrence to trespass, and 2) the proper siting of plants to avoid being inadvertent "accessories" to crime e.g. climbing trees to breach fencing. A landscape designed with CPTED principles must consider design issues for visibility, access, blind spots or corners, shadows, as well as the plant characteristics, i.e. height and width, at full growth.

END OF SECTION

II. PLANNING, DESIGN, CONSTRUCTION & CLOSEOUT CONSIDERATIONS

PARTICIPATION & REVIEWS

Purpose of reviews When Transit facilities are modified, expanded or added, P&F staff are subsequently tasked to manage, maintain and repair these facilities. The roles for P&F operating staff involvement in planning and design reviews are to:

- Determine if design criteria are consistent with maintenance work practices and resources.
- Evaluate maintainability and operability, and impacts to future facility management and operating costs.
- Contribute to product specifications.
- Alert management to future assets and the personnel/resources to maintain the assets.
- Allow preparation for the scheduling of power and facilities-related work to support the project work plan.

Reviews and/or project participation should involve key staff from the following work groups:

AREA OR SPECIALTY	P&F WORK GROUP
Facility and Master Planning	Capital Planning
Net Present Value Analyses	Capital Planning
Design Review	Capital Planning
Space Planning and Programming	Capital Planning
Scheduled Maintenance	Work Center
HVAC / Plumbing / Painting / Fire / Shelters / Carpentry	Building Systems
Custodial	Custodial
Landscaping / Grounds	Groundskeeping
Electrical / Trolley / Radio	Power Distribution
Waste Collection / Recyclables Wastewater / Energy	Environmental

END OF SECTION

II. PLANNING, DESIGN, CONSTRUCTION & CLOSEOUT CONSIDERATIONS

PLANNING CONSIDERATIONS

- Facility Planning** New facilities, expansions and remodels are based on capacity analysis, and are framed by Transit's Six-Year Service Plan and its associated strategic Expansion Plan (2003) for operating facilities. Facility planning can be generalized through three phases:
1. Laying out the project goals and assumptions allow key staff and managers to verify the basis of need.
 2. Determining space needs through documentation of:
 - Capacity modeling—this quantifies the question of what types, how much and when space is needed based on service growth and how efficient space is used.
 - Functional requirements – a planning-level program ties needs with capacity, and discerns essential functions that meet project goals.
 3. Testing the assumptions with preliminary alternatives analysis that includes a do-nothing or status quo option, documents the existing issues, level of risk, cost or impact against other options that will do-something. This begins the justifications that support the goals and scope. P&F's Capital Planning work group is a resource for capital projects with planning components that involve master or strategic facility plans, net-present-value alternative analyses, site planning, and asset assessments.
- Space Planning** Beyond requisite codes and regulations, space planning follows several criteria:
- Best practices/least operating costs
 - Facility use policies
 - Architectural and other industry standards
 - Conformance to King County policies
- Space Standards** Amount of Space: Office sizes and types are established by King County Administrative Policies and Procedures (RPM 9-1 AEP). Every attempt must be made to conform to the square footage range applicable to the job classification. Refer to Division 1 for square footages by personnel. Adjustments to a standard may occur if physical constraints or modification costs make compliance difficult. In this case, an explanation of the reasons for non-compliance should be documented.
- Non-office and specialty spaces should be defined through industry standards and through the programming process. Other space types in question should be consulted with P&F's capital planning workgroup.
- Office Landscape: Per KC Space Standards, open office landscaping is expected for all professional personnel. Private offices are allowed for Managers, Supervisors, Chiefs and others who have significant responsibility for handling confidential personnel issues. Special requests for private offices not stated above will be based on functional criteria for confidentiality and/or security.
- END OF SECTION

II. PLANNING, DESIGN, CONSTRUCTION & CLOSEOUT CONSIDERATIONS

PREDESIGN & DESIGN CONSIDERATIONS

Programming

P&F maintenance staff are typically the first to respond to facility issues. In this respect, some of the following guidelines can benefit the early design process.

With a few exceptions, general spaces from one operating facility to the next have common program elements. A good example is the program data for a typical custodial closet:

ROOM NAME:	CUSTODIAL CLOSET
Number of rooms:	One per floor
Room type:	Private, no window
Minimum size:	80sf
Adjacencies:	1) restrooms 2) elevator
Fixtures:	Floor sink, wall-mount faucet, pail hook
Utilities:	Hot and cold supply, floor drain
Finishes:	Wall – waterproof finish to 3' above sink, unpainted concrete. Floor – concrete; Ceiling – exposed
Furnishings:	Industrial shelving, approx. 48" w x 72" h with 5-6 shelves.

Room Identification & Signage

Allow adequate wall space next to doors for necessary signage and room identification. Refer to Division 10 for more information.

User Comfort

West and south facing windows should be outfitted with UV-blocking shades as well as mini-blinds, or a combination of blinds with screening material. Some designated private offices and workstation areas are to have adjustable thermostats within an allowable temperature range.

Ergonomics

Modular workstations can be adjustable to suit ergonomic needs of employees. Furniture installers should be alerted to any special employee needs. Racks, shelving and tall cabinetry should consider individual standing reach heights and reach radii not more than the median height of 65" for females and 69" for males.

Building Security

The interior layout of a building should identify three "security zones" – 1) areas open for common use during usual hours of operation, 2) secured areas and rooms restricted to certain personnel or accessible at certain times, and 3) dedicated rooms for access only to assigned personnel. Facilities' key plan and electronic access control system are based on these zones. Changes to the key and/or electronic access are to follow P&F and Transit Police security protocols.

II. PLANNING, DESIGN, CONSTRUCTION & CLOSEOUT CONSIDERATIONS

PREDESIGN & DESIGN CONSIDERATIONS

- Cut Key Plan** A cut key plan is established for all transit facilities and is managed by P&F's Work Center. A key schedule shall follow this plan and be developed in conjunction with a facility's door schedule.
- Employee Safety** Design sites and facilities with safety in mind and follow-through with commissioning that includes night testing, where necessary. Notable safety issues for employees are lighting at entrances and pathways, crosswalks through bus yards, blind spots, wayfinding visibility, and appropriate signage.
- Design Reviews** The extent of P&F staff involvement in design reviews depends on a project's goal, scope and complexity. This should be determined jointly by the program manager, project manager, P&F project liaison, and others as appropriate. The following chart summarizes a general level of effort for staff involvement during the design stages, note: the P&F capital planning group because of their major roles in capital projects is not included in this example:

MILESTONE	EXTENT OF P&F STAFF INVOLVEMENT
Predesign to 30%	Minor, assumes follow-through on P&F facility guidelines and criteria
to 60%	Minor to moderate, depending on discipline or tasks
to 90%	Moderate to high, as specifications are detailed
to 100%	Moderate to high, to enable P&F to: 1. Proactively schedule project support work. 2. Anticipate and plan around, or delay regular scheduled maintenance work during construction. 3. Plan for future resources to maintain new, modified or expanded facilities 4. Estimate future operating costs.

- Final Design** After approval of the final design set of drawings, the Project Manager shall forward to P&F the types and amounts square footages of finishes and materials for walls, floors, doors, exterior windows/glazing, landscaped areas, paved areas and other distinct materials. Schedules from drawings and/or in a database format are acceptable submittals.
- END OF SECTION**

II. PLANNING, DESIGN, CONSTRUCTION & CLOSEOUT CONSIDERATIONS

IMPLEMENTATION / CONSTRUCTION CONSIDERATIONS

P&F Construction Project Manager

P&F's project staff in the capital planning work group serve on a project's construction team. The P&F role is to support the implementation and/or construction phase by:

- Serving as the main contact point for P&F, and from P&F to the construction team.
- Coordinating activities that impact regular and/or exceptional maintenance work.
- Submitting & monitoring work requests to Power Distribution and Facilities via the Work Center.
- Following through on Power Distribution and Facilities work orders.

Use of P&F maintenance staff on capital projects

With the exception of the capital planning workgroup, P&F operating staff are limited from participating in capital projects or public works for these reasons:

- The focus of P&F's operating staff is on regularly scheduled maintenance and repair work.
- Certain types of maintenance or emergency work on existing facilities and equipment, or new works of limited scopes are reserved by Union or trade agreements, in areas where P&F historically held responsibilities for the work. At present, these include hot trolley overhead system, yard/lot striping, signage repairs, bus shelter repairs and installation.
- Public Works law (RCW 39.04) restricts the types of public works performed by County employees. Details can be obtained from the KC Charter, section 815 amendment to Contracts and Procurement Processes.

Circumstances where P&F staff can be used appropriately are:

- Emergency response to issues involving utilities, power, building systems, etc.
- Troubleshooting building and utility systems during installation and testing.
- Limited preparatory tasks that precede contractor work.
- Tasks that have been scoped, pre-scheduled and where clear cost-savings or efficiencies are expected by using P&F staff.

Typically, P&F staff do not perform the following:

- Physically move furniture and other large items.
- Custom work for individuals.
- Attend construction meetings without their supervisor's permission.
- Assist or interact with the contractors without advance permission.

II. PLANNING, DESIGN, CONSTRUCTION & CLOSEOUT CONSIDERATIONS

IMPLEMENTATION / CONSTRUCTION CONSIDERATIONS

Demolition & Reclamation	Where possible, building demolition shall make use of contractors that recycle, reuse or reclaim building materials. King County has a present contract (SVC004) that allows the RE*Store to salvage and do minor demolitions to remove reusable building materials from buildings and sites. If materials are considered reclaimable by a RE*Store representative, the work is done at no cost to Transit and King County.
Punch lists	The P&F role during punch-listing is to help note items that fall outside of the contractor's scope. This can facilitate the process for post-occupancy issue mitigation in the form of work requests and/or separate capital project requests.
Maintenance orientation training, testing and start-up	P&F staff are to be involved in the start up and commissioning of a building's mechanical and HVAC controls to ensure that such systems are operating as specified. The commissioning process begins early in the design phase and culminates in pre-occupancy testing. The P&F role during commissioning is to establish the operating expectations for the design intent and by scheduling the necessary maintenance staff for testing, training and orientation.
O&M manuals & warranties	<p>Copies of O&M manuals are to be submitted to P&F to assure that crews follow the manufacturer's recommended inspection and maintenance schedules. After a project's substantial completion, the P&F project manager shall distribute the manuals to the appropriate P&F workgroups.</p> <p>Warranties are managed by D&C's construction management. P&F can facilitate the handling of warranty issues when notified of problems or issues.</p>
As-built drawings	Post-construction as-built drawings and data on square footages, type and amount of space, finishes and windows are needed for P&F to confirm from final design or update additional maintenance workloads. In addition, as more green materials are used, this data will help evaluate their effect on maintenance and repair.
Asset inventory	<p>Closing out a project's expenditures through fixed asset forms, asset transfers and/or surplus declarations are required per King County Fixed Asset policies. Closing the work in progress balances and establishing new assets fall into two general categories: 1) Moveable assets not part of a building's structure, and 2) Property assets which is the balance of all project costs.</p> <p>It is important to have assets appropriately documented, tagged, and inventoried because it affects future replacements or upgrades. Eligibility for coverage under the Transit Asset Management Program requires previous asset tags and/or documentation.</p>

END OF SECTION

III. Technical Sections

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01 General Requirements

01.10.00 SPACE STANDARDS

Design Guideline The amount of space and space types for offices and office support at County agencies shall comply with King County's Administrative Policies and Procedures, "Office Standards for County Agencies." KC policy is: www.metrokc.gov/recelec/archives/policies/rpm91ae.htm

For non-office space such as shops, classrooms, workrooms and other space not defined in the KC Office Standards, these are to be programmed by planners, architects and/or industrial engineers using applicable design concepts for maintainability, sustainability and other guidelines.

Amount of Space King County's space standards allocate square footage by job classification. To apply this standard to job classifications in Transit, P&F took each space range and applied them to the most similar job functions. P&F also compared job functions and square footages used by other government agencies with similar standards for office space allocation.

Acceptable SF ranges for offices for all new and remodel work:

Section Manager	110 – 180 nsf
Section Supervisor	110 – 180 nsf
Professional / Technical.....	85 – 125 nsf
Technician.....	85 – 100 nsf
Clerical / Office Technical	50 – 70 nsf
Confidential Secretary.....	85 – 110 nsf
Field Staff.....	60 – 100 nsf
Circulation Factor.....	Not to exceed 25%

These office space standards represent a reasonable range of space for the expected work functions as applied to appropriate Transit positions.

Non-office Spaces When space is not used as offices or for specialized functions, it shall be programmed separately based on architectural or engineering standards. Typical Transit facilities' non-office or specialized space can include:

- Class and training rooms
- Kitchens and lunchrooms, with vending machines
- Recreation rooms
- Specialized storage
- Dispatch rooms and work areas
- Locker rooms
- Maintenance and equipment space

01 General Requirements

01.10.0 SPACE STANDARDS

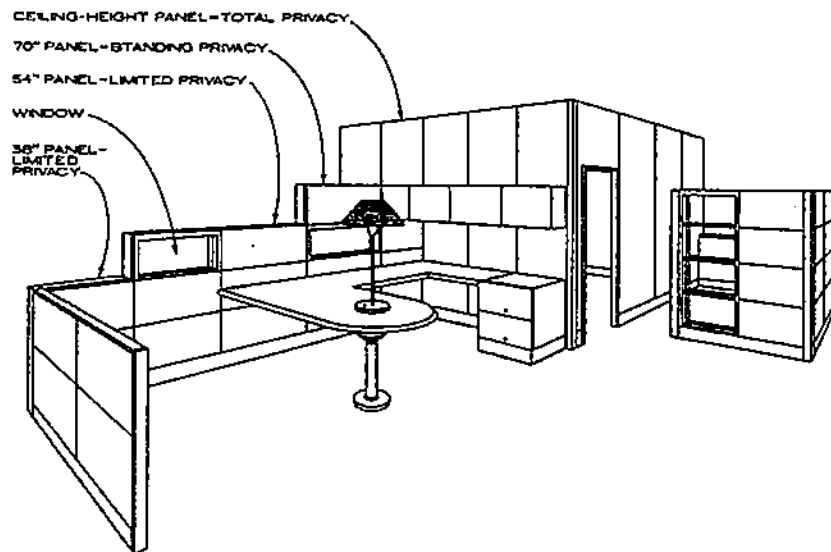
Types of Space Open office landscaping, through use of office cubicles and/or partitioned spaces, are to be planned for the majority of job classifications (source: KC Office Standards for County Agencies, § 6.7)

Private offices, in conformance with space standards, are to be provided to those positions who deal with confidential personnel matters that comprise at minimum 50% of their stated job responsibilities (source: KC Office Standards for County Agencies, § 6.7.1)

An adequate number of conference rooms shall be provided to accommodate the need for private conferences and other meetings.

Exceptions to the amount and type of space and special space requirements shall be documented and explained for exclusion.

Sample Component Wall & Partition System



END OF SECTION

08 Openings

08.11.00 METAL DOORS AND FRAMES

Industry Standards Comply with NFPA 80 for fire protection ratings.
Comply with NFPA 105 or UL 1784 for smoke control.
Comply with NFPA 252 or UL 10B. Test Pressure: Atmospheric

**Acceptable Manufacturers
and Product Brands** Ceco Door Products -- www.cecodoor.com
Curries Company -- www.curries.com
Kewanee Corporation -- www.kewanee.com/
END OF SECTION

08 Openings

08.14.00 WOOD DOORS

Industry Standards Comply with Architectural Woodwork Institute, "AWI Quality Standards Illustrated," latest edition.
www.awinet.org

Comply with National Wood Window & Door Association Standard - Wood Door Manufacturers Association (WDMA) Industry Standard 1A-04. Industry standard for architectural wood flush doors, latest edition.
www.nwwda.org

Comply with NFPA 252; Standard Methods of Fire Tests of Door Assemblies

Comply with NFPA 80; Fire Doors and Windows

END OF SECTION

08 Openings

08.51.00 STEEL FRAMED WINDOWS AND SKYLIGHTS

Design Guideline New or replacement windows for transit facilities may be steel framed. See related Division 8.80 – Glazing.

Industry Standards Comply with the following test-performance requirements, as evidenced by reports of test performed on manufacturer's standard assemblies by a qualified independent testing agency.

- ASTM E 330 Structural Performance Test
- ASTM E 283 Air Infiltration Test
- ASTM E 331 Test for Water Penetration Under Static Pressure

END OF SECTION

08 Openings

08.52.00 ALUMINUM FRAMED WINDOWS

Design Guideline New or replacement windows for transit facilities may be aluminum framed. See related Division 8.80 - Glazing. For maintenance reasons, this is the preferred material for window framing.

Industry Standards Comply with AAMA/NWWDA 101/I.S.2; performance specification for aluminum windows. <http://www.aamanet.org>

END OF SECTION

08 Openings

08.71.00 DOOR HARDWARE

Design Guideline The facility standard for door hardware applies to the lock cylinders. Master lock sets shall follow P&F's transit-wide facility cut-key system.

Door hardware for electronic access applications—refer to Division 28, Electronic Security.

Industry Standards Lever Sets:
Finish shall be US26D, Satin Chrome Plated (BHMA 626)

Exterior Butts:
Finish shall be US32D Satin Stainless Steel (BHMA 630)

**Acceptable Manufacturers
and Product Brands** Exterior Butts: McKinney Products Company –
www.mckinneyhinge.com

Weather-stripping and Continuous Hinges: Pemko Manuf.
Company—www.pemko.com

Surface Door Closures & Exit Devices: Corbin Russwin—
www.corbin-russwin.com

Electric Latch: Architectural Control Systems, Inc. –
www.acsi-inc.com

Concealed Door Closures: LCN -- www.lcnclosers.com

Kick & Mop Plates: Tice Industries -- www.ticeindustries.com

Wall and Floor Stops & Silencers: Trimco -- www.trimcobbw.com

Overhead Stops: Glynn Johnson -- www.glynn-johnson.com

END OF SECTION

08 Openings

08.80.00 GLAZING

Design Guideline Applicable to windows, relites in doors and interiors, curtain window walls, entrances, storefront framing and skylights. General issues affecting maintenance are breakage/failure caused by thermal movement, load and wind impacts, sealant or gasket failures and glazing deterioration.

& Refer to Design & Construction engineering specifications for details.

Industry Standards Annealed Float Glass:
Comply with ASTM C 1036 Type I transparent glass, flat, quality q3. – www.astm.org

Heat Treated Float Glass:
Comply with ASTM C 1048, Type I quality q3.

Coated Spandrel Float Glass:
Must pass fallout resistance test for spandrel glass specified in ASTM C 1048.

Polished Wire Glass:
Comply with ASTM C 1036 Type II class I, quality q8, mesh ml 6.4 mm thick.

Laminated Glass:
Comply with ASTM C 1172, and contain interlayer of polyvinyl butyral or sheet cured resin, clear, with proven record not to discolor, bubble, or lose physical and mechanical properties after lamination.

Insulating Glass Units:
Comply with ASTM E 774, Class CBA units.

Performance Specification Bus Shelter Glass:
Each piece of shelter glass shall consist of two sheets of 1/4" clear, tempered, plate glass. The sheet shall be permanently laminated to a plasticized, poly-vinyl butyral sheet - .06" thick, specific for glass laminate. Shall be clear, tempered, laminated, and adhere to ANSI Z97.1-1984 glazing standards:

- Type 1 Plate Glass, Class 1
- Glazing Quality "B"
- Edges seamed
- Markings per ANSI Standard – www.ansi.org

08 Openings

08.80.00 GLAZING

Performance Specification Fire Rated Assemblies:
Comply with NFPA 80, listed and labeled by a testing agency acceptable to authorities having jurisdiction for fire ratings indicated, based on testing according to NFPA 257.; shall be set in UL rated glazing compound and frames.

Acceptable Manufacturers and Product Brands Fire Rated Assemblies:
Nippon Electric Glass Company -- www.negamerica.com

FireLiteNT -- www.fireglass.com
END OF SECTION

09 Finishes

09.30.00 CERAMIC TILE

- Design Guideline** Appropriate uses of ceramic tile:
- Floors—for high traffic areas such as restrooms, hallways, entry vestibules, and durable to resist scuffing and tracked dirt.
 - Walls and wainscots – in restrooms, above custodial floor sinks, backsplashes.
 - Shower stalls and floors

Tile Size: For floors, primary tiles shall be no less than 12"x 12" and non skid

Color: Compatible with interior palette.

Grout color: For floors, grout color shall be dark (e.g., dark grays, black) and compatible with the selected tile color

Thresholds: For floor transition between different floor finishes

- Industry Standards** Comply with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions and other characteristics.

- Performance Specification** Tile product shall be durable, easy to clean, and shall not require specialty equipment or tools to maintain.

- Acceptable Manufacturers and Product Brands**
- Tiles: American Olean, division of Dal-Tile International
- Grout: Atlas Minerals & Chemicals, Inc.
Boiardi Products Corp
Bostik
C-Cure
Custom Building Products

END OF SECTION

09 Finishes

09.50.00 CEILING TILE AND SUSPENSION SYSTEMS



Design Guideline	This guideline applies to ceilings composed of acoustical panels and exposed metal suspension systems. There is a standard product brand for acoustical panels used for suspended ceilings at transit facilities.
Industry Standards	<p>Metal suspension systems shall comply with the manufacturer's standard direct-hung metal suspension system of types, structural classifications and finishes that comply with applicable ASTM C 635 requirements.</p> <p>Acoustical panels shall comply with ASTM E 1264 classifications.</p>
Performance Specification	<p>Suspension systems</p> <ul style="list-style-type: none">▪ Wide-face, single-web zinc-coated steel▪ Shall meet proper seismic code <p>Acoustical panels:</p> <ul style="list-style-type: none">▪ Noise Reduction Coefficient rating of 0.70▪ Light reflectivity rating of 0.89 or greater▪ Size of panels is 24" x 48", with thickness of ¾"▪ Color is white
Acceptable Manufacturers and Product Brands	<p>Ceiling Suspension Systems:</p> <p>Armstrong—www.armstrong.com</p> <p>Chicago Metallic Corporation – www.chicagometallic.com</p> <p>Donn Suspended Ceiling System – www.usg.com</p>
Sole Product Brand	<p>Ceiling Tile:</p> <p>Armstrong Ultima Tegular 3252 – www.armstrong.com</p>

END OF SECTION

09 Finishes

09.60.00 FLOOR FINISHES

Design Guideline The selection of flooring material for any space shall be 1) appropriate for the planned or expected use or activity, 2) consistent throughout the defined space and 3) limited to the types easily cleaned by manual hand mop or broom, and vacuum. Sheet vinyl and VCT are not to be use unless pre-approved by P&F representative.

FLOOR FINISH	APPLICATIONS	MAINTENANCE ISSUES
Ceramic Tile	High traffic areas Hallways Restrooms>Showers	Durability, easy to clean in areas with little to no furnishings, non-skid.
Concrete	Custodial closets Storage rooms Stairwells Locker rooms Shops	Stained or impregnated color, not an overlay for appearance and sealed for durability.
Integral Color Concrete	Lunchrooms VM Chiefs & Clerks Dispatch areas Lobbies/vestibules	Durable. Not recommended in areas with lots of furnishings. For maintenance, concrete and ceramic tile is preferred.
 Rubber	Exercise Rooms	Standard product for all exercise room floors, eliminating need for mats under equipment. See 09.65
 Carpet or Carpet tiles	Offices Conference & classrooms Ops. Quiet room	Standard product brand. See 09.68

Industry Standards
END OF SECTION

Refer to specific floor finish standards.

09 Finishes

09.65.00 RESILIENT FLOORING

Design Guideline



There are three types of floor finishes are considered "resilient:"

1. VCT / Linoleum
2. Recycled Rubber or Athletic Flooring
3. Rubber Tile

For maintenance purposes, it is preferable to select a dark-hued background, with optional color highlight compatible with interior palette. Walk off mats refer to 12.48.00

Industry Standards

VCT/Linoleum Sheet: Comply with ASTM F 2034

Resilient Athletic Flooring (Rubber): Comply with ASTM F 1344 Class 1-A (solid color) or 1-B (mottled colors).

Rubber Tile: Comply with ASTM F 1344.

Performance Specification

VCT/Linoleum: Tile or sheet covering

Patterns and colors extended through entire wear-layer thickness.
Critical Radiant Flux Classification: Class I, not less than 0.45 w/sq. cm. per ASTM E 648.



Recycled Rubber Flooring:

Made from recycled SRB tire rubber, non-laminated, single-ply surface, with reprocessed EPDM color flecks. Rolls in 48" width.

Rubber Tile:

100% rubber, stain resistant tested to ASTM D 543. Tile size shall be 2x2 ft square and ¼" thick.

Acceptable Manufacturers and Product Brands

VCT/Linoleum Resilient Flooring and Base:

Dodge – Regupol – www.regupol.com

ECOearth – www.gerbertltd.com

Recycled Rubber Flooring

ECO-Surfaces – www.ecosurfaces.com

Rubber Tile Flooring:

Dodge – Regupol – www.regupol.com

ECOearth – www.gerbertltd.com

Roppe Corp.—www.roppe.com

END OF SECTION

09 Finishes

09.68.00 CARPETING

Design Guideline

Carpet is appropriate for use in offices, conference or meeting rooms, classrooms and in spaces where sound attenuation is required. Exceptions are for vehicle maintenance chiefs and VM support staff offices where integral color concrete or ceramic tile are more suitable.

Performance Specification

Carpeting shall contain high recycled content for both backing and synthetic fibers.



Description: Textured pattern loop, 5/64" gauge, stitch count min. 9.9 to 11.4 per inch, average pile thickness of .093" to .108". Total weight shall be 70.44 to 72.44 oz per sq yd. Static shall conform to 3.0kv when tested under Standard Shuffle Test (70F, 20% RH). Tiles are preferred, with appropriate adhesive.

Tape: Rubber lock method, tug seals method for railings.

Leveling Compound: Trowelable, latex modified Portland cement based.

Cushion: ¼" thick flat-slab type sponge rubber pad weighing no less than 72 oz per sq yd.

Carpet grippers: Smooth Edge Type D.

Metal Edge Strips : Satin aluminum.



Adhesive: Low VOC content below 150g/L and shall contain no formaldehyde.

Acceptable Manufacturers and Product Brands

Carpeting:

Lees-Concept HRC, Lees-Aspire HRC -- www.leescarpets.com

Cushion:

Air Crest Products
BF Goodrich

Tape:

Rubber Lock Method Railings
Tug Seals Method
Naugatuck Chemical

Carpet Grippers:

Roberts Co.

Metal Edge Strips:

Chromedge #1754-MF

END OF SECTION

09 Finishes

09.90.00 PAINT AND PRIMER

Design Guideline Color selection for building interiors and exteriors is to follow the current color palettes set by Facilities Maintenance. Paint colors apply to only painted surfaces, excluding most metal, wood, concrete and other materials when left in their “natural” states, pre-treated like powder-coatings, or comes with integrated color.

Interiors Space definitions:

- Offices refer to enclosed rooms (with a door). This excludes cubicles or partitioned spaces.
- Office-related spaces are those rooms primarily used by office occupants, such as open work areas with cubicles, photocopy/work rooms, storage, closets, meeting rooms dedicated for office use, etc.
- Common use areas are classrooms, multi-use conference rooms, lunchrooms and lounges, operator report areas, quiet rooms, etc., where there is no assigned occupant.
- For hallways, vestibules and other minor auxiliary spaces, colors will be determined by their proximity to the spaces as defined above.

Exceptions to interior color selection are the following standards applicable to all facilities:

- Shops and maintenance bays—a reflective gloss white.
- Safety markings – special “safety yellow” and black
- Railings and hand rails – natural metal, or powder-coated dark grey or charcoal.

Selection guidelines

- A workgroup can select up to two colors (plus the “base color,” typically a neutral white) to create a 2-3 color mini-palette for its interior walls.
- From the selected 2-3 color mini-palette, office occupants – as a group – can opt for one accent color on one wall. The remaining three walls can be a second color.
- Other finishes and materials, if new or as replacements, should complement the selected mini-palette.

Exteriors Building components with color choices are:

- Body and roof units
- Doors and jams
- Roof trim caps

09 Finishes

09.90.00 PAINT AND PRIMER

Design Guideline

Selection guidelines

- A workgroup or along with consultants can select one color in each building component category for the building's exterior mini-palette.
- The same palette must be applied to all buildings and structures located on the defined property. Depending on timing, color selection for new construction or major remodels can determine the same exterior colors for other buildings on the property. If new exterior colors are selected prior to new construction, then new buildings must follow the selected palette.

Color Palettes

The current color palettes for interiors and exteriors are managed by the Building Systems workgroup, paint crew, at South Facilities Maintenance. Color samples are available by contacting a Facilities Chief at 206 684-2254 Comfort Station Roofs - Black per Paul Sorensen 5-26-2011
General:

Performance Specification



- Flat paints/coatings shall have VOC content below 50g/liter.
- Non-flat paints/coatings shall have VOC content below 150g/liter.
- Anti-corrosive coatings shall have VOC content below 250g/liter.
- Varnishes/sealers shall have VOC content below 350g/liter.
- Aromatic compound content shall be less than 1.0% by weight.
- Primers shall be appropriate for use on bare substrates. All interior paints shall be 100% acrylic, with noted finishes:

- Walls: Satin
- Interior Millwork and Metal: Eggshell enamel alkyd base.
- Interior Wood: Eggshell or semi-gloss.
- Interior Shops and Non-Office Spaces Millwork (includes stairwells, storage, and other non-occupied spaces): Gloss enamel alkyd base.
- Interior Primer: White and appropriate for use on bare substrates.

Exterior Applications for masonry, stucco, concrete, galvanized metal doors, and millwork:

- Vehicle: 100% acrylic elastomeric water-based coating
- Finish/Sheen: Flat or eggshell / 4-5 at 60°, 2-3 at 85°
Coverage per coat: Smooth concrete 100-125 sf per gallon
Concrete block 50-75 sf per gallon Stucco 75-100 sf per gallon

Acceptable Manufacturers and Product Brands

KC Procurement has a pilot program to identify Environmentally Preferable (EP) products to support the County's green initiatives. All paint used by Facilities Maintenance has the "Green Seal Standard" and are "Green Seal Certified" for Environmentally Preferred Paint (EPP). Refer to: www.greenseal.org/certproducts.htm#paints for list of manufacturers.

END OF SECTION

10 Specialties

10.14.00 INTERIOR SIGNAGE

Design Guideline	<p>This guideline excludes fire/safety requirements for exits and other signage related to emergency evacuation and wayfinding. Refer to Division 26, Electrical Systems.</p> <p>There are three signage categories for interior rooms and spaces:</p> <ol style="list-style-type: none">1. Panel Signage: As required by code and for dedicated uses that typically has no occupancy, e.g. "Custodian" or "Restroom".2. Sign holders and sign inserts: For occupancy or use identification.3. Room/Door identification: For maintenance or repair use. <p>Exceptions are to be defined for safety, wayfinding, access restrictions, and other special signage needs.</p> <p>Standard Font: Typeface for all lettering shall be Verdana. Point size as appropriate to the sign function.</p> <p>Signage Sizes: Sign holders and sign inserts have standard sizes. Other signs shall meet all minimum requirements and sized to meet each sign function. Refer to Performance Specs for more information.</p> <p>Panel Signage: Panel or fixed signs include universal icons and Braille where appropriate to meet building and occupancy code requirements. This includes but is not limited to restrooms, accessible entries, elevators, stairs, and telephones.</p> <p>Sign Holders: Sign holders shall be installed next to doors or entries of rooms where such identification is deemed useful for wayfinding or occupancy identification.</p> <p>Sign Inserts: Names of occupants and room functions shall be determined by building users. The initial order of new sign inserts shall be handled by P&F through the Transit Print Shop located at the Component Supply Center.</p> <p>Room/Door ID: All interior door frames shall have door numbers affixed in the middle of the out-facing top frame. The numbers shall match the door scheduled on the construction set.</p>
Industry Standards	<p>Panel signs shall have a non-glare finish and all lettering and graphics must contrast with the background.</p>

10 Specialties

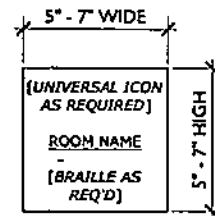
10.14.00 INTERIOR SIGNAGE

Performance Specification

Panel Signs:

Materials can be cast acrylic, plastic laminate, aluminum sheet/plate, or phenolic-backed photopolymer sheet. Color for all panel signs shall be aluminum or faux-aluminum.

Signs required by code to include icons and/or Braille shall have dimensions of a maximum of 7" wide by 7" high and a minimum of 5" wide by 5" high.



Non-code required panel signs (or fixed signs for dedicated use rooms), such as "Computer Room," "Storage," or "Parts Room" can be sized accordingly. This is also applicable to Special Signs, such as "Upstairs to Administration," to assist with wayfinding.

Sign Holders:

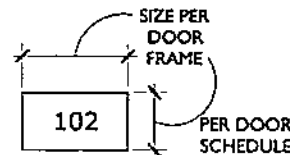
Shall be made of extruded, high-impact PVC. Dimensions shall be 6"x6" and affixed with 4 metal knobs. Signs shall be mounted at a height of 60" from the finish floor to the centerline of the sign.

Sign Inserts:

Shall be printed and affixed to 5"x5" foam core. The design and color shall complement the interior palette and use Verdana or Humanist typeface in black.

Room/Door Numbers:

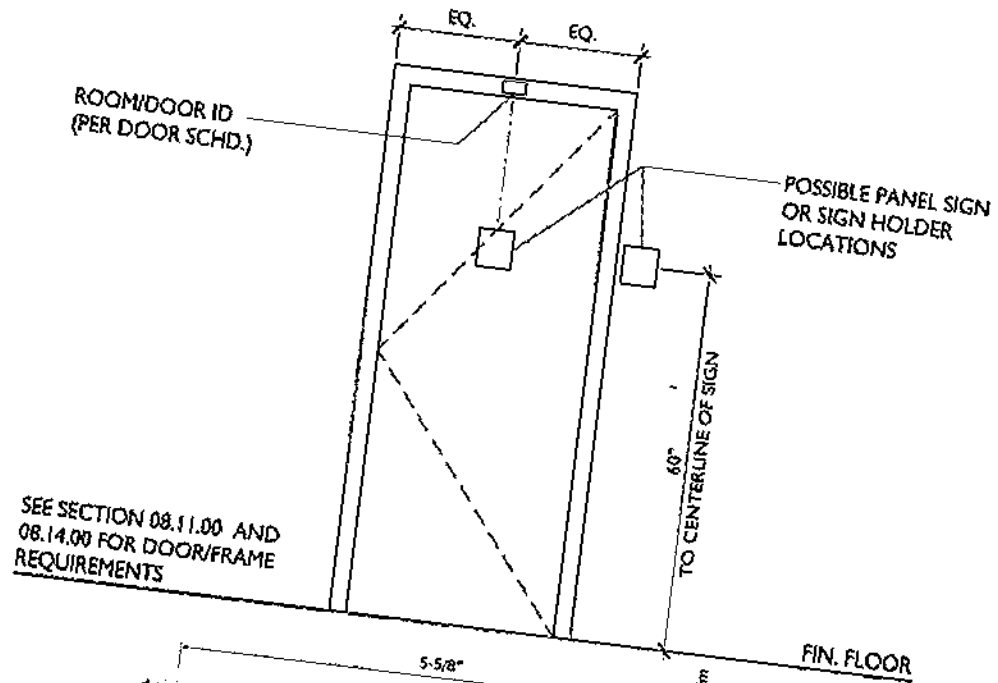
Shall consist of adhesive decals at a height and width to fit into the top door frame and in a shade lighter or darker than the frame color.



10 Specialties

10.14.00 INTERIOR SIGNAGE

Signage Guidelines – Mounting Locations
Removable Foam Core Insert – example
END OF SECTION



10 Specialties

10.28.00 TOILET, LAVATORY & SHOWER ACCESSORIES

Design Guideline Accessories for restrooms and shower rooms, if separate, shall be selected and located to allow for efficient cleaning and restocking of products.

By area, the general and usual accessories shall comprise the following:

AREA OR ROOM	ACCESSORIES
Entry Vestibule	Full length mirror
Hand wash area	Over-sink mirrors, towel dispensers, waste receptacles, soap dispensers, sanitary napkin dispenser
Toilet stalls	Grab bar ADA toilet, tissue dispenser, seat cover dispenser, sanitary napkin waste receptacle
Changing Room	Curtain rod, clothing hooks, full length mirror on one wall
Shower	For stalls, curtain rod, grab bar ADA stalls, liquid soap dispenser Note: Gang-type shower rooms do not require curtain rods.

Industry Standards As applicable for specified use.
Mirrors:
Glass shall be 6mm thick and comply with ASTM C1036 Type I, Class I, Quality q2 and comply with FS DD-M-411 or 1/4" thick polished stainless steel sheet.

Performance Specification Hand Towel Dispenser:
Dispensers shall be surface mounted and use 1000 hard roll or center feed roll. The dispenser shall have a tumbler lock.

Waste Receptacle:
Receptacles shall be semi-recessed and have a 12 gallon capacity. The receptacle shall have a tumbler lock.

Liquid Soap Dispenser:

- For lavatories, pump dispensers shall mount to lavatory and have a 45 fluid oz. capacity.
- ~~For showers, dispensers shall be wall mounted and have a 45 fluid oz. capacity.~~

Sanitary Napkin Dispenser:
Dispensers shall be recessed and free (not coin operated).

10 Specialties

10.28.00 TOILET, LAVATORY & SHOWER ACCESSORIES

Performance Specification

Grab Bars:

Bars shall be 18 gauge stainless steel. Bars shall be 1.5" in diameter with a 1.5" clearance from the wall. Bars should have a non-slip gripping surface.

Toilet Tissue Dispenser:

Dispenser shall fit Scott type 07202 "Jumbo Roll Tissue" type toilet paper. Dispenser shall be surface mounted or approved substitute.

Seat Cover Dispenser:

Dispenser shall be recessed and have a 500 cover capacity. The dispenser shall have a tumbler lock.

Shower and Curtain Rod:

Curtain type shall be HD 1/25" OD to custom length

Acceptable Manufacturers and Product Brands

Hand towel rolls:

Kimberly-Clark Model 01000 -- [http://www.kcprofessional.com/us/Acclaim rolls #26601](http://www.kcprofessional.com/us/Acclaim%20rolls%20#26601)

Under Lavatory Guards:

Brocar Products or Truebro -- www.brocar.com or www.truebro.com

Seat Cover Dispenser: American Specialties 6277 SS

Liquid Soap Dispenser (wall mount ~~for showers~~): Bobrick MDL#B-8221

Liquid Soap Dispenser (in-sink pump): Bobrick B-8221

Grab Bars: Bobrick B-68616.99

Shower and Curtain Rod: SS 3 flanges: American Specialties 1204

Curtain: American Specialties 1200V; Hooks: 1200 SHU

Mirrors: American Specialties 0620 SS frame

10 Specialties

10.28.00 TOILET, LAVATORY & SHOWER ACCESSORIES

Sole Product Brands Hand Towel Dispenser:
Kimberly-Clark "IN SIGHT" Model 09990

Sanitary Napkin Waste Receptacle: Bobrick B3644 SS --
www.bobrick.com

Sanitary Napkin Dispenser: American Specialties 64684 SS --
www.americanspecialties.com

Toilet Tissue Dispenser: Kimberly-Clark "IN SIGHT" Model 09551
with 2 roll pin inserts.

Toilet Tissue:
Scott Jumbo Roll Tissue (JRT) 07827 (note: do not use JRT Jr.)

END OF SECTION

10 Specialties

10.50.00 LOCKERS

Design Guideline

This guideline only applies to clothes storage lockers. Lockers are provided for transit operators, vehicle maintenance personnel, facilities personnel and other classifications that require use of uniforms and other agency-issued clothing to be worn during work hours. Other Storage Specialties shall be determined according to functional requirements.

All lockers for transit personnel shall be metal. The types of lockers shall accommodate the types of use by different work groups.

Guidelines to locker types for various work groups are:

Operations	Double-tiered with combination locks. Typical use is to store street clothes and personal items. Most drivers arrive "in uniform."
Vehicle Maintenance	Single-tiered with combination locks. Usually part of, or adjacent to restroom and shower facilities. Used by personnel for complete change of clothing on a daily basis.
P&F Maintenance	Same as VM
Other Groups	Shall be determined by functional requirements.

Related accessories such as benches are usually added to locker rooms for maintenance personnel, and not for operators due to space constraints in Operations locker rooms.

Lockers for VM and other maintenance staff are usually located within a restroom area, while lockers for Operations are located near but separate from restrooms.

Color selected shall complement the interior color palette.

Industry Standards

Comply with AAMA/NWWDA 101/I.S.2; <http://www.aamanet.org>

Performance Specification

Minimum locker requirements for Operators are:

Type: Double tier unit, 72" high

Dimensions: Each unit 15"wide x 18"deep x 36" high

Top Option: Continuous slope tops

Interior Options: Clothes hooks, either top or sides

Minimum locker requirements for Maintenance staff are:

Type: Single tier unit, 72" high

Dimensions: Each unit 12"wide x 18" deep x 72" high

Top Option: Flat top to accommodate clean uniform storage bins

Interior Options: One shelf, clothes hooks beneath shelf or on sides

10 Specialties

10.50.00 LOCKERS

Performance Specification

Minimum locker "options" requirements for all lockers:
 Gauge: The locker door and frame shall be 16 gauge metal and body parts shall be 24 gauge.
 Base: Closed
 Ventilation: Louvered vents at the top and bottom of each door
 End panels: At each exposed bank end.

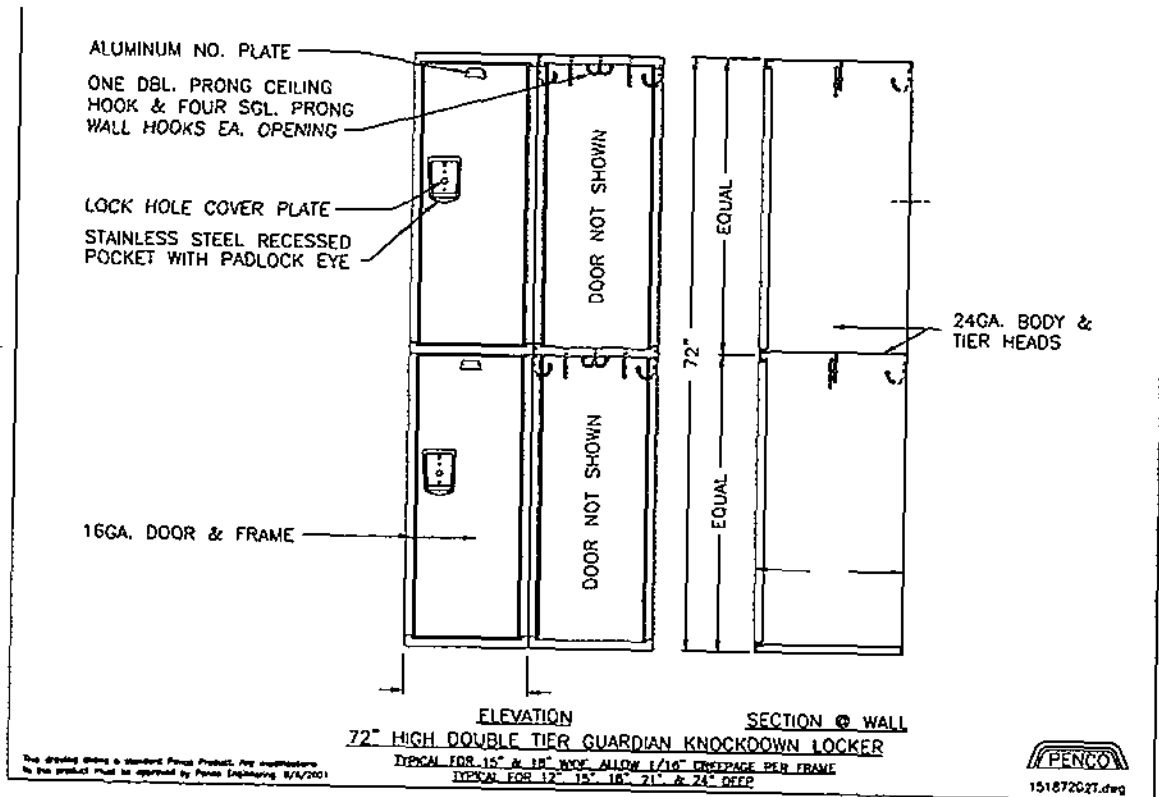
Locker Benches:

Bench tops shall be 4'-6" wide x 9" deep x 1-1/4" thick. Tube pedestals shall be 16-1/4" high.

Acceptable Manufacturers and Product Brands

PENCO Products: Vanguard or Guardian lockers – www.pencoproducts.com

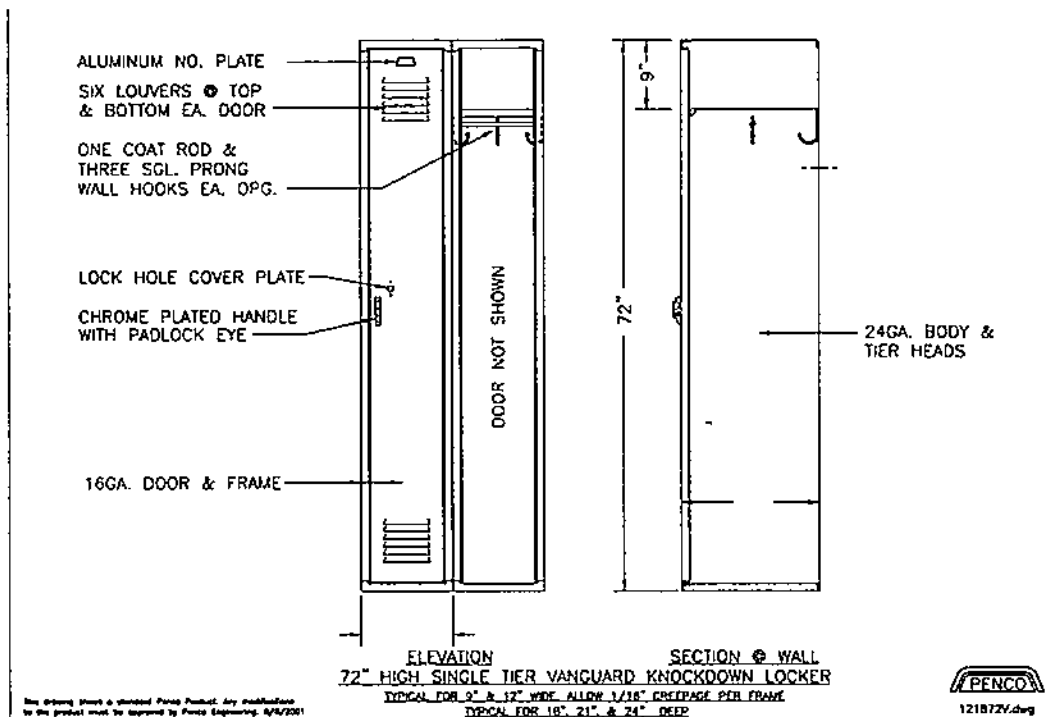
Lyon Workspace Products – www.lyonworkspace.com



Double Tier Locker

10 Specialties

10.50.00 LOCKERS



Double Tier Locker

END OF SECTION

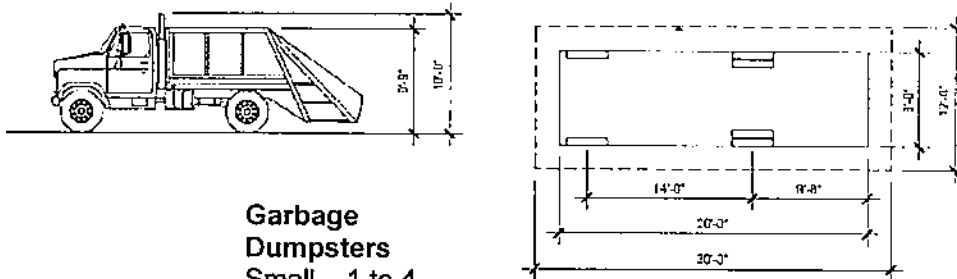
11 Equipment

11.10.00 MAINTENANCE EQUIPMENT

Design Guideline To support maintenance services, equipment used by Facilities shall be accommodated in the site and building design. This Division emphasizes generally used large or heavy equipment with access, operating and/or size issues. Other equipment for specialized maintenance needs shall be defined during programming on a case-by-case basis.

Garbage Compactor Trucks

While waste collection at most operating facilities are contracted out, North Facilities may service general garbage collection at other Transit properties. A typical compacting garbage truck has these dimensions:



Garbage Dumpsters

Small – 1 to 4

cubic yard capacity – dumpsters (2 cy capacity is preferred) shall be rear-loading; the cross bar shall be at 45" from the ground with the box measuring 63" at the crossbar. Tires shall be solid core.

Large – 8 to 40 cubic yard capacity – dumpsters shall be of the self-contained variety.

Floor Scrubbers

Currently, Custodial Services uses two types* of floor scrubbers; one to three machines are located at each Base and other facilities. Both are walk-behinds and battery operated, requiring 110 VAC power source for the battery charger. Scrubber storage may be required at certain facilities.

Smaller scrubbers have a 17" cleaning path (overall size approx. 22" x 40") for general hard floor finishes.

Large scrubbers have 28"-33.5" cleaning path (overall size approx. 43" x 50") for industrial-type floor finishes, like Shops.

Heavy rider scrubbers are used for maintaining DSTT stations.

11- Equipment

11.24.00 MAINTENANCE EQUIPMENT

Acceptable Manufacturers

Floor and wall cleaning equipment:
Stainless steel shelf with mop and broom holders Bobrick #B-224x36
END OF SECTION

12- Furnishings

12.21.00 WINDOW BLINDS

Design Guideline Blinds and other screening treatments for windows are allowed for purposes of light control, sun/glare control and/or privacy.

Acceptable window blinds or shades:

Horizontal louver mini-blinds for all exterior and interior windows.
UV-blocking roll-up shades for west and south-facing exterior windows to reduce heat and glare.

Combination UV-blocking screen accordion shades for exterior windows.

Color selection of blinds and screens:

Color(s) selected shall be neutral darks or lights, or complement the interior color palette

One color choice per Transit section is allowed, although one color choice throughout a single building is preferred for a consistent appearance.

Other treatments are by exception, to be approved by P&F.

Industry Standards Unless otherwise indicated, treatments shall comply with products passing flame-resistance test according to NFPA 701.

Corded Window Covering Product Standard: WCMA A 100.1

Performance Specification Mini blinds:
Slats: Aluminum, alloy and temper, with crowned profile and radius corners.
Finish: Ionized coating; antistatic, dust-repellent, baked polyester.
Nom. Slat width: 1"
Color: Shall be compatible with interior and exterior palette.
Sun screen manual roll-down shades:
Material: 500 denier fiberglass, vinyl coated
Weight: 13.6 oz. per square yard
Texture: 5% openness
Pattern: T screen 5100, dark color on interior, light color on exterior.

Acceptable Manufacturers and Product Brands Hunter Douglas Window Fashions
Levolor
Seattle Curtain Manufacturing, Co.
Draper Shade
MechoShade Systems

END OF SECTION

12 Furnishings

12.48.00 FLOOR MATS

Design Guideline	<p>Mats are defined as removable overlays placed in special areas to protect flooring, provide worker comfort, or both. There are three categories of mats for various uses:</p> <ol style="list-style-type: none">1. Main entries/vestibules: Carpet-type walk-off mats in recessed metal frames. This is a standard to be applied to the design of new facilities and replacement in remodels as feasible.2. Dispatch, Parts and Counter work areas where standing is frequent: Anti-fatigue, ergonomic, cushioned rubber resilient mat.3. Minor entries: Rubber tire mats, coco fiber mats
Industry Standards	Comply with appropriate industry standards
Performance Standards	<p>Carpet-Type Mats at Main Entries (recessed) Face Fiber: Non-woven, 100% solution dyed polypropylene Total Weight: 93oz. per sq. yd. Backing: Natural/synthetic composite rubber</p> <p>Recessed Aluminum Frames: Shall be extruded aluminum, ASTM B221, alloy 6061-T6 or alloy 6063 T5, T6 or T52.</p> <p>Anti-Fatigue Resilient Mats Description: 100% polyurethane, cut to full size with beveled edges Thickness: 5/8" Weight: 1lb per square foot</p> <p>Rubber Tire Mats Description: Edge-grain laminated and chenille-buffed rubber tire wall cuts, boned to sheet rubber or other durable backing sheet to form a thickness of 3/8 to 7/16".</p> <p>Coco Fiber Mats Description: Coco fiber yarn permanently bonded to PVC backing, shed resistant. Overall Thickness and Weight: 5/8 to 3/4" and 1.5 lb/sf, or 1" and 2 lb/sf, or 1 1/4" and 2.5 lb/sf.</p>

12 Furnishings

12.48.00 FLOOR MATS

Acceptable Manufacturers and Product Brands

Carpet-Type Mats, recessed:
Van Dijk

Recycled Rubber Tire Mats:
AFCO-USA
Cactus Mat Manufacturing
Consolidated Plastics Co.
Mats Incorporated

Coco Mats:
AFCO-USA
Mats Incorporated

Sole Product Brand

Anti-fatigue mat by Ergomat – www.ergomat.com
END OF SECTION

12 Furnishings

12.50.00 FURNITURE

Design Guideline	Furnishings defined in this guideline are moveable, modular and not attached to the facility structure. Built-in casework and other furnishings attached to a facility structure are excluded. Furnishings must be ordered from any KC approved vendor with current contracts. Specific items not available through KC-approved vendors can be procured through other sources by following procurement procedures set by KC Purchasing. For more information, contact KC Finance, Goods Procurement Services, 684-1681. Existing furniture in good condition must be re-used. Furniture purchased and inventoried for use at a facility is to remain at the facility (except for ergonomic chairs; refer to asset transfer procedures from the section's Administrative Specialist). Office/workstation furniture must be modular. No custom built furniture or casework will be provided for offices.
Computer workstation desk	Any combination of modular units to suit the job responsibilities, e.g., a supervisor with 1-on-1 conferencing needs may opt for a workstation with an extension, called a peninsula, for this purpose. Other work surface extensions can accommodate equipment (printers, faxes). Acceptable finish is laminate; no solid wood.
Workstation seating	Adjustable, executive-type, rolling; upholstered.
Task seating	Adjustable, lesser grade than executive, rolling, upholstered.
Guest seating	Upholstered, vinyl or molded plastic
Conference, classroom seating	Vinyl or molded plastic with sled base; can be stackable.
File storage	Types of filing system to meet paper storage needs. Individual files can be in the form of pedestals, overhead compartments, 2 to 4 door verticals or laterals. Common files can be banks of vertical and/or laterals, or high density models for large capacity needs.
Ergonomic accommodations	Employees can request ergonomic seating and/or adjustable height workstations with justification (medical, industrial hygiene evaluation, etc.). Adjustable height workstations can be used when a computer desk is used by other staff or through work rotations.
Conference tables	Size and shape to suit the planned capacity. Individual office conference tables can be a min. 24" (2 cap.) to a max. 36" (4 cap.) diameter.
Classroom tables	Series, 2 ft wide by 5 ft long for movability; can opt for foldable legs. This provides flexibility to configure suitable room layouts.
Lounge-type seating	Modulars, sofas, or chairs in a heavy gauge vinyl similar to material used for bus seating; no fabric upholstery.
Workstation options:	Task lighting, bookcases, white or bulletin boards

END OF SECTION

12 Furnishings

12.93.00 SITE FURNITURE

Design Guideline Outdoor amenities for employees typically consist of benches, tables, trash receptacles, and small information kiosks. Product selection and siting considerations include:

1. Durability to withstand temperature and weather. When tables and chairs or benches are purchased at the same time, the products shall be from the same manufacturer.
2. Site adjacencies to associated lunch or break rooms, entry ways or other areas compatible to the function of the facility.
3. Separation from vehicle and bus traffic paths.

Note: As of January 2006, no outdoor smoking is allowed 25ft from any building entry or vent. Cigarette butt receptacles are allowed only in designated "employee smoking areas" that meet the 25ft criteria.

Performance Specification



Tables, Chairs and Benches:

Acceptable Materials are:

- Ferrous metal with baked-on polyester powder coat
- Recycled plastic, highest density

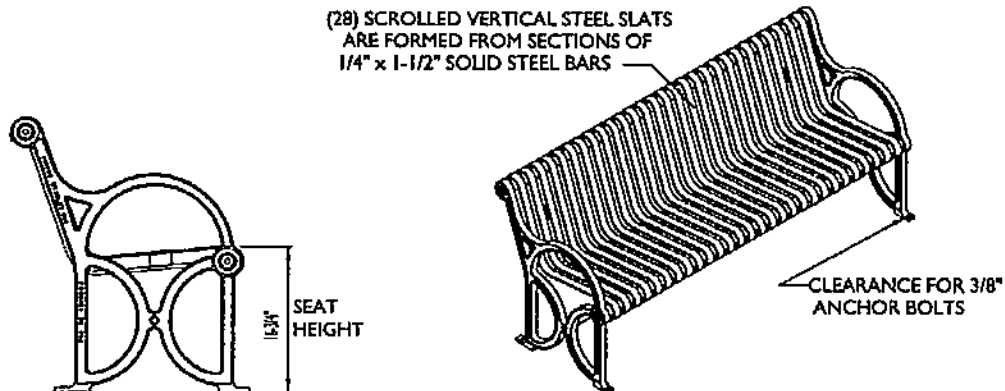
Acceptable Manufacturers and Product Brands

Victor Stanley – www.victorstanley.com

Wabash – www.wabashvalley.com

Plastic Lumber Yard –

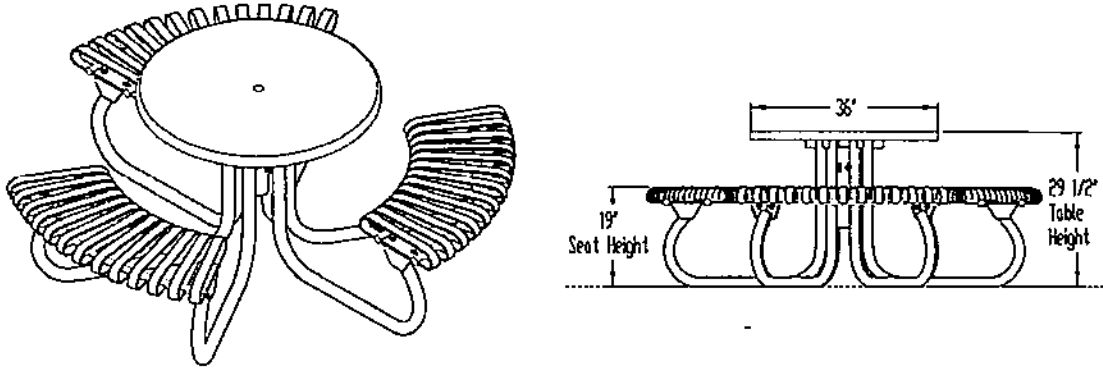
www.plasticlumberyard.com/FURNITURE/index.html



Typical Metal Benches such as Victor Stanley

12 Furnishings

12.93.00 SITE FURNITURE



Typical Metal Tables such as Victor Stanley

END OF SECTION

12 Furnishings

12.93.13 BICYCLE LOCKERS FOR EMPLOYEE USE

Design Guideline

Bicycle amenities support Commute Trip Reduction strategies to reduce use of SOVs and provide alternative modes of transportation. The bike locker models are standard at all transit operating facilities. Different locking mechanisms may be used to accommodate employee use.

The order of preference for added or new bicycle storage at operating facilities is:



1. An interior bike storage room for new facility construction.
2. Exterior locker units.
3. Bicycle racks sited near an entry and have moderate cover for rain protection.

Performance Specification

Bicycle Lockers:

Lockers shall be all composite, prefabricated, pad-mounted, and modular made of compression-formed, high density sheet molding compound. The type of locking mechanism shall be as programmed to meet the type of use.

Bicycle Racks:

Racks shall be plastic color-coated carbon steel, with size and capacity based upon site determination and user needs. Racks shall have a 2 bolt anchoring system and double sided access.

Verticle Bike Hangers:

For bike storage rooms, hangers shall consist of powder coated steel plated hook to suspend a series of single bicycles vertically on the wall. Include cable for locking option. Every other hook shall be staggered and spaced a minimum of 18" apart.

Sole Product Brands

Bicycle Lockers:

CycleSafe ProPark double unit www.cycle-safe.com

Bicycle Racks:

Cora Expo W Series Rack www.cora.com

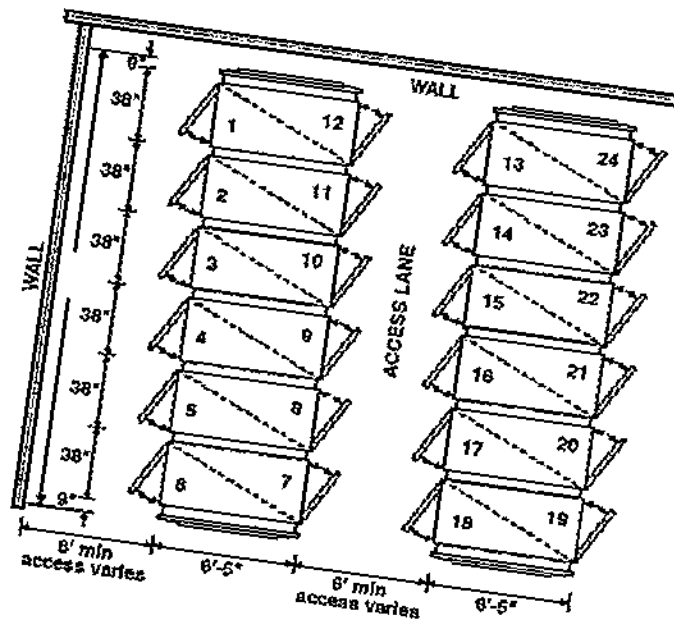
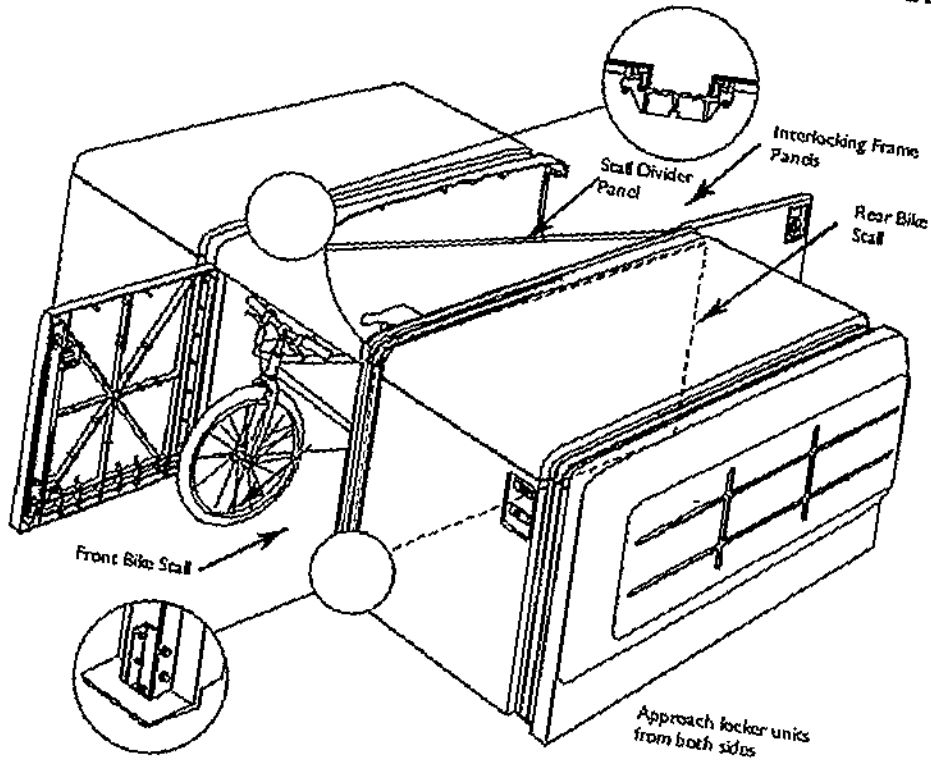
Proprietary Product

Bicycle Hangers:

"Mini Mum" Vertical Bicycle Storage System
Rutland Industries – www.rutlandindustries.com/mini_mum/

12 Furnishings

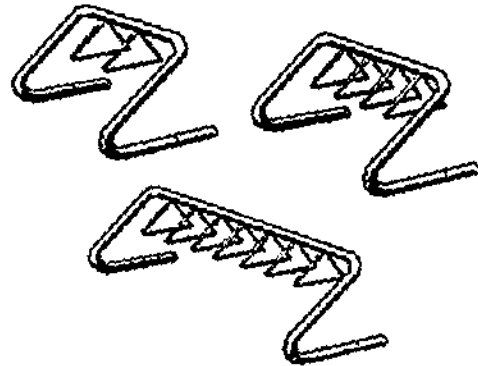
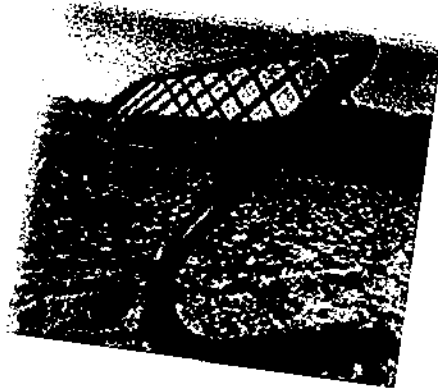
12.93.13 BICYCLE LOCKERS FOR EMPLOYEE USE



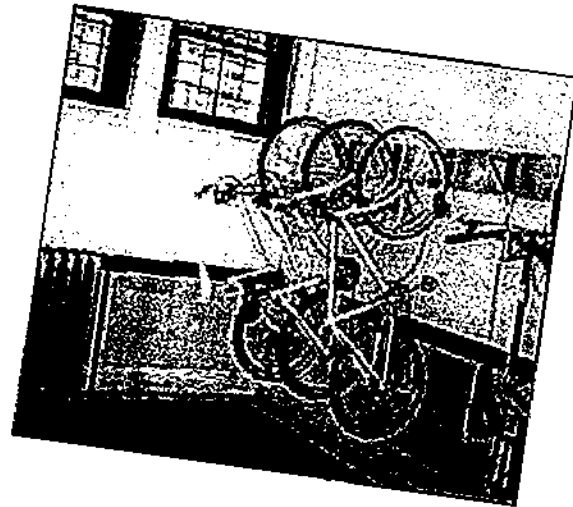
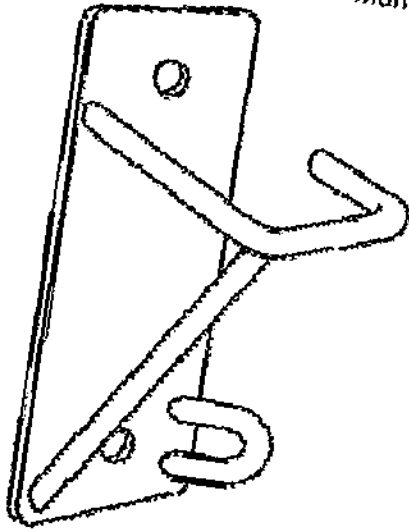
CycleSafe "ProPark" Bike Locker Diagrams

12 Furnishings

12.93.14 BICYCLE RACKS AND HOOKS



Cora Expo W Series Bike Racks
Hanger Measurements: 3" x 6" x 5" deep
"Mini Mum" Vertical Bicycle Storage System

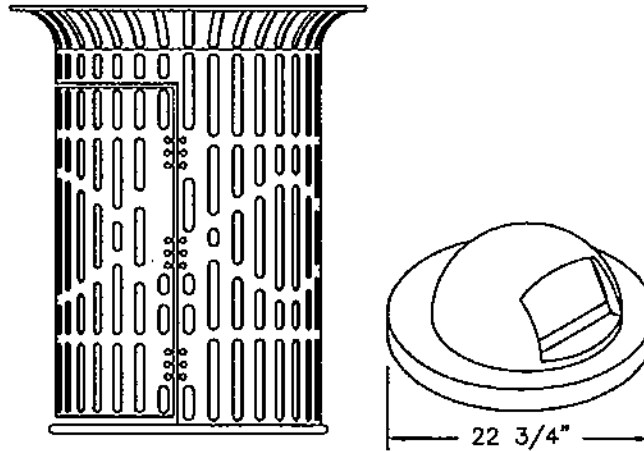


END OF SECTION

12 Furnishings

12.93.23 TRASH RECEPTACLES - EXTERIOR

Design Guidelines	This guideline applies to general garbage and, where appropriate, cigarette butt receptacles stationed outdoors at operating and passenger facilities. General waste receptacles are the same product used at bus shelter zones. Cigarette butt receptacles for employee use must be stationed in designated "smoking areas" that meet the 25ft rule of the January 2006 state law.
Performance Specification	<p>Waste receptacles</p> <ul style="list-style-type: none">▪ Poly-vinyl coated metal, 10-gauge rib panel with 12-gauge side door continuous hinge▪ Capacity to house 21 to 32 gallon waste can.▪ Lid accessory is a dome top. <p>Cigarette butt receptacles Wabash Valley – www.wabashvalley.com Waste receptacle FR 500R with dome top lid EDT100N</p>
Acceptable Manufacturers and Product Brands	Victor Stanley, Inc. – www.victorstanley.com Waste receptacle RB-36



Typical 32 gallon receptacle and dome top lid
END OF SECTION

21 Fire Suppression

21.13.00 FIRE SUPPRESSION & SPRINKLER SYSTEMS

Design Guideline Components include network panels, smoke detectors, heat detectors, horn/strobe lights, duct smoke detectors, break glass pull stations.

The sprinkler system shall be designed for the type of hazards determined for each location.

A facility's fire suppression plan shall be approved by Transit's insurance carrier, Factory Mutual Global.

Industry Standards Comply with editions currently adopted by AHJ:
NFPA 101, Life Safety Code
UFC, Uniform Fire Code
NFPA 70, National Electrical Code
NFPA 72, National Fire Alarm Code
NFPA 13 latest edition, National Fire Suppression (Sprinkler)

Performance Specification Refer to D&C for technical performance specifications.

&

Acceptable Manufacturers and Product Brands Sprinkler Systems:
Viking -- www.vikingcorp.com
Grinnell Corporation -- www.simplexgrinnell.com

Proprietary Product Fire Panels:
Edwards System Technology -- www.est.net
Refer to Section 28.00.00

END OF SECTION

22 Plumbing

22.30.00 PLUMBING EQUIPMENT

Design Guideline For domestic water heaters, hot water capacity shall be at least 80 gallons. The capacity shall be based on facility requirements for hot water demand.

Industry Standards Domestic Water Heaters:
Heaters shall conform to ASHRAE 90A requirements for energy efficiency. They shall also conform to standards of the International Plumbing Code (IPC). Heaters shall comply with UL 1453.

Acceptable Manufacturers and Product Brands Domestic Water Heaters:
Bradford White Corp – www.bradfordwhite.com
Rheem – www.rheem.com
AO Smith Water Products – www.aosmith.com

Exterior Water Heater:
Rheem
END OF SECTION

22 Plumbing

22.40.00 PLUMBING FIXTURES

Design Guideline Common plumbing fixtures are referenced for the following rooms/areas:

FIXTURES	RESTROOMS	KITCHENS	WASH / UTILITY STATIONS	EXTERIORS
Service sink			X	
Lavatory	X	X		
Toilet	X			
Urinal	X			
Faucet	X	X	X	
Shower head	X			
Instant Hot H ₂ O		X		
Ice Machines		X		
Hose bibs	X			X

Restrooms:

- Lavatories shall be 18 gauge metal, stainless steel countertop model or vitreous china, self-rimming countertop model.
- Toilets shall be vitreous china, wall hung, elongated bowl, top inlet.
- Urinals shall be vitreous china, wall mounted with sensor operated "flush-o-meter."
- Faucets shall be polished chrome plated cast brass, center-set with single indexed handle and aerator; with infra-red sensor.
- Shower head & valve shall be chrome plated, low flow with anti-scald balanced pressure valve.
- Hose bibs shall total one per restroom including floor drain.

Kitchens:

- Sinks shall be 18 gauge stainless steel with double compartments; one compartment shall be installed with food waste disposal.
- Faucets shall be polished chrome mixing faucet, center mount swing gooseneck spout.
- Instant Hot Water dispensers shall be installed at the rim of sinks; filtered supply side.
- Food waste disposals shall be installed with dishwasher drain connections.
- Ice Machines shall be the standard product for operating facilities consisting of a ice maker and a dispenser.

Coffee/Break Stations:

- Sinks shall be 18 gauge stainless steel, single bowl.
- Faucets shall be polished chrome mixing faucet with lever handles, swivel gooseneck spout.
- Instant Hot Water dispensers shall be installed at the rim of the sinks.

22 Plumbing

22.40.00 PLUMBING FIXTURES

Design Guideline

Utility Stations:

- Custodial mop sinks shall be vitreous china, floor model.
- Faucets shall be rough chrome mixing faucet, wall-hung to accommodate mop and other wash buckets.

Wash Stations:

- Sinks shall be industrial, galvanized metal.
- Faucets shall be rough chrome mixing faucet with attached eyewash at faucet outlet.

Exteriors:

- Hose bibs shall have freeze-proof faucets with vacuum breakers in security wall boxes.

Industry Standards

Plumbing fixtures shall comply with National Sanitation Foundation (NSF) requirements.

Enameled cast iron fixtures shall comply with ASME A112.19.1M.

Fittings shall comply with ANSI A112.18.1M-79

Plastic mop service basin shall comply with ANSI A124.6.

Vitreous china fixtures shall comply with ASME A112.19.2M-82.

Flush Valves shall comply with ASME A112.19.5.

Plastic shower enclosures shall comply with ANSI Z124.2.

Performance Specification

Flush valves:

Tanks shall use 1.6 gallons of water per flush or less. Urinals shall use 1 gallon or less per flush. Tanks shall have exposed sensor operated closet Flushometer (Sloan).

Lavatories:

Lavatories shall be wall hung or cabinet mounted and equipped with center-set faucets complete with single indexed handle, aerator, pop-up drain, and 1/4" trap.

Water Closet:

Water closets shall be wall hung, blow back style, with flush valves and concealed carriers. Carriers must support up to 350 lbs.

Urinals:

Urinals shall be wall hung, with 2" drain outlet. Carriers must support up to 250 lbs.

Showers valves:

Showers shall have temperature and pressure balancing.

Ice Machine and Dispenser

Produce up to 355 lbs of ice per day; stores 120 lbs.

22 Plumbing

22.40.00 PLUMBING FIXTURES

Acceptable Manufacturers and Product Brands

Fixtures:

American Standard – www.americanstandard-us.com

Elkay—www.elkay.com/

Kohler – www.kohler.com

Sterling—www.sterlingplumbing.com

Sinks

Eljer – www.eljer.com

American Standard – www.americanstandard-us.com

Kohler – www.kohler.com

Lavatory Faucet:

Chicago #786 in restrooms – www.chicagofaucets.com

Chicago #802 in kitchens

Shower Faucet:

Symmons 1-25-FSB or approved equal – www.symmons.com

Instant Hot Water:

In Sinkerator H770 or approved equal – www.insinkerator.com

Water Closet:

Zurn – www.zurn.com

Jay R Smith – www.jrsmith.com

American Standard Model #2257.103 – www.americanstandard-us.com

Flush Valves:

Sloan Optima Model #111ES and Model #186-1 ES-S 1 g/f

www.sloanvalve.com

Lavatories:

Just Manufacturing Model #A-33338, SS—www.justmfq.com/

Chicago Faucet #550.—www.chicagofaucets.com

Water Closet Seats:

Forbes Wright Church Model #9900C—www.churchseats.com

Urinals:

American Standard Allbrook Model #6541-132

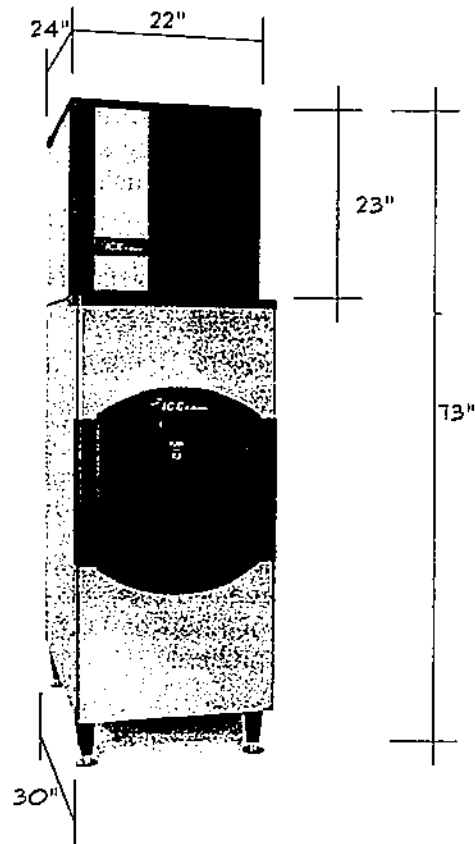
Showers:

Symmons Temptrol #S-96-1-131 – www.symmons.com

22 Plumbing

22.40.00 PLUMBING FIXTURES

Sole Product Brand Ice Dispensing Machine: Hotel Series, Model CD 40022
Ice Cube Making Machine: Hotel Series, Model 0320 HA
www.iceomatic.com See photo below.



END OF SECTION

23 HVAC

23.00.00 HVAC

Design Guideline Transit Facilities has system standards for all heating, cooling, and ventilation. Refer to D&C design criteria.

&

Industry Standards All equipment to be tested and certified by nationally recognized industry standards agencies such as UL, ARI, NFPA, AMCA, AGA. Compressor equipment shall use Copeland scroll compressors and R-410A refrigerant. Packaged rooftop gas-fired equipment shall utilize powered venting. All rooftop equipment shall use powered return fans. All gas-fired equipment to use FM approved gas trains.

Performance Specification Roof top Gas Packs: Stainless steel heat exchangers with powered venting and mixing boxes with dampers.

Heating Water Boilers: Condensing boilers sized to 90 degree return water

Air to water Chiller: Copeland scroll compressors, R-410a, VFD condenser fan control, electronic TXV, stainless steel fasteners, coils designed for power washing

Large air handlers for office spaces: Direct drive fans with VFDs, bolted panel construction, SS fasteners, 2" prefilters with 12" final filter, 24x24 or 12x24 or a combo of both with hydronic or indirect gas furnace preheat

Shop Air Handlers: Same as above with indirect gas heating Maxon brand or hydronic coil. 4" pleated filter, 24x24 or 12x24 or a combo of both in supply and return air stream. Plate and frame heat exchanger.

Pumps: In-line vertical or horizontal.

AC Ductless: ductless split system with indoor, fan powered coil and condenser

Exhaust fans: roof mounted, up or down blast depending upon application

Condensing Units: Remote DX cooling, condensing unit is separate from air handler

23HVAC

23.00.00 HVAC

Acceptable Manufacturers and Product Brands

Roof top Air Conditioners: Addison or Aaon

Roof top Gas Packs: Addison or Aaon—www.aaonnet.com

Boiler over 1mbtu/hr: Cleaver Brooks or AERCO—www.aerco.com

Air Handlers: Alliance or Energy Labs—www.energylabs.com

Pumps: Bell & Gossett or Armstrong

Split, ductless AC or Heat Pump: Mitsubishi or Fujitsu

Direct or indirect gas burners: Maxon—www.maxoncorp.com

Flame controllers: Honeywell 7800 series

Air filters: Farr—www.camfilfarr.com

Gas fired water heater: RBI—www.rbiwaterheaters.com

Chiller: Petra -- www.petra-eng.com

END OF SECTION

25 Integrated Automation

25.00.00 INTEGRATED AUTOMATION

Design Guidelines	Metro Transit's standard building automated control system is Siemens Apogee System 600. Contact Ben Sharp at Siemens – Landis Division, 425-507-4300 for more information.
Performance Specifications &	Transit's Design & Construction, Mechanical/Electrical Engineering leads all vendor management, planning and design specifications. Refer to D&C performance specs for more information.
Industry Standards	Comply with appropriate industry standards
Proprietary Product	Siemens Building Technology, Apogee System 600 -- www.sbt.siemens.com

END OF SECTION

26 Electrical

26.00.00 ELECTRICAL

Design Guideline

Receptacles/Plugs:

- Offices, flex and meeting rooms: Duplex on min. three of four walls, 12 feet on center as wall space allows.
- Corridors: Convenience outlets at 25 feet on center spacing.
- Dedicated equipment: Specific loads for vending machines, kitchen appliances, shop equipment/tools, photocopiers, fax machines, and other loads over 500 volt-amperes.
- Convenience outlets: Electrical room, telephone room, machine room, elevator pit, restrooms.
- Outdoors: Near each exterior entry door, within 25' of each air-handling unit on rooftops, closets, attics, and mezzanines.

Switchboard:

- New 480Y/277V power panels shall be sized such that the load can be increased by 30% (space and capacity, no spare breakers shall be installed), new 208Y/120V power panels shall be sized that the load can be increased by 50% capacity. Equip each 208Y/120V panel with a minimum of 20% spare circuit breakers with space for an additional 10%. All hardware shall be provided including bus work, terminations to complete the panel board. Minimum sized panel shall be 100 amp.

'EXIT' signage:

- Use LED based exit signs, KC Metro standard, Lithonia Quantum (LQM-S-W-3-G-120/277).
- Unacceptable sources are incandescent, standard fluorescent, photo luminescent, radioactive light.
- Have battery back-up for all locations without an emergency power generator.

Industry Standards

Comply with National Electrical Code (NEC), Underwriter's Laboratory (UL), and National Electrical Manufacturer's Association (NEMA). All receptacles and plugs shall be specification grade

Performance Specification



Transit's Design & Construction, Electrical Engineering leads all electrical programming and design efforts. Refer to D&C's performance specifications for electrical systems.

Conduit: Minimum trade size shall be ¾" and 1" embedded underground or within walls unless specifically noted.

Circuit Conductors: Stranded wire only, minimum 12 AWG unless specified.

Switchboard: Floor-mounted and freestanding unit, with single main breaker and feeder breakers per requirements and shall contain four 3-pole, 100 amp spaces for future loads.

26 Electrical

26.00.00 ELECTRICAL

Acceptable Manufacturers and Product Brands

Firestops:

Flamemastic 77 – www.outline-international.com

Vimasco No. 1-A – www.vimasco.com

Circuit Conductors:

Okonite, Okoseal-N – www.okonite.com

Anaconda – www.generalcable.com

Boxes and Cabinets:

Paco

Steel City

Circle AW

Receptacles/Plugs:

Hubbell – www.hubbellonline.com

GE – www.geindustrial.com

Disconnects/Fused Switches:

Square D – www.squared.com

Cutler Hammer – www.cutlerhammer.com

GE

Automatic Transfer Switch:

Onan – www.onan.com

ASCO – www.asco.com

Switchboard:

GE

Square D

Motor Control Center 600V:

GE

Square D

Acceptable Manufacturers and Product Brands

Overload Relays:

Cutler Hammer

Allen Bradley – www.ab.com

Motor Starters:

Allen Bradley

Square D

Circuit Breakers:

Square D bolt-in or approved substitute that is matched to

existing.

Proprietary Product

Uninterruptible Power Supply

Leviton – www.leviton.com

END OF SECTION

26 Electrical

26.05.53 IDENTIFICATION FOR ELECTRICAL

Design Guideline Nameplates shall be provided on all electrical equipment.

Industry Standards Comply with National Electrical Code (NEC), Underwriter's Laboratory (UL), and National Electrical Manufacturer's Association (NEMA).

Performance Specification Junction boxes shall be coded by the following colors:
Emergency Power Orange
Fire Alarm Red

END OF SECTION

26 Electrical

26.50.00 LIGHTING

Design Guideline

&

Interior Foot-Candle Levels:
Minimum maintained illumination levels and preferred luminary equipment are to conform to Transit Electrical Design standards. Refer to D&C for more information.

Interior Lighting Fixtures:
Fixtures shall be placed no higher than 12 feet, exempting high bays and other shop-type interiors. Low ceiling areas and task lighting shall use fluorescent fixtures. For Shops, industrial spaces shall use metal halide HID.

Exterior Lighting:
Exterior lighting shall be provided at building entries, parking areas, site egresses, storage and work yards, flag poles, pathways, and key signage. Light type shall be high pressure sodium.

Industry Standards

Comply with National Electrical Code (NEC), Underwriter's Laboratory (UL), and National Electrical Manufacturer's Association (NEMA).

Interior Foot-Candle Levels:
Comply with Illumination Engineering Society Handbook recommendations.

Fluorescent T5's & T'8 lamps: 4 ft medium bi-pin

Compact Fluorescent
26W dimming/electronic 4pin
26W standard 2pin
32W dimming/electronic 4pin

Acceptable Manufacturers and Product Brands

Interior Lighting and Fixtures:
Ballasts shall be less than 10% total harmonic distortion:
Advance
Magnetek
Motorola

END OF SECTION

27 Communications

27.00.00 COMMUNICATIONS

Design Guideline Voice Communications – Telephone Sets:
Incoming WAN and telecommunication service shall follow KC ITS Division requirements. KC Telecom section information is available at: <http://kcweb.metrokc.gov/des/phones/default.asp>

Participation in the design and service procurement of a facility's telecommunication system is through ITS's Telecom and Network Engineering staff, in Technologies & Operation, 296-0600.

Intercom and Paging Systems:
Zoned PA system: All-call, area or group, and exterior. Available via telephone extension.

Performance Specification Voice Communications – Telephone Sets:
Data wiring shall use CAT-5e and RJ-45 modular interface jacks.
Voice wiring shall use CAT-3 UTP cable and RJ-11 modular interface jacks.

Proprietary Products Voice Communications – Telephone Sets:
Per service contract managed by KC Telecom section, ITS Division.

END OF SECTION

28 Electronic Security

28.00.00 ELECTRONIC SECURITY

Design Guideline The design of a facility's security system shall be based on and be consistent with the security concepts defined by Transit's Facility Security Program. The security network for most of Transit's facilities is a centralized, integrated access/alarm/monitor/recording system, compatible with KC IP/Ethernet-based "I-net" network. A centralized monitoring station is via a server located in the Transit Employee Parking Garage (as of 2006).

While the security system shall be designed according to the needs of the property, facilities and functions, common components are standardized for operating consistency and maintainability:

CCTV cameras or PTZ Domes:

For monitoring and visual recording of a property's entry points and other areas considered at risk for intrusion. Exterior cameras can be mounted on posts, poles, roofs or sides of buildings.

Door or Gate Access Hardware:

Each door or gate targeted for electronic access shall reflect the facility's programmed secured zones, operating logistics, and emergency protocols. Equipment includes card readers, door conduit, strikes and contacts; door alarms, and in some cases, intercoms.

Access Control System Infrastructure:

A proprietary manufacturer – Andover, and the manufacturers of its associated equipment – serves as Transit's sole system for key card access. Its infrastructure requirements are:

Remote call station, Intelligent System Controller (ISC) door controller with UPS, control relays and wiring, security closet with backboard, alarm horn, temperature sensor.

Key Cards:

The KC-issued employee I.D. Flex Pass shall be used as the sole key card for access onto Transit properties. The card will authorize access to employees by job classification or position to their required work spaces. This is managed through an employee database access software application in the P&F manager's office.

&

For any security plan to work holistically, equipment must work concurrently with operating practices that reinforce protocols and procedures for employee safety and property security. For more detailed information, contact Transit Design & Construction or Transit Police.

28 Electronic Security

28.00.00 ELECTRONIC SECURITY

Industry Standards

Key Card Access System:

Access systems shall comply with UL-294 Standards for Access Control System Control Units.

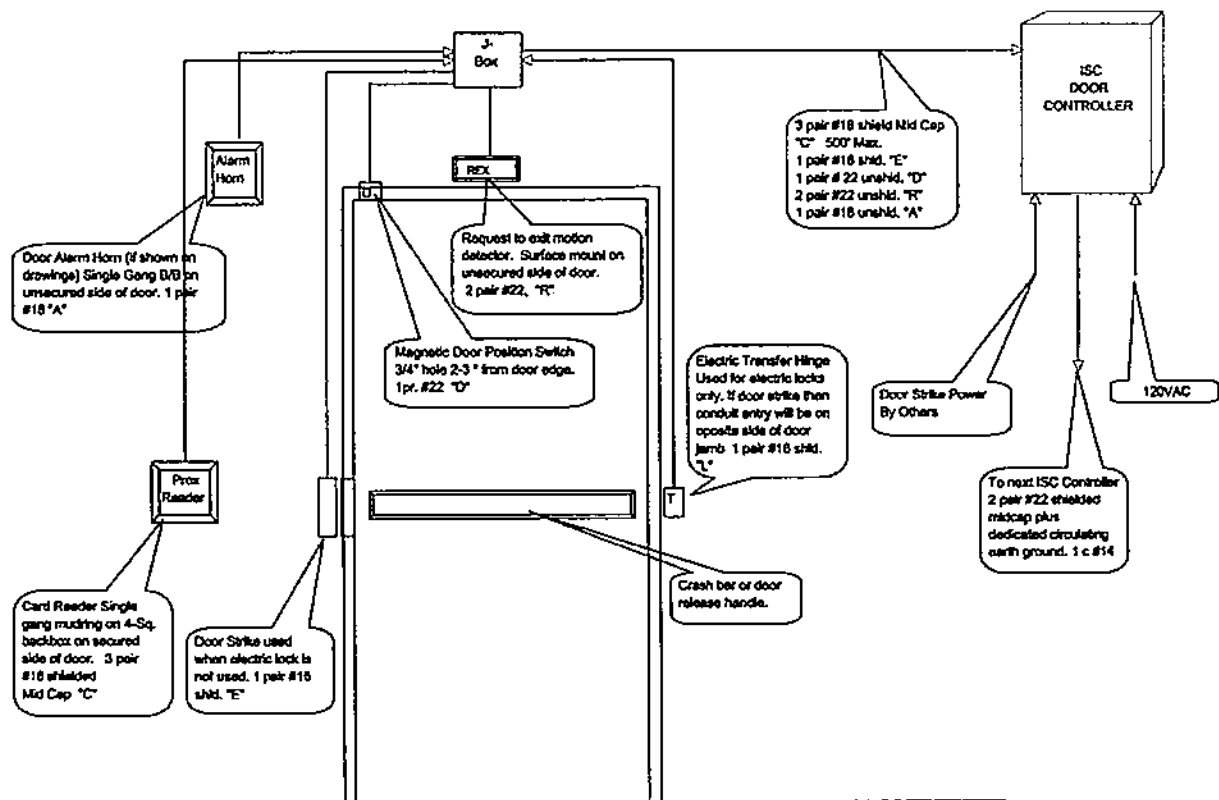
Performance Specification

Specification details are available from Design & Construction. Only the most general components are provided below to illustrate a system interface concept:



Card Readers of the mullion-mounted proximity type :

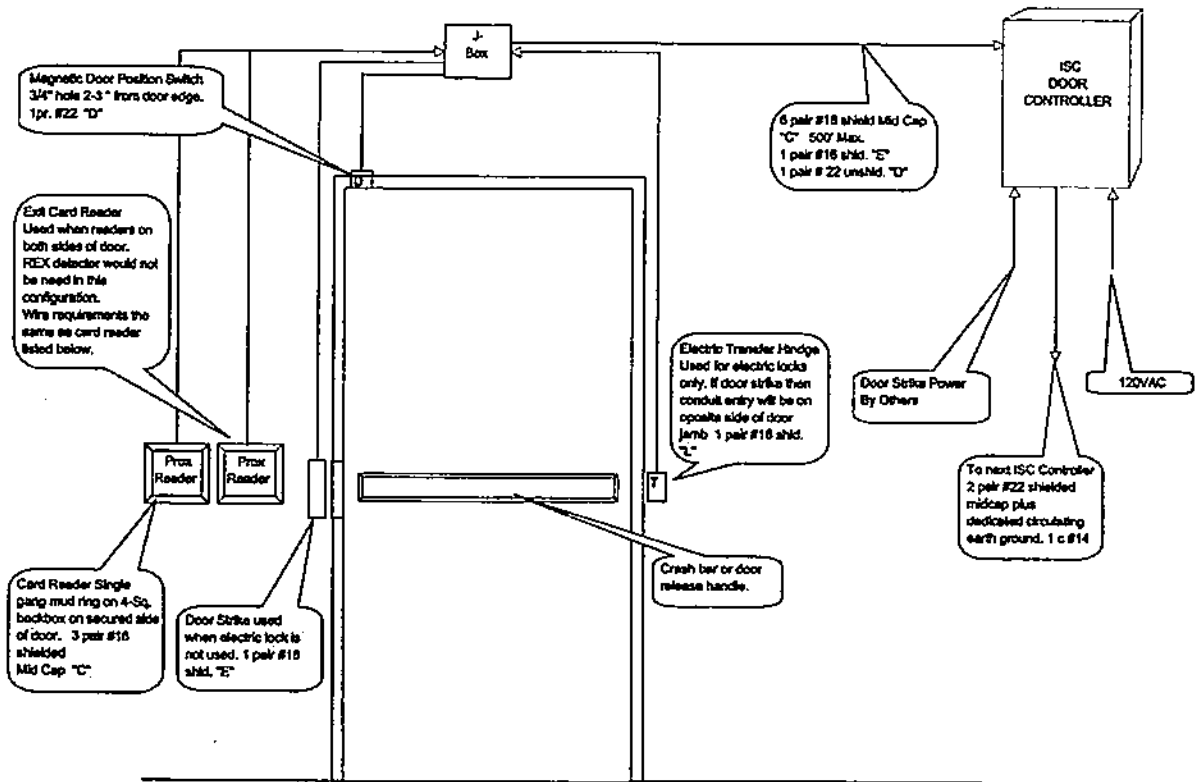
- Tamper proof and weather proof, with operable temperature range of -20° through 125° F.
- Size: No larger than 6" x 1.75" x 1.1"
- Capable of reading KC-issued I.D. card



Example 1 Typical Card Reader Configuration

28 Electronic Security

28.00.00 ELECTRONIC SECURITY



Proprietary Product Example 2 Typical Card Reader Configuration
Access Control System: Andover

Card readers: Motorola FP1511A

Fire panels:
Edwards System Technology -- www.est.net

END OF SECTION

32 Exterior Improvements

32.17.00 PAVEMENT SPECIALTIES

Design Guideline

&

Pavement Markings:

Required markings for site circulation are:

- Parking and No Parking delineations
- Circulation/vehicular direction arrows
- Fire lanes
- One-way, exit only, stop markings
- Pedestrian crosswalks

Refer to D&C for further information.

END OF SECTION

32 Exterior Improvements

32.80.00 IRRIGATION

Design Guideline For the majority of landscape designs, automated pop-up sprinkler irrigation systems are expected for planted areas. By exception, special xeriscape drought tolerant designs may forego sprinkler systems when coordinated with and approved by North Facilities Groundskeeping.

&

Refer to D&C for green design information.

Industry Standards PVC piping shall be Schedule 40 and conform to ASTM D 1785-86
PVC fittings shall conform to ASTM D2466-78; threaded PVC fittings and nipples shall be Schedule 80.

Performance Specification All systems shall have appropriate backflow prevention device, manual shutoff valve, and pressure reducing valve installed.

Acceptable Manufacturers and Product Brands Sprinkler body:
Rainbird 1800 series -- www.rainbird.com

END OF SECTION

32 Exterior Improvements

32.90.00 LANDSCAPING

Design Guideline The types of planted areas on transit properties fall into three general categories that roughly correspond to the weed tolerance levels identified in the Integrated Pest Management (IPM) plan for grounds maintenance.

Low weed tolerance areas have high public visibility for transit customers or community-invested projects. More groundskeeping resources tend to be scheduled for these sites:

- Transit Centers and Park-and-Ride lots, particularly entrances and areas visible from public streets.
- Exceptional areas designed or developed with community participation, e.g., the grass field at North Base and the Madrona Rectifier Station.

Medium weed tolerance areas have minimal to no public visibility but could be part of the work environment for Transit employees. These include:

- Bus bases and other operating support facilities.
- Property lines to prevent plant growth onto adjacent properties.

High weed tolerance areas have minimal to no public or employee visibility, usually among established plants. These include:

- Detention or storm water ponds.
- Remote or isolated areas at either passenger or operating facilities.
- Little or unused fields.

Part of the IPM plan accounts for the best distribution of groundskeeping resources for all transit properties. This allows crews to schedule the appropriate maintenance practices for the types of landscape designed around these tolerance levels.

Minimum Guidelines from IPM and CPTED:

- **Plant characteristics:** Low maintenance, native species, drought tolerant, air pollution tolerant plants assumes plant selection follows the right plant for the right place principle.
- **Plant types:** In any landscape design, limit the types of plants to 4 or 5, excluding established structural trees or under story shrubs.
- **Barrier plant characteristics:** Shrubs used to discourage human proximity have thorns, needles on stems and/or leaves, and a dense structure.

32 Exterior Improvements

32.90.00 LANDSCAPING

- fill
- Design Guideline**
- Minimize bare ground by selecting fast-growing groundcovers to out against weeds.
 - Tree characteristics: Of the appropriate species, trees are to be kept pruned up to ten feet above ground to allow for visibility.
 - No trees are to be planted along security fencing. A minimum of 10ft from perimeter fence lines is required.
 - Height of shrubs should not exceed three feet at maturity.
 - Turf grass can be used for fields or open areas that are left unlandscaped. Such fields are not irrigated.
 - No ivy or other plants considered noxious. Refer to King County's noxious weeds program at: <http://dnr.metrokc.gov/wlr/lands/weeds/index.htm>
 - No chunky bark to be used as mulch.
 - Locate plants to support or direct wayfinding, or design-in commonly used pedestrian paths
 - Rock and stone: Bricks, river rock and other masonry materials smaller than 15 square inches are to be grouted or secured in a manner to prevent removal by hand.
 - Berms and other above grade areas shall be designed to contain soil and mulch where little to no run-off would occur during heavy rains or by irrigation.
 - Determine the watering plan for the critical first year of new landscaping, with or without an irrigation plan to be reviewed and accepted by Facilities Groundskeeping.
- Industry Standards** Plants to comply with ANSI 260.1 American Standard for Nursery Stock.

END OF SECTION

33 Utilities

33.00.00 UTILITIES

Design Guideline When utilities—water, natural gas, electricity – service multiple buildings on a property, sub-meters for each separate building shall be installed. For irrigation systems, provide a irrigation deduct meter.

For underground drainage structures, all shall address the following maintenance issues:

- Manholes located to allow maintenance access with Transit's eductor truck. South Facilities has procedures if needed.
- Structures entered by personnel shall have adequate access manholes to meet confined space working conditions.
- Structures entered by personnel shall have an access ladder made of non-corrosive materials
- Locations of manholes shall be out of high-traffic areas
- All vault compartments shall be accessible from the surface. Access ladders shall be available for each compartment.

Performance Specification Sewage Pump: Cast iron, open inlet, vertical discharge, with cast iron impeller.

Flexible Connectors: Bronze or stainless steel.

Acceptable Manufacturers and Product Brands

Sewage Pump:
Bell & Gossett Domestic Pump – www.bellgossett.com
ITT Industries – www.itt.com
Paco – www.paco-pumps.com

Flexible Connectors:
Flex-Hose Co. – www.flexhose.com
Metraflex, Inc. – www.metraflex.com

Backflow Prevention Devices:
Watts – www.watts.com
Febco – www.febcoonline.com
Wilkins – www.zurn.com

Water Pressure Regulator:
Watts – www.watts.com

Strainers:
Watts – www.watts.com

Trap Seal Primer Valves:
Watts – www.watts.com

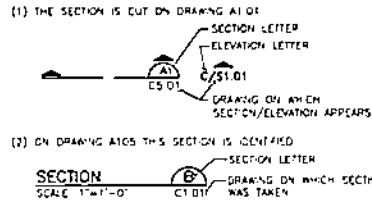
Drains:
Jay R Smith – www.jrsmith.com
Zurn – www.zurn.com
END OF SECTION

APPENDIX C

KING COUNTY TRANSIT

STANDARD SINGLE-UNIT COMFORT STATION

TYPICAL SECTION AND DETAIL REFERENCING SYSTEM



STANDARD SINGLE UNIT COMFORT STATION

DRAWING NUMBERING SYSTEM KEY

DISCIPLINE	DESIGNATOR	DESIGNATED CATEGORY
C	GENERAL	0 GENERAL
C	CIVIL	1 PLANS
L	LANDSCAPE	2 ELEVATIONS
A	ARCHITECTURE	3 SECTIONS
S	STRUCTURAL	4 ENLARGED PLANS
M	MECHANICAL	5 DETAILS
FP	FIRE PROTECTION	6 SCHEDULES & DIAGRAMS
E	ELECTRICAL	7 USER DEFINED
T	TROLLEY	8 USER DEFINED
		9 30 YEARS

AREA LOCATION (FOR PRODUCTS WITH MULTIPLE LOCATIONS): **2 C1.01**

DISCIPLINE DESIGNATOR SEPARATOR

SEQUENTIAL DRAWING NUMBER WITH DISCIPLINE AND DESIGNATED CATEGORY

ABBREVIATIONS:

ACI	AMERICAN CONCRETE INSTITUTE
AFF	ABOVE FINISHED FLOOR
APA	AMERICAN PLYWOOD ASSOCIATION
CND	CONDUIT
CFM	CUBIC FEET PER MINUTE
CW	COLD WATER
DA	DIAMETER
EW	EACH WAY
GFCI	GROUND FAULT CURRENT INTERRUPT
GFI	GROUND FAULT INDICATOR
CPM	GALLONS PER MINUTE
IBC	INTERNATIONAL BUILDING CODE
MAX	MAXIMUM
NTS	NOT TO SCALE
OC	ON CENTER
PSI	POUNDS PER SQUARE INCH
REQ'D	REQUIRED
RFP	REINFORCED FIBERGLASS PANEL
SCL	SEATTLE CITY LIGHT
SS	SANITARY SEWER
TP	TRAP PRIMER
TYP	TYPICAL
W	WATER
W/	WITH

WASHINGTON ENERGY CODE INFORMATION

EQUIPMENT POLYISOCYANURATE INSULATION - R11.5
 WALLS BATT OR POLYISOCYANURATE INSULATION - R19.0
 ROOF BATT OR POLYISOCYANURATE INSULATION - R38.0

STRUCTURAL & ARCHITECTURAL CONSTRUCTION NOTES:

- CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CURRENT INTERNATIONAL BUILDING CODE, THE CURRENT UNIFORM PLUMBING CODE, AND LATEST EDITION OF THE APPLICABLE JURISDICTION'S BUILDING CODE AND AMENDMENTS.
- A COPY OF THE APPROVED PLAN MUST BE ON SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
- CODE - LATEST EDITION OF IBC AS ADOPTED BY LOCAL JURISDICTION. SEISMIC REQUIREMENTS PER ASCE 7 AND USGS S4 S1 SITE CLASS S15.
- CONCRETE (ACI 318-05) $f'_c = 3000$ PSI, 7 DAY 6 SACK, 3" SLUMP, 5% AIR ENTRAINMENT, REBAR $f_y = 60,000$ PSI.
- FIELD VERIFY ALL DIMENSIONS PRIOR TO START OF WORK.
- ALL WATER SERVICE PIPING MUST BE INSPECTED PRIOR TO BACKFILLING TRENCH.
- INSTALL FOUNDATION PERIMETER INSULATION AND CLOSURE PER **DRAWING 53.01**.
- PROVIDE MINIMUM 6x6 HEADER AT DOORS. PROVIDE BLOCKING AS REQUIRED FOR ALL FIXTURES AND EQUIPMENT.
- ALL TIMBER SHALL BE DOUGLAS FIR/LARCH NUMBER 2 OR BETTER GRADE. PLYWOOD SHALL BE C-D, EXTERIOR GLE, STRUCTURAL I OR STRUCTURAL II.
- MINIMUM FASTENING SHALL BE PER IBC TABLE 2304.9.1.
- SEE **DRAWING M1.01** FOR PLUMBING RISER DIAGRAM.
- INSPECTIONS PER IBC SECTION 109.
- FINISHED COMFORT STATION INTERIOR SHALL COMPLY WITH ADA AND ADA ACCESSIBILITY REQUIREMENTS. SEE **BARRIER FREE ACCESS DETAIL DRAWING A1.01**.

GENERAL NOTES:

- ALL LOCATIONS OF EXISTING UTILITIES HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS. ARE APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.
- THE CONTRACTOR SHALL LOCATE AND PROTECT ALL CASTINGS AND UTILITIES DURING CONSTRUCTION AND SHALL CONTACT THE UNDERGROUND UTILITIES LOCATOR SERVICE (1-800-424-5555) AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE POWER, WATER, SEWER AUTHORITIES AND KC METRO PRIOR TO THE START OF WORK.
- THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND LOCATIONS PRIOR TO START OF WORK.
- ALL WATER SERVICE PIPING MUST BE INSPECTED PRIOR TO BACKFILLING TRENCH.
- ALL DEMOLITION DEBRIS MUST BE DISPOSED OF LEGALLY, OFF SITE.

INDEX OF COMFORT STATION DRAWINGS

SHEET NUMBER	DRAWING NUMBER	DRAWING TITLE
	ARCHITECTURAL	
1	A0.01	CONSTRUCTION NOTES AND GENERAL INFORMATION
2	A1.01	FOUNDATION, FLOOR AND ROOF PLANS
3	A2.01	EXTERIOR ELEVATIONS & DOOR SPECIFICATION
4	A2.02	INTERIOR ELEVATIONS & WASHROOM ACCESSORIES
5	A7.01	CAST-IN-PLACE CONCRETE SPECIFICATION
6	A7.02	ROUGH CARPENTRY & SHEATHING SPECIFICATIONS
7	A7.03	THERMAL INSULATION & EXTERIOR FINISH CARPENTRY SPECIFICATIONS
8	A7.04	METAL ROOF PANELS SPECIFICATION
9	A7.05	SHEET METAL FLASHING & TRIM SPECIFICATION
10	A7.06	DOOR HARDWARE SPECIFICATION
11	A7.07	FIBERGLASS REINFORCED PLASTIC PANELS & PAINTING SPECIFICATIONS
	STRUCTURAL	
12	S3.01	CONSTRUCTION DETAILS
13	S3.02	CONSTRUCTION DETAILS
	MECHANICAL	
14	M1.01	PLUMBING PLANS
15	M5.01	SECTION & PLUMBING RISER DIAGRAM
	ELECTRICAL	
16	E1.01	ELECTRICAL PLAN AND PANEL SCHEDULE

PROJECT DESCRIPTION

OWNER	KING COUNTY
AGENT	
BUILDING USE:	63 SF COMFORT STATION
PROPERTY ZONING	
OCCUPANCY GROUP:	U (UTILITY/AMBULANCE)
CONSTRUCTION TYPE:	V
REFERENCE:	2009 INTERNATIONAL BUILDING CODE

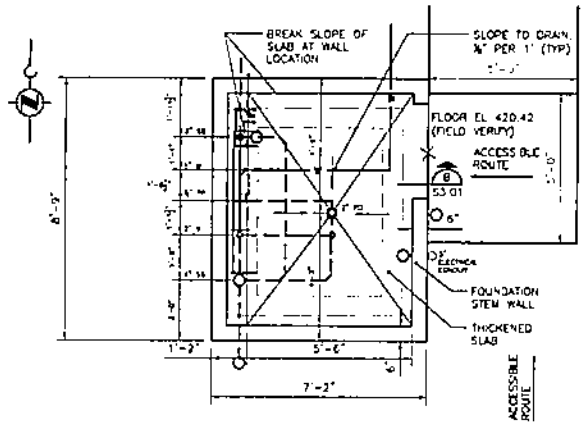
NO.	REVISION	BY	APP'D	DATE
1	AS CONSTRUCTED			3/31/2012



DESIGNED	CHECKED	DATE
J. DAVIS	P. ENG	AS NOTED
	APPROVED	SEE LOCATION 44
B. FARMS-BATTMAN	D. CAMPBELL	
CREATED	REV. NO.	ONE INCH AT FULL SIZE
J. DAVIS	432	
PREPARED BY	DATE	
D. CAMPBELL	CONTRACT NO.	IF NOT ONE INCH SCALE ACCORDINGLY

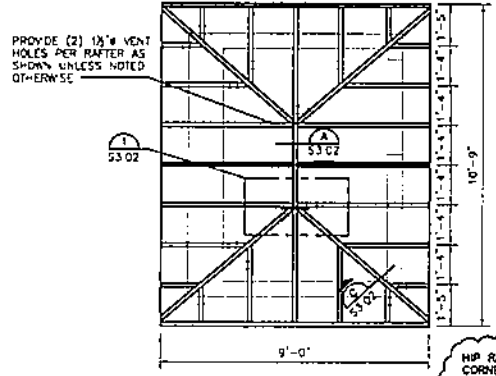


METRO TRANSIT DIVISION STANDARD SINGLE UNIT DRIVER'S COMFORT STATION	DATE APRIL 2012
CONSTRUCTION NOTES & GENERAL INFORMATION	DRAWING NO. A0.01
	SHEET NO. 1 OF 16



FOUNDATION PLAN
SCALE: 1/2" = 1'-0"

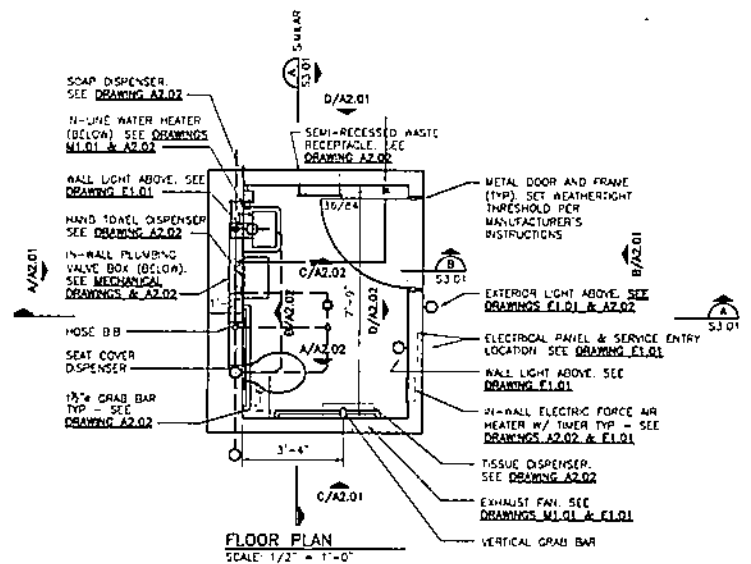
NOTE: 6" CONCRETE SLAB ON GRADE W/ SMOOTH TROREL FINISH OVER 4" GRAVEL. SLOPE SLAB 1/8" FT TOWARD DRAIN (TYPICAL AS SHOWN)



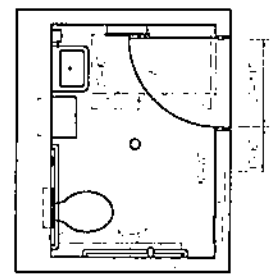
ROOF FRAMING PLAN
SCALE: 1/2" = 1'-0"

CONSTRUCTION NOTES:

1. REFER TO **DRAWING A0.01** FOR GENERAL NOTES AND STRUCTURAL & ARCHITECTURAL CONSTRUCTION NOTES.
2. PIPE LOCATIONS SHOWN PER PLUMBING SCHEMATIC. SEE **DRAWING M1.01**
3. SEE **DRAWING M5.01** FOR PLUMBING RISER DIAGRAM.
5. CLEAR FLOOR SPACE AT LAVATORY AND AT WATER CLOSET SHALL BE AS SHOWN IN **BARRIER FREE ACCESS DETAIL**. THIS DRAWING.
7. SEE **DRAWING A7.01** FOR CAST-IN-PLACE CONCRETE SPECIFICATION. **DRAWING S3.01** FOR DETAILS.
9. SEE **DRAWING A7.02** FOR ROUGH LUMBER AND SHEATHING SPECIFICATIONS. **DRAWINGS S3.01 & S3.02** FOR ADDITIONAL NOTES AND DETAILS.
10. PROVIDE BLOCKING AS REQUIRED FOR ALL RESTROOM FIXTURES.
11. INSTALL FOUNDATION PERIMETER INSULATION AND CLOSURE PER **DRAWING S3.01**.



FLOOR PLAN
SCALE: 1/2" = 1'-0"

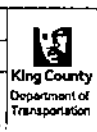


BARRIER FREE ACCESS DETAIL
SCALE: 1/2" = 1'-0"

NO.	REVISION	BY	APP'D	DATE
1	AS CONSTRUCTED			03/2012

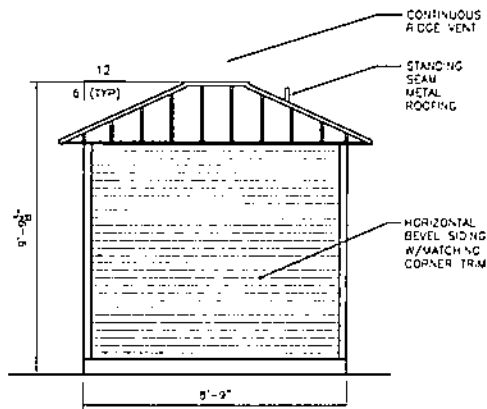


DESIGNED	PROJECT MANAGER	SCALE
J. SAWS J. SAWS	R. ENG ST/ENGINEER	AS NOTED SEE DRAWINGS
B. FARNS-BATMAN DREW	D. CAMPBELL BB NO 432-444	ONE INCH = 1/4" FULL SIZE IF NOT ONE INCH SCALE ACCORDINGLY
J. SAWS PROJECT NO. 443	D. CAMPBELL CONTRACT NO.	

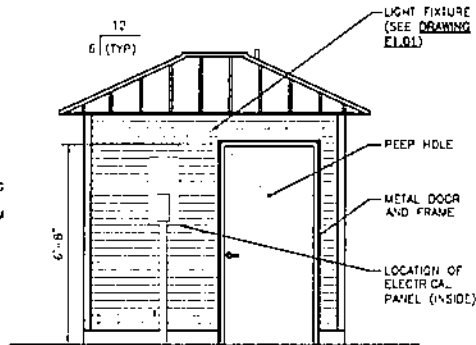


METRO TRANSIT DIVISION
STANDARD SINGLE-LINE T
DRIVER'S COMFORT STATION
**FOUNDATION, FLOOR
& ROOF PLANS**

DATE	MARCH 2012
DRAWING NO.	A1.01
SHEET NO. OF	2 18



WEST
ELEVATION A
SCALE: 1/2" = 1'-0" A1.01



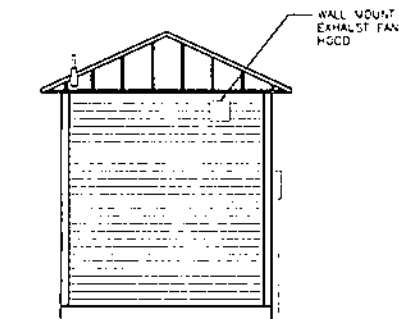
EAST
ELEVATION B
SCALE: 1/2" = 1'-0" A1.01

METAL DOOR AND FRAME SPECIFICATION Q87100

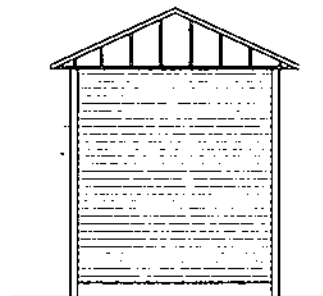
1. ACCEPTABLE MANUFACTURERS INCLUDE THE FOLLOWING:
 a. CECO DOOR PRODUCTS; AN ASSA ABLOY GROUP COMPANY.
 b. CURRIES COMPANY; AN ASSA ABLOY GROUP COMPANY.
 c. KEWASKEE CORPORATION (THE).
2. INSTALL PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS
3. SEE DRAWING A7.04 FOR DOOR HARDWARE SPECIFICATION.



DOOR TYPE
SCALE: 1/2" = 1'-0"



SOUTH
ELEVATION C
SCALE: 1/2" = 1'-0" A1.01

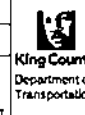


NORTH
ELEVATION D
SCALE: 1/2" = 1'-0" A1.01

▲				
▲				
▲				
▲				
▲	AS CONSTRUCTED			03/2012
REV	REVISION	BY	APP'D	DATE



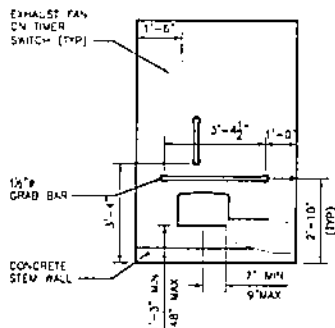
DESIGNED B. FARMS-BATEMAN	PROJECT MANAGER P. ENG	SCALE AS NOTED
DRAWN B. FARMS-BATEMAN	APPROVED J. CAMPBELL	EYE LOCATION NO.
CHECKED J. DAVIS	DATE 03/12/12	ONE INCH AT FULL SIZE
PERFORMER J. CAMPBELL	CONTRACT NO.	IF NOT ONE INCH, SCALE ACCORDINGLY



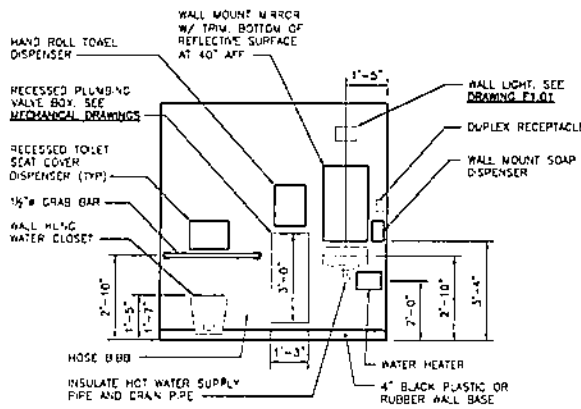
METRO TRANSIT DIVISION
STANDARD SINGLE-UNIT
DRIVER'S COMFORT STATION

**EXTERIOR ELEVATIONS
& DOOR SPECIFICATION**

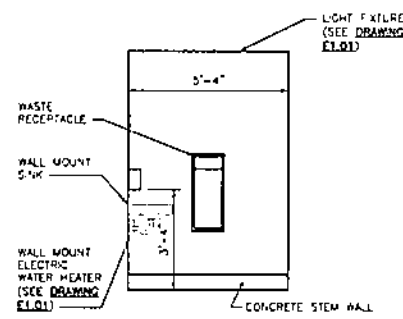
DATE MARCH 2012
DRAWING NO. A2.01
SHEET NO. 3 OF 16



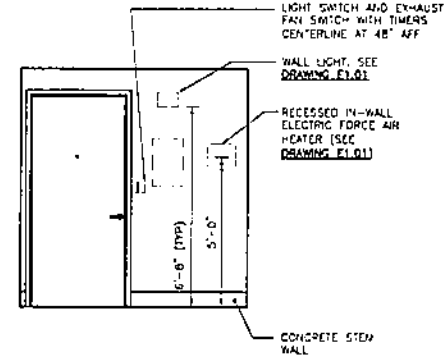
INTERIOR ELEVATION A
SCALE: 1/2" = 1'-0" A1.01



INTERIOR ELEVATION B
SCALE: 1/2" = 1'-0" A1.01



INTERIOR ELEVATION C
SCALE: 1/2" = 1'-0" A1.01



INTERIOR ELEVATION D
SCALE: 1/2" = 1'-0" A1.01

WASHROOM ACCESSORIES SCHEDULE

ITEM	MANUFACTURER	MODEL NUMBER	DIMENSIONS
REFRESH WALL DISPENSER*	AMERLITE, LARS	REFRESH WALL MODEL 10000	1'-0" X 1'-0" X 1'-0"
SEMI-RECESSED TRASH RECEPTACLE	BOBRICK	B-3644, FINISH: SATIN-FINISH STAINLESS STEEL STYLE, SEMI-RECESSED	17.2" X 30.6" X (4.1" X 23" PROJECTION)
WALL MIRROR w/ STAINLESS STEEL CHANNEL FRAME	BOBRICK	B-105 1824	18" X 24"
RECESSED TOILET SEAT COVER DISPENSER	BOBRICK	B-301	15.1875" X 12.75" X 2.5625" DEPTH
WALL MOUNT TOILET SEAT COVER DISPENSER*	AMERLITE, LARS	WALL MOUNT TOILET SEAT COVER DISPENSER MODEL 10000	1'-0" X 1'-0" X 1'-0"
SURFACE-MOUNTED SOAP DISPENSER	BOBRICK	B-2111	4 1/2" X 6 1/2" X 3 1/2"
1/2" DIAMETER GRAB BARS	BOBRICK	8806X42 AND 8806X36	42" LENGTH 1/2" DIAMETER
WALL-MOUNTED VITREOUS CHINA SINK, WHITE	AMERICAN STANDARD	COMRADE 0124.024	10" W X 18.25" D 4" FALCET CENTERS
WALL-HUNG TOILET, WHITE	KOHLER	KINGSTON K-4330	16.75" X 29.625" X 15" ABOVE FINISH FLOOR (W/O SEAT) WASTE EX. 1 CENTER = 5" ABOVE FINISH FLOOR
TOILET SEAT, WHITE	KOHLER	K-4679-CA LUSTRA WITH 1" HEIGHT BUMPERS	DEPTH 2" - 4" PER ADA 4.16.3
UNDERLAVATORY GUARDS	PLUMBER SPECIALTY PRODUCTS, INC. TO- PRODUCTS TRUEBRO, INC.	ANTI-CRIB, MOULDED-PLASTIC, WHITE	

*PROVIDED BY KING COUNTY METRO TRANSIT FOR INSTALLATION BY CONTRACTOR. CONTRACTOR SHALL PROVIDE BLOCKING AS REQUIRED FOR INSTALLATION.
NOTE: SEE DRAWING M5.01 FOR PLUMBING EQUIPMENT SCHEDULE.

WASHROOM ACCESSORIES SPECIFICATION 102800

- FABRICATION OF KEYS: PROVIDE UNIVERSAL KEYS FOR INTERNAL ACCESS TO ACCESSORIES FOR SERVICING AND RESUPPLYING. PROVIDE A MINIMUM OF SIX KEYS TO KING COUNTY PROJECT REPRESENTATIVE.
- INSTALL ACCESSORIES ACCORDING TO MANUFACTURERS' WRITTEN INSTRUCTIONS, USING FASTENERS APPROPRIATE TO SUBSTRATE INDICATED AND RECOMMENDED BY LIST MANUFACTURER. INSTALL UNITS LEVEL, PLUMB, AND FULLY ANCHORED IN LOCATIONS AND AT HEIGHTS INDICATED.

AS CONSTRUCTED	03/2013
REVISION	BY APP DATE



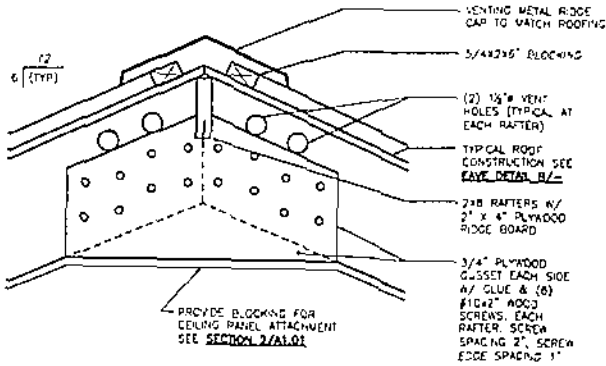
DESIGNER B. FARSE-BATEMAN	PROJECT NUMBER P. 1100	SCALE AS NOTED
CHECKED B. FARSE-BATEMAN	DRAWN D. CRAPPER	DATE 01/10/13
DATE 01/10/13	CONTRACT NO.	ONE COPY AT FULL SIZE
D. CRAPPER		IF NOT ONE PRO-SCALE ACCORDINGLY

METRO TRANSIT DIVISION
STANDARD SINGLE-UNIT
DRIVER'S COMFORT STATION

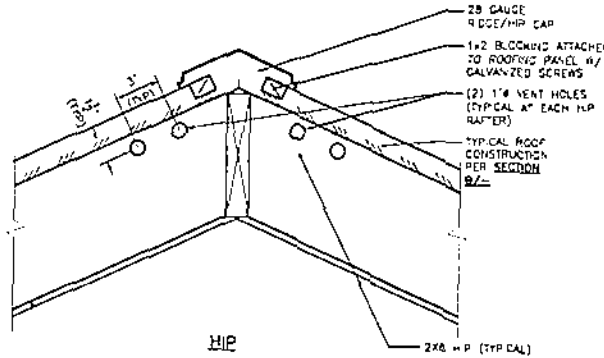
King County
Department of Transportation

INTERIOR ELEVATIONS & WASHROOM ACCESSORIES

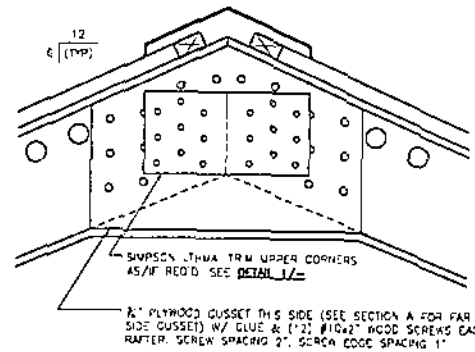
DATE: MARCH 2012
SHEET NO: A2.02 OF 16



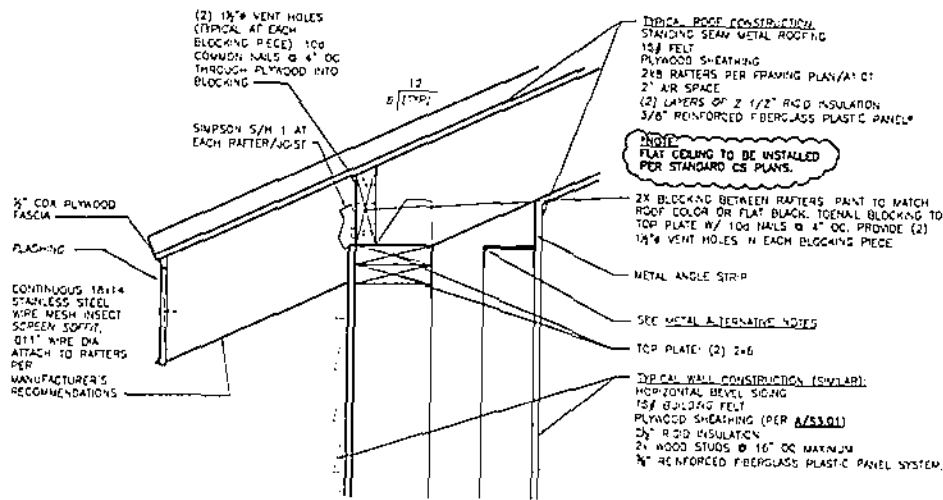
RIDGE
SECTION A
SCALE 3" = 1'-0"
AT B1



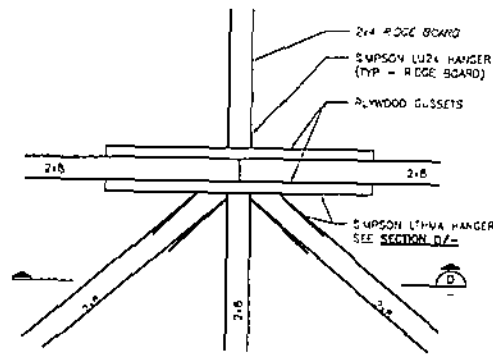
HIP
SECTION C
SCALE 3" = 1'-0"
AT D1



RIDGE
SECTION D
SCALE 3" = 1'-0"
AT D1
NOTE: H.P. GUSSETS NOT SHOWN



EAVE
SECTION B
SCALE 3" = 1'-0"
AT B1



RIDGE
DETAIL I
SCALE 3" = 1'-0"
AT D1

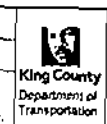
- NOTES:**
1. SEE DRAWING A7.02 FOR ROUGH CARPENTRY & SHEATHING SPECIFICATIONS.
 2. SEE DRAWING A7.03 FOR THERMAL INSULATION & EXTERIOR FINISH CARPENTRY SPECIFICATIONS.
 3. SEE DRAWING A7.04 FOR METAL ROOF PANELS SPECIFICATION.
 4. SEE DRAWING A7.05 SHEET METAL FLASHING & TRIM SPECIFICATION.
 5. SEE DRAWING A7.06 FOR DOOR HARDWARE SPECIFICATION.
 6. SEE DRAWING A7.07 FOR FIBERGLASS REINFORCED PLASTIC PANELS & PAINTING SPECIFICATIONS.

NOTE: PAINT EDGE AND FACE OF 2x8 RAFTER AND PLYWOOD FASCIA TO MATCH METAL ROOFING OR FLAT BLACK.

AS CONSTRUCTED				
NO	REVISION	BY	APP'D	DATE



DESIGNED	PROJECT MANAGER	SCALE
J. DAVIS	H. CHS	AS NOTED
DRAWN	CHECKED	DATE
P. FARIS - PATMAN	S. CAMPBELL	3/17/2012
DATE	BY	DATE
3/21/12	H. CHS	3/17/12
APPROVED	CONTRACT NO.	
J. DAVIS		
DATE		
3/21/12		



METRO TRANSIT DIVISION STANDARD SINGLE-UNIT DRIVER'S COMFORT STATION	DATE: MARCH 2012
TYPING NO: S3.02	
CONSTRUCTION DETAILS	SHEET NO. OF 13 16

CAST-IN-PLACE CONCRETE SPECIFICATION 033000

1. THIS SECTION INCLUDES THE FOLLOWING:

- A. CAST-IN PLACE CONCRETE
- B. FORMWORK
- C. REINFORCEMENT
- D. CONCRETE MATERIALS
- E. MIXTURE DESIGN
- F. PLACEMENT PROCEDURES
- G. FINISHES

2. QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS: A FIRM EXPERIENCED IN MANUFACTURING READY-MIXED CONCRETE PRODUCTS AND THAT COMPLES WITH ASTM C 94/C 94M REQUIREMENTS FOR PRODUCTION FACILITIES AND EQUIPMENT.
- B. ACI PUBLICATIONS: COMPLY WITH THE FOLLOWING UNLESS MODIFIED BY REQUIREMENTS IN THE CONTRACT DOCUMENTS
 - ACI 301, "SPECIFICATION FOR STRUCTURAL CONCRETE," SECTIONS 1 THROUGH 5
 - ACI 117, "SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS"

3. FORM-FACING MATERIALS

- A. SMOOTH-FORMED FINISHED CONCRETE: FORM-FACING PANELS THAT WILL PRODUCE CONTINUOUS, TRUE, AND SMOOTH CONCRETE SURFACES. FINISH IN LARGEST PRACTICABLE SIZES TO MINIMIZE NUMBER OF JOINTS.

4. STEEL REINFORCEMENT

- A. REINFORCING BARS: ASTM A 615/A 615M, GRADE 60, DEFORMED.
- B. BAR SUPPORTS: BOLSTERS, CHAIRS, SPACERS, AND OTHER DEVICES FOR SPACING, SUPPORTING, AND FASTENING REINFORCING BARS AND RELATED WIRE REINFORCEMENT IN PLACE. MANUFACTURE BAR SUPPORTS FROM STEEL, WIRE, PLASTIC, OR PRECAST CONCRETE ACCORDING TO CRS'S "MANUAL OF STANDARD PRACTICE"

5. CONCRETE MATERIALS

- A. CEMENTITIOUS MATERIAL: USE THE FOLLOWING CEMENTITIOUS MATERIALS OF THE SAME TYPE, BRAND, AND SOURCE, THROUGHOUT PROJECT: PORTLAND CEMENT: ASTM C 150, TYPE I.
- B. NORMAL-WEIGHT AGGREGATES: ASTM C 33, GRADED, 1-1/2"-INCH NOMINAL MAXIMUM COARSE-AGGREGATE SIZE
- C. WATER: ASTM C 94/C 94M.
- D. AIR-ENTRAINING ADMIXTURE: ASTM C 260
- E. CHEMICAL ADMIXTURES: PROVIDE ADMIXTURES CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER ADMIXTURES AND THAT WILL NOT CONTRIBUTE WATER-SOLUBLE CHLORIDE IONS EXCEEDING THOSE PERMITTED IN HARDENED CONCRETE. DO NOT USE CALCIUM CHLORIDE OR ADMIXTURES CONTAINING CALCIUM CHLORIDE
 - WATER-REDUCING ADMIXTURE: ASTM C 494/C 494M, TYPE A
 - RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE B
 - WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE D
 - HIGH-RANGE, WATER-REDUCING ADMIXTURE: ASTM C 494/C 494M, TYPE F
 - HIGH-RANGE, WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE G
 - PLASTICIZING AND RETARDING ADMIXTURE: ASTM C 1017/C 1017M, TYPE II

6. VAPOR RETARDERS

- A. PLASTIC VAPOR RETARDER: ASTM E 1745, CLASS C, OR

POLYETHYLENE SHEET, ASTM D 4397, NOT LESS THAN 10 MILS THICK. INCLUDE MANUFACTURER'S RECOMMENDED ADHESIVE OR PRESSURE-SENSITIVE JOINT TAPE.

7. CURING MATERIALS

- A. ABSORBING COVER: MASHGRO M 182, CLASS 2, BURLAP CLOTH MADE FROM JUTE OR HEMP, WEAVING APPROXIMATELY 9 OZ./50 YD. WHEN DRY.
- B. MOISTURE-RETAINING COVER: ASTM C 111, POLYETHYLENE FILM OR WHITE BURLAP-POLYETHYLENE SHEET
- C. WATER: POTABLE
- D. CLEAR, WATERBORNE, MEMBRANE-FORMING CURING COMPOUND, ASTM C 309, TYPE 1, CLASS B, DISSIPATING
- E. CLEAR, SOLVENT-BORNE, MEMBRANE-FORMING CURING AND SEALING COMPOUND: ASTM C 1315, TYPE 1, CLASS A

8. RELATED MATERIALS

- A. EXPANSION- AND ISOLATION-JOINT-FILLER STRIPS: ASTM D 1751, ASPHALT-SATURATED CELLULOSIC FIBER OR ASTM D 1752, COAM OR SELF-EXPANDING CORE

9. CONCRETE MIXTURES

- A. PREPARE DESIGN MIXTURES FOR EACH TYPE AND STRENGTH OF CONCRETE, PROPORTIONED ON THE BASIS OF LABORATORY TRIAL MIXTURE OR FIELD TEST DATA, OR BOTH, ACCORDING TO ACI 301.
- B. PROPORTION NORMAL-WEIGHT CONCRETE MIXTURE AS FOLLOWS
 - MINIMUM COMPRESSIVE STRENGTH: 3000 PSI AT 7 DAYS.
 - MAXIMUM WATER-CEMENTITIOUS MATERIALS RATIO: 0.50.
 - SLUMP LIMIT: 4 INCHES MAXIMUM
 - AIR CONTENT: 5 PERCENT, PLUS OR MINUS 1.5 PERCENT AT POINT OF DELIVERY FOR 1-1/2"-INCH NOMINAL MAXIMUM AGGREGATE SIZE.
 - AIR CONTENT: DO NOT ALLOW AIR CONTENT OF FROELED FINISHED FLOORS TO EXCEED 3 PERCENT.

10. FABRICATING REINFORCEMENT

- A. FABRICATE STEEL REINFORCEMENT ACCORDING TO CRS'S "MANUAL OF STANDARD PRACTICE"

11. CONCRETE MIXING

- A. READY-MIXED CONCRETE: MEASURE, BATCH, MIX, AND DELIVER CONCRETE ACCORDING TO ASTM C 94/C 94M AND ASTM C 1116, AND FURNISH BATCH TICKET INFORMATION
 - WHEN AIR TEMPERATURE IS BETWEEN 85 AND 90 DEG F, REDUCE MIXING AND DELIVERY TIME FROM 1-1/2 HOURS TO 75 MINUTES;
 - WHEN AIR TEMPERATURE IS ABOVE 90 DEG F, REDUCE MIXING AND DELIVERY TIME TO 60 MINUTES

12. FORMWORK

- A. DESIGN, ERECT, SHORE, BRACE, AND MAINTAIN FORMWORK ACCORDING TO ACI 301 TO SUPPORT VERTICAL, LATERAL, STATE, AND DYNAMIC LOADS, AND CONSTRUCTION LOADS THAT MUST BE APPLIED, UNTIL STRUCTURE CAN SUPPORT SUCH LOADS.
- B. CONSTRUCT FORMWORK SO CONCRETE MEMBERS AND STRUCTURES ARE OF SIZE, SHAPE, ALIGNMENT, ELEVATION, AND POSITION INDICATED, WITH TOLERANCE LIMITS OF ACI 117.
- C. CHAMFER EXTERIOR CORNERS AND EDGES OF PERMANENTLY EXPOSED CONCRETE.

13. CURING AND SEALING INSTALLATION

- A. PLACE AND SECURE ANCHORAGE DEVICES AND OTHER EMBEDDED ITEMS REQUIRED FOR ADJOINING WORK THAT IS ATTACHED TO OR SUPPORTED BY CAST-IN-PLACE CONCRETE. USE SETTING DRAWINGS, TEMPLATES, DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS FURNISHED WITH ITEMS TO BE EMBEDDED

14. VAPOR RETARDER INSTALLATION

- A. PLASTIC VAPOR RETARDERS: PLACE, PROTECT, AND REPAIR VAPOR RETARDERS ACCORDING TO ASTM E 1843 AND MANUFACTURER'S WRITTEN INSTRUCTIONS
 - LAP JOINTS 6 INCHES AND SEAL WITH MANUFACTURER'S RECOMMENDED TAPE

15. STEEL REINFORCEMENT INSTALLATION

- A. GENERAL: COMPLY WITH CRS'S "MANUAL OF STANDARD PRACTICE" FOR PLACING REINFORCEMENT.
 - DO NOT CUT OR PUNCTURE VAPOR RETARDER. REPAIR DAMAGE AND RESEAL VAPOR RETARDER BEFORE PLACING CONCRETE.

16. JOINTS

- A. GENERAL: CONSTRUCT JOINTS TRUE TO LINE WITH FACES PERPENDICULAR TO SURFACE PLANE OF CONCRETE.
- B. ISOLATION JOINTS IN SLABS-ON-GRADE: AFTER REMOVING FORMWORK, INSTALL JOINT-FILLER STRIPS AT SLAB JOINTS WITH VERTICAL SURFACES, SUCH AS RETAINING WALLS, FOUNDATION WALLS BACK OF CURB, AND OTHER LOCATIONS, AS INDICATED.

17. CONCRETE PLACEMENT

- A. BEFORE PLACING CONCRETE, VERIFY THAT INSTALLATION OF FORMWORK, REINFORCEMENT, AND EMBEDDED ITEMS IS COMPLETE AND THAT REQUIRED INSPECTIONS HAVE BEEN PERFORMED.
- B. DEPOSIT CONCRETE CONTINUOUSLY IN ONE LAYER OR IN HORIZONTAL LAYERS OF SUCH THICKNESS THAT NO NEW CONCRETE WILL BE PLACED ON CONCRETE THAT HAS HARDENED ENOUGH TO CAUSE SEAMS OR PLANES OF WEAKNESS. CONSOLIDATE PLACED CONCRETE WITH MECHANICAL VIBRATING EQUIPMENT ACCORDING TO ACI 301.
- C. COLD-WEATHER PLACEMENT: COMPLY WITH ACI 308.1.
- D. HOT-WEATHER PLACEMENT: COMPLY WITH ACI 301.

18. FINISHING FORMED SURFACES

- A. SMOOTH-FORMED FINISH: AS-CAST CONCRETE TEXTURE IMPARTED BY FORM-FACING MATERIAL, ADAPTED IN AN ORDERLY AND STRUCTURAL MANNER WITH A MINIMUM OF SEAMS. REPAIR AND PATCH THE HOLES AND DEFECTS. REMOVE FINISH AND OTHER PROJECTIONS THAT EXCEED SPECIFIED LIMITS ON FORMED-SURFACE IRREGULARITIES
 - APPLY TO CONCRETE SURFACES EXPOSED TO PUBLIC VIEW: FLOOR AND STEW WALL
- B. RELATED UNFORMED SURFACES: AT TOPS OF WALLS, HORIZONTAL OFFSETS, AND SIMILAR UNFORMED SURFACES ADJACENT TO FORMED SURFACES, STRIKE OFF SMOOTH AND FINISH WITH A TEXTURE MATCHING ADJACENT FORMED SURFACES. CONTINUE FINAL SURFACE TREATMENT OF FORMED SURFACES UNFORMLY ACROSS ADJACENT UNFORMED SURFACES, UNLESS OTHERWISE INDICATED.

19. FINISHING FLOORS AND SLABS

- A. GENERAL: COMPLY WITH ACI 302.1R RECOMMENDATIONS FOR SCREENING, RESTRAIGHTENING, AND FINISHING OPERATIONS FOR CONCRETE SURFACES. DO NOT RET CONCRETE SURFACES
 - APPLY FLOAT FINISH TO FLOOR SLAB SURFACES EXPOSED TO VIEW.
- B. FLOAT FINISH: CONSOLIDATE SURFACE WITH POWER-DRIVEN FLOATS OR BY HAND FLOATING IF AREA IS SMALL OR UNACCESSIBLE TO POWER-DRIVEN FLOATS. RESTRAIGHTEN, CUT DOWN HIGH SPOTS, AND FILL LOW SPOTS. REPEAT FLOAT PASSES AND RESTRAIGHTENING UNTIL SURFACE IS LEFT WITH A UNIFORM, SMOOTH, GRANULAR TEXTURE.
 - APPLY FLOAT FINISH TO FLOOR SLAB SURFACES EXPOSED TO VIEW.
- C. TROWEL FINISH: AFTER APPLYING FLOAT FINISH, APPLY FIRST TROWELING AND CONSOLIDATE CONCRETE BY HAND OR POWER-DRIVEN TROWEL. CONTINUE TROWELING PASSES AND RESTRAIGHTEN UNTIL SURFACE IS FREE OF TROWEL MARKS AND UNIFORM IN TEXTURE AND APPEARANCE. GRIND SMOOTH ANY SURFACE DEFECTS THAT WOULD TELEGRAPH THROUGH APPLIED COATINGS OR FLOOR COVERINGS.

- APPLY A TROWEL FINISH TO FLOOR SLAB SURFACES EXPOSED TO VIEW.
- FINISH AND MEASURE SURFACE PER DRAWINGS SO FINISH SLOPES ARE UNIFORM AND DO NOT DEVIATE FROM SPECIFIED SPOT GRADE ELEVATIONS MORE THAN 1/4" IN 10 FEET.

20. CONCRETE PROTECTING AND CURING

- A. GENERAL: PROTECT FRESHLY PLACED CONCRETE FROM PREMATURE DRYING AND EXCESSIVE COOL OR HOT TEMPERATURES. COMPLY WITH ACI 306.1 FOR COLD-WEATHER PROTECTION AND ACI 301 FOR HOT-WEATHER PROTECTION DURING CURING
- B. EVAPORATION RETARDER: APPLY EVAPORATION RETARDER TO UNFORMED CONCRETE SURFACES IF HOT, DRY, OR WINDY CONDITIONS CAUSE MOISTURE LOSS APPROXIMATING 0.2 LB/50 FT.² H BEFORE AND DURING FINISHING OPERATIONS. APPLY ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AFTER PLACING, SCREEDING, AND BULL FLOATING OR DAMPING CONCRETE, BUT BEFORE FLOAT FINISHING.
- C. CURE CONCRETE ACCORDING TO ACI 308.1 BY ONE OR A COMBINATION OF THE FOLLOWING METHODS:
 - MOISTURE CURING: KEEP SURFACES CONTINUOUSLY MOIST FOR NOT LESS THAN SEVEN DAYS.
 - MOISTURE-RETAINING-COVER CURING: COVER CONCRETE SURFACES WITH MOISTURE-RETAINING COVER FOR CURING CONCRETE, PLACED IN A BEST PRACTICABLE MANNER WITH SIDES AND ENDS LAPPED AT LEAST 12 INCHES, AND SEALED BY WATERPROOF TAPE OR ADHESIVE. CURE FOR NOT LESS THAN SEVEN DAYS. IMMEDIATELY REPAIR ANY HOLES OR TEARS DURING CURING PERIOD USING COVER MATERIAL AND WATERPROOF TAPE.
 - CURING COMPOUND: APPLY UNIFORMLY IN CONTINUOUS OPERATION BY POWER SPRAY OR ROLLER ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS. REPEAT AREAS SUBJECTED TO HEAVY RAINFALL WITHIN THREE HOURS AFTER INITIAL APPLICATION. MAINTAIN CONTINUITY OF COATING AND REPAIR DAMAGE DURING CURING PERIOD.
 - CURING AND SEALING COMPOUND: APPLY UNIFORMLY TO FLOORS AND SLABS INDICATED IN A CONTINUOUS OPERATION BY POWER SPRAY OR ROLLER ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS. REPEAT AREAS SUBJECTED TO HEAVY RAINFALL WITHIN THREE HOURS AFTER INITIAL APPLICATION. REPEAT PROCESS 24 HOURS LATER AND APPLY A SECOND COAT. MAINTAIN CONTINUITY OF COATING AND REPAIR DAMAGE DURING CURING PERIOD

21. CONCRETE SURFACE REPAIRS

- A. DEFECTIVE CONCRETE: REPAIR AND PATCH DEFECTIVE AREAS WHEN APPROVED BY KING COUNTY PROJECT REPRESENTATIVE. REMOVE AND REPLACE CONCRETE THAT CANNOT BE REPAIRED AND PATCHED TO ARCHITECT'S APPROVAL.

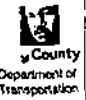
22. FIELD QUALITY CONTROL

- A. TESTING AND INSPECTING: OWNER WILL ENGAGE A QUALIFIED INDEPENDENT TESTING AND INSPECTING AGENCY TO PERFORM FIELD TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.
 - TESTING SERVICES: TESTS SHALL BE PERFORMED ACCORDING TO ACI 301.

AS CONSTRUCTED	03/20/23
REVISION	DATE



DESIGNER	PROJECT NUMBER	SCALE
B. BARRIS-BATTMAN	P. ENG	AS NOTED
D. CAMPBELL	D. CAMPBELL	ONE INCH AT FULL SIZE
DATE RECORDED	DATE	IF NOT ONE INCH SCALE, ACCORDINGLY
2 CAMPBELL		



METRO TRANSIT DIVISION STANDARD SINGLE-UNIT DRIVER'S COUPLET STATION	DATE MARCH 2023
CAST-IN-PLACE CONCRETE SPECIFICATION	CHANGE NO. A7.01
	PAGES 5 16

ROUGH CARPENTRY SPECIFICATION 061000

1. THIS SECTION INCLUDES THE FOLLOWING:

- A. FRAMING WITH DIMENSION LUMBER.
- B. WOOD BLOCKING, CHAIRS AND NAILERS.

2. WOOD PRODUCTS, GENERAL

- A. LUMBER: DOC PS 20 AND APPLICABLE RULES OF GRADING AGENCIES INDICATED. IF NO GRADING AGENCY IS INDICATED, PROVIDE LUMBER THAT COMPLES WITH THE APPLICABLE RULES OF ANY RULES-WRITING AGENCY CERTIFIED BY THE ALSO BOARD OF REVIEW. PROVIDE LUMBER GRADED BY AN AGENCY CERTIFIED BY THE ALSO BOARD OF REVIEW TO INSPECT AND GRADE LUMBER UNDER THE RULES INDICATED.
 - FACTORY MARK EACH PIECE OF LUMBER WITH GRADE STAMP OF GRADING AGENCY.
 - PROVIDE DRESSED LUMBER, S4S, UNLESS OTHERWISE INDICATED

3. WOOD-PRESERVATIVE-TREATED LUMBER

- A. PRESERVATIVE TREATMENT BY PRESSURE PROCESS: AHPA C2, EXCEPT THAT LUMBER THAT IS NOT IN CONTACT WITH THE GROUND AND IS CONTINUOUSLY PROTECTED FROM LIQUID WATER MAY BE TREATED ACCORDING TO AHPA C31 WITH INORGANIC BORDON (SBK)
 - PRESERVATIVE CHEMICALS: ACCEPTABLE TO AUTHORITY'S HAVING JURISDICTION AND CONTAINING NO ARSENIC OR CHROMIUM
- B. KILN-DRY LUMBER AFTER TREATMENT TO A MAXIMUM MOISTURE CONTENT OF 19 PERCENT
- C. MARK LUMBER WITH TREATMENT QUALITY MARK OF AN INSPECTION AGENCY APPROVED BY THE ALSO BOARD OF REVIEW.
- D. APPLICATION: TREAT ITEMS INDICATED ON DRAWINGS, AND THE FOLLOWING
 - WOOD SILLS, SLEEPERS, BLOCKING, AND SIMILAR CONCEALED MEMBERS IN CONTACT WITH MASONRY OR CONCRETE.

5. DIMENSION LUMBER FRAMING

- A. MAXIMUM MOISTURE CONTENT: 19 PERCENT.
- B. FRAMING OTHER THAN NON-LOAD-BEARING INTERIOR PARTITIONS: CONSTRUCTION OR NO. 2 GRADE AND ANY OF THE FOLLOWING SPECIES:
 - HEM-FIR (NORTH), NLCA.
 - DOUGLAS FIR-LARCH; WCLB OR WAPA

6. MISCELLANEOUS LUMBER

- A. GENERAL: PROVIDE MISCELLANEOUS LUMBER INDICATED AND LUMBER FOR SUPPORT OR ATTACHMENT OF OTHER CONSTRUCTION, INCLUDING THE FOLLOWING:
 - BLOCKING
 - NAILERS
- B. FOR MEMS OF DIMENSION LUMBER SIZE, PROVIDE CONSTRUCTION OR NO. 2 GRADE LUMBER WITH 19 PERCENT MAXIMUM MOISTURE CONTENT OF ANY SPECIES.
- C. FOR CONCEALED BOARDS, PROVIDE LUMBER WITH 19 PERCENT MAXIMUM MOISTURE CONTENT AND THE FOLLOWING SPECIES AND GRADES:
 - WESTERN WOODS, CONSTRUCTION OR NO. 2 COMMON GRADE; WCLB OR WAPA

7. FASTENERS

- A. GENERAL: PROVIDE FASTENERS OF SIZE AND TYPE INDICATED THAT COMPLY WITH REQUIREMENTS SPECIFIED
 - WHERE ROUGH CARPENTRY IS EXPOSED TO WEATHER, IN GROUND CONTACT, PRESSURE-PRESERVATIVE TREATED, OR IN AREA OF HIGH RELATIVE HUMIDITY, PROVIDE FASTENERS WITH HOT-DIP ZINC COATING COMPLYING WITH ASTM A 153/A 153M.
- B. POWER-DRIVEN FASTENERS: NES HER-272.

- C. BOLTS: STEEL BOLTS COMPLYING WITH ASTM A 307, GRADE A WITH ASTM A 303 HEX NUTS AND WHERE INDICATED, FLAT WASHERS.

8. METAL FRAMING ANCHORS

- A. BASIS-OF-DESIGN PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS INDICATED ON DRAWINGS OR COMPARABLE PRODUCTS BY ONE OF THE FOLLOWING:
 - ALPHE ENGINEERED PRODUCTS, INC.
 - KMC METALS PRODUCTS, INC.
 - SIMPSON STRONG-TIE CO., INC.
 - USP STRUCTURAL CONNECTORS
- B. ALLOWABLE DESIGN LOADS: PROVIDE PRODUCTS WITH ALLOWABLE DESIGN LOADS, AS PUBLISHED BY MANUFACTURER, THAT MEET OR EXCEED THOSE INDICATED. MANUFACTURER'S PUBLISHED VALUES SHALL BE DETERMINED FROM EMPIRICAL DATA OR BY RATIONAL ENGINEERING ANALYSIS AND DEMONSTRATED BY COMPREHENSIVE TESTING PERFORMED BY A QUALIFIED, INDEPENDENT TESTING AGENCY.
- C. GALVANIZED STEEL SHEET: HOT-DIP, ZINC-COATED STEEL SHEET COMPLYING WITH ASTM A 653/A 653M, G60 COATING DESIGNATION.

9. MISCELLANEOUS MATERIALS

- A. SILL-SEALER GASKETS: GLASS-FIBER-RESIN; INSULATION, FABRICATED IN STRIP FORM, FOR USE AS A SILL SEALER: 1-INCH NOMINAL THICKNESS, COMPRESSIBLE TO 1/32 INCH, SELECTED FROM MANUFACTURER'S STANDARD WIDTHS TO SUIT WIDTH OF SILL MEMBERS INDICATED.

10. INSTALLATION

- A. SET ROUGH CARPENTRY TO REQUIRED LEVELS AND LINES, WITH MEMBERS PLUMB, TRUE TO LINE, CUT, AND FITTED. FIT ROUGH CARPENTRY TO OTHER CONSTRUCTION, SQUARE AND CORNER AS NEEDED FOR ACCURATE FIT. LOCATE NAILERS, BLOCKING, AND SIMILAR SUPPORTS TO COMPLY WITH REQUIREMENTS FOR ATTACHING OTHER CONSTRUCTION.
- B. FRAMING STANDARD: COMPLY WITH AF&PA'S DETAILS FOR CONVENTIONAL WOOD FRAME CONSTRUCTION, UNLESS OTHERWISE INDICATED.
- C. METAL FRAMING ANCHORS: INSTALL METAL FRAMING TO COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
- D. DO NOT SPICE STRUCTURAL MEMBERS BETWEEN SUPPORTS, UNLESS OTHERWISE INDICATED.
- E. COMPLY WITH AHPA M4 FOR APPLYING FIELD TREATMENT TO CUT SURFACES OF PRESERVATIVE-TREATED LUMBER.
- F. SECURELY ATTACH ROUGH CARPENTRY WORK TO SUBSTRATE BY ANCHORING AND FASTENING AS INDICATED, COMPLYING WITH THE FOLLOWING:
 - NES HER-272 FOR POWER-DRIVEN FASTENERS
 - TABLE 2304.9.1, "FASTENING SCHEDULE," IN ICC'S INTERNATIONAL BUILDING CODE.

11. PROTECTION

- A. PROTECT WOOD THAT HAS BEEN TREATED WITH INORGANIC BORDON (SBK) FROM WEATHER. IF, DESPITE PROTECTION, INORGANIC BORDON-TREATED WOOD BECOMES WET, APPLY EPA-REGISTERED BORATE TREATMENT APPLY BORATE SOLUTION BY SPRAYING TO COMPLY WITH EPA-REGISTERED LABEL.

SHEATHING SPECIFICATION 061600

1. THIS SECTION INCLUDES THE FOLLOWING:

- A. WALL SHEATHING.
- B. ROOF SHEATHING.
- C. BUILDING PAPER.
- D. FLEXIBLE FLASHING AT OPENINGS IN SHEATHING.

2. DELIVERY, STORAGE, AND HANDLING

- A. STACK PLYWOOD AND OTHER PANELS FLAT WITH SPACERS BETWEEN EACH BUNDLE TO PROVIDE AIR CIRCULATION. PROVIDE FOR AIR CIRCULATION AROUND STACKS AND UNDER COVERINGS.

4. WOOD PANEL PRODUCTS, GENERAL

- A. PLYWOOD DOC PS OR DOC PS 2.

5. WALL SHEATHING

- A. PLYWOOD WALL SHEATHING: EXTERIOR, STRUCTURAL I SHEATHING.

6. ROOF SHEATHING

- A. PLYWOOD ROOF SHEATHING: EXTERIOR, STRUCTURAL I SHEATHING.

7. FASTENERS

- A. GENERAL: PROVIDE FASTENERS OF SIZE AND TYPE INDICATED.
 - FOR WALL AND ROOF SHEATHING PANELS, PROVIDE FASTENERS WITH CORROSION-PROTECTIVE COATING HAVING A SALT-SPRAY RESISTANCE OF MORE THAN 500 HOURS ACCORDING TO ASTM B 117.

8. WEATHER-RESISTANT SHEATHING PAPER

- A. BUILDING PAPER: ASTM D 226, TYPE 1 (NO. 15 ASPHALT-SATURATED ORGANIC FELT), UNPERFORATED.

9. MISCELLANEOUS MATERIALS

- A. ADHESIVES FOR FIELD GLUING PANELS TO FRAMING: FORMULATION COMPLYING WITH ASTM D 3498 THAT IS APPROVED FOR USE INDICATED BY MANUFACTURERS OF BOTH ADHESIVES AND PANELS.
 - USE ADHESIVES THAT HAVE A VOC CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- B. FLEXIBLE FLASHING: SELF-ADHESIVE, RUBBERIZED-ASPHALT COMPOUND, GRADED TO A HIGH-DENSITY POLYETHYLENE FILM TO PRODUCE AN OVERALL THICKNESS OF NOT LESS THAN 0.025 INCH.

10. INSTALLATION, GENERAL

- A. SECURELY ATTACH TO SUBSTRATE BY FASTENING AS INDICATED, COMPLYING WITH THE FOLLOWING:
 - NES HER-272 FOR POWER-DRIVEN FASTENERS.
 - TABLE 2304.9.1, "FASTENING SCHEDULE," IN ICC'S INTERNATIONAL BUILDING CODE.
- B. COORDINATE SHEATHING INSTALLATION WITH FLASHING AND JOINT-SEALANT INSTALLATION SO THESE MATERIALS ARE INSTALLED IN SEQUENCE AND MANNER THAT EXCLUDE EXTERIOR MOISTURE.

11. WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. GENERAL: COVER SHEATHING WITH WEATHER-RESISTANT SHEATHING PAPER AS FOLLOWS:
 - CUT BACK BARRIER 1/2 INCH ON EACH SIDE OF THE BREAK IN SUPPORTING MEMBERS AT EXPANSION- OR CONTRACTION-JOINT LOCATIONS.
 - APPLY BARRIER TO COVER VERTICAL FLASHINGS WITH A MINIMUM 4-INCH OVERLAP, UNLESS OTHERWISE INDICATED.
- B. BUILDING PAPER: APPLY HORIZONTALLY WITH A 2-INCH OVERLAP AND A 6-INCH END LAP. FASTEN TO SHEATHING WITH GALVANIZED STAPLES OR ROOFING NAILS.

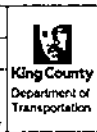
12. FLASHING INSTALLATION

- A. APPLY FLEXIBLE FLASHING WHERE INDICATED TO COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.

AS CONSTRUCTED	PERSON	BY	APP. DATE
			03/26/12



DESIGNED BY	PROJECT MANAGER	SCALE
B. FARRIS-BATEMAN	J. FINE	AS NOTED
DRAWN BY	APPROVED BY	SEE LOCATION NO.
B. FARRIS-BATEMAN	D. CAMPBELL	
CHECKED BY	DATE	ONE INCH AT FULL SIZE
J. CHAI	03/26/12	IF NOT ONE INCH, SCALE ACCORDINGLY
REVISIONS	DATE	
D. CAMPBELL		



METRO TRANSIT DIVISION STANDARD SINGLE-UNIT DRIVER'S COMPART STATION		DATE MARCH 2012
ROUGH CARPENTRY & SHEATHING SPECIFICATIONS		ISSUE NO. A7.02
PROJECT NO.	DATE	OF
		6 16

THERMAL INSULATION SPECIFICATION 072100

1. THIS SECTION INCLUDES THE FOLLOWING:

- A. PERIMETER WALL INSULATION (SUPPORTING BACKFILL)
- B. CONCEALED BUILDING INSULATION

2. QUALITY ASSURANCE

- A. FIRE-TEST-RESPONSE CHARACTERISTICS: PROVIDE INSULATION AND RELATED MATERIALS WITH THE FIRE-TEST-RESPONSE CHARACTERISTICS INDICATED, AS DETERMINED BY TESTING CHEMICAL PRODUCTS PER ASTM E 84 FOR SURFACE-BURNING CHARACTERISTICS AND OTHER METHODS INDICATED WITH PRODUCT, BY UL OR ANOTHER TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. IDENTIFY MATERIALS WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AND INSPECTING AGENCY.

4. MANUFACTURERS

- A. ACCEPTABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, MANUFACTURERS SPECIFIED.

5. FOAM-PLASTIC BOARD INSULATION

- A. EXTRUDED-POLYSTYRENE BOARD INSULATION (FOUNDATION PERIMETER) ASTM C 578, TYPE IV, 1.50 LB/CU FT, WITH MAXIMUM FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES OF 75 AND 450, RESPECTIVELY.
 - MANUFACTURERS:
 - DIVERSIFOAM PRODUCTS
 - DOW CHEMICAL COMPANY
 - OWENS CORNING
 - PACTIV BUILDING PRODUCTS DIVISION
- B. FOIL-FACED, POLYISOCYANURATE BOARD INSULATION (WALLS AND ROOF) ASTM C 1289, TYPE I, CLASS 1 OR 2, WITH MAXIMUM FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES OF 75 AND 450, RESPECTIVELY, BASED ON TESTS PERFORMED ON LINED CORE ON THICKNESSES UP TO 4 INCHES.
 - MATERIAL TYPE: HCFC-FREE
 - MANUFACTURERS:
 - a. ATLAS ROOFING CORPORATION
 - b. DOW CHEMICAL COMPANY
 - c. RMAX, INC

6. GLASS-FIBER BLANKET INSULATION

- A. AVAILABLE MANUFACTURERS
 - CERTANTEC CORPORATION
 - GUARDIAN FIBERGLASS, INC.
 - JOHNS MANVILLE
 - KNAUF FIBER GLASS
 - OWENS CORNING
 - APPROVED EQUAL
- B. FACED, GLASS-FIBER BLANKET INSULATION: ASTM C 655, TYPE 1 (BLANKETS WITH REFLECTIVE MEMBRANE FACING), CLASS A (MEMBRANE-FACED SURFACE WITH A FLAME-SPREAD INDEX OF 25 OR LESS), CATEGORY 1 (MEMBRANE IS A VAPOR BARRIER), FACED WITH FOIL-SCRIM-WRAFF, FOIL-SCRIM, OR FOIL-SCRIM-POLYETHYLENE VAPOR-BARRIER MEMBRANE ON 1 FACE
- C. WHERE GLASS-FIBER BLANKET INSULATION IS INDICATED BY THE FOLLOWING THICKNESSES, PROVIDE BLANKETS IN BATT OR ROLL FORM WITH THERMAL RESISTANCES INDICATED:
 - 5-1/2 INCHES THICK WITH A THERMAL RESISTANCE OF 19 DEG F X H X 50 FT²/BTU AT 75 DEG F (33 R X 50 M/W AT 24 DEG C)
 - 6-1/2 INCHES THICK WITH A THERMAL RESISTANCE OF 21 DEG F X H X 50 FT²/BTU AT 75 DEG F (37 R X 50 M/W AT 24 DEG C)

7. AUXILIARY INSULATING MATERIALS

- A. ADHESIVE FOR BONDING INSULATION: PRODUCT WITH DEMONSTRATED CAPABILITY TO BOND INSULATION SECURELY TO SUBSTRATES INDICATED WITHOUT DAMAGING INSULATION AND SUBSTRATES

8. INSULATION FASTENERS

- A. ADHESIVELY ATTACHED, SPHOLE-TYPE ANCHORS: PLATE OR ANGLE FORMED FROM PERFORATED GALVANIZED CARBON-STEEL SHEET, 0.030 INCH THICK BY 2 INCHES SQUARE, WELDED TO PROJECTING CORREN-COATED STEEL SPANDE 0.125 INCH IN DIAMETER AND OF LENGTH CAPABLE OF HOLDING INSULATION OF THICKNESS INDICATED SECURELY IN POSITION WITH 1-1/2-INCH SQUARE OR DIAMETER SELF-LOCKING WASHERS COMPLYING WITH THE FOLLOWING REQUIREMENTS:
 - INSULATION-RETAINING WASHERS: SELF-LOCKING WASHERS FORMED FROM 0.018-INCH-THICK GALVANIZED STEEL SHEET, WITH BEVELED EDGE FOR INCREASED STIFFNESS.
- B. ANCHOR ADHESIVE: PRODUCT WITH DEMONSTRATED CAPABILITY TO BOND INSULATION ANCHORS SECURELY TO SUBSTRATES INDICATED WITHOUT DAMAGING INSULATION, FASTENERS, AND SUBSTRATES

9. INSTALLATION GENERAL

- A. COMPLY WITH INSULATION MANUFACTURER'S WRITTEN INSTRUCTIONS APPLICABLE TO PRODUCTS AND APPLICATIONS INDICATED
- B. INSTALL INSULATION THAT IS UNHARMED, DRY, AND UNMOISTENED AND THAT HAS NOT BEEN LEFT EXPOSED AT ANY TIME TO ICE, RAIN, AND SNOW
- C. EXTEND INSULATION IN THICKNESS INDICATED TO ENVELOPE ENTIRE AREA TO BE INSULATED. CUT AND FIT TIGHTLY AROUND OBSTRUCTIONS AND FILL VOIDS WITH INSULATION. REMOVE PROJECTIONS THAT INTERFERE WITH PLACEMENT
- D. WATER-PIPING COORDINATION: COORDINATE LOCATION OF PIPING TO ENSURE THAT IT IS PLACED ON WARM SIDE OF INSULATION AND INSULATION ENCAPSULATES PIPING
- E. FOR PREFORMED INSULATING UNITS, PROVIDE SIZES TO FIT APPLICATIONS INDICATED AND SELECTED FROM MANUFACTURER'S STANDARD THICKNESSES, WIDTHS, AND LENGTHS. APPLY SINGLE LAYER OF INSULATION UNITS TO PRODUCE THICKNESS INDICATED UNLESS MULTIPLE LAYERS ARE OTHERWISE SHOWN OR REQUIRED TO MAKE UP TOTAL THICKNESS

10. INSTALLATION OF PERIMETER INSULATION

- A. ON VERTICAL SURFACES, SET INSULATION UNITS IN ADHESIVE APPLIED ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS. USE ADHESIVE RECOMMENDED BY INSULATION MANUFACTURER.
- D. PROTECT BELOW-GRADE INSULATION ON VERTICAL SURFACES FROM DAMAGE DURING BACKFILLING BY APPLYING PROTECTION COURSE WITH JOINTS BUTTED. SET IN ADHESIVE ACCORDING TO INSULATION MANUFACTURER'S WRITTEN INSTRUCTIONS
- C. PROTECT TOP SURFACE OF HORIZONTAL INSULATION FROM DAMAGE DURING CONCRETE WORK BY APPLYING PROTECTION COURSE WITH JOINTS BUTTED.

11. INSTALLATION OF GENERAL BUILDING INSULATION

- A. APPLY INSULATION UNITS TO SUBSTRATES BY METHOD INDICATED, COMPLYING WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. IF NO SPECIFIC METHOD IS INDICATED, BOND UNITS TO SUBSTRATE WITH ADHESIVE OR USE MECHANICAL ANCHORAGE TO PROVIDE PERMANENT PLACEMENT AND SUPPORT OF UNITS.
- B. SEAL JOINTS BETWEEN FOAM-PLASTIC INSULATION UNITS BY APPLYING ADHESIVE, MASTIC, OR SEALANT TO EDGES OF EACH UNIT TO FORM A TIGHT SEAL AS UNITS ARE SHOWN INTO PLACE. FILL VOIDS BY COMPLETED INSTALLATION WITH ADHESIVE, MASTIC, OR SEALANT AS RECOMMENDED BY INSULATION MANUFACTURER

EXTERIOR FINISH CARPENTRY SPECIFICATION 062013

1. THIS SECTION INCLUDES THE FOLLOWING:

- A. HARDBOARD SIDING AND TRIM

2. MATERIALS GENERAL

- A. LUMBER: DOC PS 20 AND APPLICABLE GRADING RULES OF INSPECTION AGENCIES CERTIFIED BY AISC'S BOARD OF REVIEW.
- B. SOFTWOOD PLYWOOD: DOC PS 1.
- C. HARDBOARD: ANA A135.4

3. HARDBOARD SIDING

- A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - COLLINS PRODUCTS LLC; COLLING COMPANIES, INC. (THE)
 - GEORCA-PACIFIC CORP.
 - LOUISIANA-PACIFIC CORPORATION
 - TEMPLE-ISLAND INC.
- B. HARDBOARD SIDING: ANA A135.6, PRIMED WITH MANUFACTURER'S STANDARD EXTERIOR PRIMER.
 - TYPE: 7/16-INCH THICK BY 6-INCH WIDE LAP SIDING
 - TEXTURE: SMOOTH
- C. HARDBOARD TRIM
 - TYPE: 7/16-INCH (11-MM) THICK, SQUARE-EDGE FLAT PANELS, WITHOUT GROOVES

4. MISCELLANEOUS MATERIALS

- A. FASTENERS FOR EXTERIOR FINISH CARPENTRY: PROVIDE NAILS OR SCREWS, IN SUFFICIENT LENGTH TO PENETRATE NOT LESS THAN 1-1/2 INCHES INTO WOOD SUBSTRATE.
 - FOR PREFRISHED ITEMS, PROVIDE MATCHING PREFRISHED ALUMINUM FASTENERS WHERE FACE FASTENING IS REQUIRED
 - FOR APPLICATIONS NOT OTHERWISE INDICATED, PROVIDE HOT-DIP GALVANIZED STEEL FASTENERS
- B. INSECT SCREENING FOR SOFFIT VENTS: AS SHOWN ON THE DRAWINGS.
- C. SEALANTS: LATEX, COMPLYING WITH ASTM C 834, TYPE P, GRADE NF AND WITH APPLICABLE REQUIREMENTS IN DIVISION 07 SECTION "JOINT SEALANTS," RECOMMENDED BY SEALANT MANUFACTURER AND MANUFACTURER OF SUBSTRATES FOR INTENDED APPLICATION.

6. PREPARATION

- A. PRIME LUMBER TO BE PAINTED, INCLUDING BOTH FACES AND EDGES. CUT TO REQUIRED LENGTHS AND PRIME ENDS. COMPLY WITH REQUIREMENTS IN DIVISION 09 SECTION "EXTERIOR PAINTING."

7. INSTALLATION GENERAL

- A. INSTALL EXTERIOR FINISH CARPENTRY LEVEL, PLUMB, TRUE, AND ALIGNED WITH ADJACENT MATERIALS. USE CONCEALED SHIMS WHERE NECESSARY FOR ALIGNMENT.
 - SCRIBE AND CUT EXTERIOR FINISH CARPENTRY TO FIT ADJOINING WORK. REFINISH AND SEAL CUTS AS RECOMMENDED BY MANUFACTURER

8. STAGING AND RUNNING TRIM INSTALLATION

- A. INSTALL TRIM WITH MINIMUM NUMBER OF JOINTS. PRACTICAL, USING FULL-LENGTH PIECES FROM MAXIMUM LENGTHS OF LUMBER AVAILABLE. DO NOT USE PIECES LESS THAN 24 INCHES LONG EXCEPT WHERE NECESSARY.
 - USE SCARF JOINTS FOR END-TO-END JOINTS.
 - STAGGER END JOINTS IN ADJACENT AND RELATED MEMBERS
- B. FIT EXTERIOR JOINTS TO EXCLUDE WATER COPE AT RETURNS AND MITER AT CORNERS.

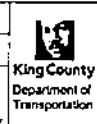
9. SIDING INSTALLATION

- A. INSTALL SIDING TO COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
- B. HARDBOARD SIDING: INSTALL HARDBOARD SIDING COMPLYING WITH ANA'S RECOMMENDED BASIC APPLICATION AND PAINTING INSTRUCTIONS FOR HARDBOARD SIDING. INSTALL PANELS WITH EDGES OVER FRAMING OR BLOCKING. LEAVE 3/16-INCH GAP AT PERIMETER, OPENINGS, AND HORIZONTAL PANEL JOINTS UNLESS OTHERWISE RECOMMENDED BY PANEL MANUFACTURER.
 - SEAL BUTT JOINTS AT INSIDE AND OUTSIDE CORNERS AND AT TRIM LOCATIONS.
 - CONCEAL FASTENERS TO GREATEST PRACTICAL EXTENT BY PLACING IN GROOVES OF SIDING PATTERN OR BY CONCEALING WITH APPLIED TRIM OR BATTENS AS DETAILED.

AS CONSTRUCTED	REVISION	BY	APP'D	DATE
				03/2012



DESIGNED BY: B. FARNS - PATMAN	PROJECT NUMBER: B. ENG. 072100	SCALE: AS NOTED
CHECKED BY: B. FARNS - PATMAN	D. CAMPBELL	SEE LOCATION NO.
DRAWN BY: J. DAVIS	DATE: 4/13/11	ONE SHEET OF FULL SET
APPROVED BY: D. CAMPBELL	CONTRACT NO:	IF NOT ONE EACH, SCALE ACCORDINGLY



METRO TRANSIT DIVISION STANDARD SINGLE-UNIT DRIVER'S COMFORT STATION	SHEET NO. 7 OF 16
THERMAL INSULATION & EXTERIOR FINISH CARPENTRY SPECIFICATIONS	DATE: MARCH 2012
	DRAWING NO. A7.03

METAL ROOF PANELS SPECIFICATION 074113

1. PERFORMANCE REQUIREMENTS

- A. WIND-UPLIFT RESISTANCE: PROVIDE METAL ROOF PANEL ASSEMBLIES THAT COMPLY WITH UL 580 FOR WIND-UPLIFT-RESISTANCE CLASS INDICATED.
- D. UPLIFT RATING: UL 90
- C. FUG LACING: PROVIDE METAL ROOF PANELS AND COMPONENT MATERIALS THAT COMPLY WITH REQUIREMENTS OF FUG 4471 AS PART OF A PANEL ROOFING SYSTEM AND THAT ARE LISTED IN FUG 2 "APPROVAL GUIDE" FOR CLASS 1 OR NONCOMBUSTIBLE CONSTRUCTION, AS APPLICABLE. IDENTIFY MATERIALS WITH FUG MARKINGS.
- D. FIRE/RAINSTORM CLASSIFICATION: CLASS 1A-90
- E. STRUCTURAL PERFORMANCE: PROVIDE METAL ROOF PANEL ASSEMBLIES CAPABLE OF WITHSTANDING THE EFFECTS OF GRAVITY LOADS AND THE FOLLOWING LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED, BASED ON TESTING ACCORDING TO ASTM C 1592, AS INDICATED ON THE DRAWINGS.
- F. ENERGY PERFORMANCE: PROVIDE ROOF PANELS THAT ARE LISTED ON THE U.S. DEPARTMENT OF ENERGY'S ENERGY STAR ROOF PRODUCTS QUALIFIED PRODUCT LIST FOR STEEP-SLOPE ROOF PRODUCTS.

2. QUALITY ASSURANCE

- A. FIRE-RESISTANCE RATINGS: WHERE INDICATED, PROVIDE METAL ROOF PANELS IDENTICAL TO THOSE OF ASSEMBLIES TESTED FOR FIRE RESISTANCE PER ASTM E 119 BY A QUALIFIED TESTING AGENCY. IDENTIFY PRODUCTS WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.
- COMBUSTION CHARACTERISTICS: ASTM C 130

3. WARRANTY

- A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE METAL ROOF PANEL ASSEMBLIES THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD, 15 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.
- B. SPECIAL WARRANTY ON PANEL FINISHES: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR FINISH OR REPLACE METAL ROOF PANELS THAT SHOW EVIDENCE OF DEGRADATION OF FACTORY-APPLIED FINISHES WITHIN SPECIFIED FINISH WARRANTY PERIOD, 20 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

4. PANEL MATERIALS

- A. METAL/COL-COATED STEEL SHEET: RESTRICTED FLATNESS STEEL SHEET METAL/COL COATED BY THE HOT-DIP PROCESS AND PREPARED BY THE COL-COATING PROCESS TO COMPLY WITH ASTM A 792/A 792M.
- B. ALUMINUM-ZINC ALLOY-COATED STEEL SHEET: ASTM A 792/A 792M CLASS A200 COATING DESIGNATION, GRADE 40, STRUCTURAL QUALITY.
- C. SURFACE: SMOOTH, FLAT FINISH.
- D. EXPRESSED COL-COATED FINISH: 2-COAT FLUOROPOLYMER AAMA 621. FLUOROPOLYMER FINISH CONTAINS NO LESS THAN 70 PERCENT PVDF RESIN BY WEIGHT IN COLOR COAT.
- E. CONCEALED FINISH: MANUFACTURER'S STANDARD WHITE OR LIGHT-COLORED ACRYLIC OR POLYESTER BACKER FINISH.
- F. PANEL SEALANT TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS, GRAY POLYBUTYLENE COMPOUND SEALANT TAPE WITH RELEASE-PAPER BACKING, 1/2 INCH WIDE AND 1/8 INCH THICK.
 - JOINT SEALANT: ASTM C 922, AS RECOMMENDED BY METAL ROOF PANEL MANUFACTURER.
 - BUTYL-RUBBER-BASED, SOLVENT-RELEASE SEALANT: ASTM C 1331.

5. FIELD-INSTALLED THERMAL INSULATION

- A. INSULATION RETAINER STRIPS: 0.019-INCH THICK, FORMED, GALVANIZED-STEEL OR PVC RETAINER CLIPS WELDED TO MATCH INSULATION FACING.
- B. THERMAL SPACER BLOCKS: FABRICATED FROM EXTRUDED POLYSTYRENE, 1 INCH THICK.

6. UNDERLAYMENT MATERIALS

- A. SELF-ADHERING, HIGH-TEMPERATURE SHEET: 30 TO 40 MILS THICK MATERIAL, CONSISTING OF SLIP-RESISTING, POLYETHYLENE-FIBER TOP SURFACE LAMINATED TO LAYER OF BUTYL OR SBS-MODIFIED ASPHALT ADHESIVE, WITH RELEASE-PAPER BACKING, COIL APPLIED. PROVIDE PRIMER WHEN RECOMMENDED BY UNDERLAYMENT MANUFACTURER.
- D. THERMAL STABILITY: STABLE AFTER TESTING AT 240 DEG F, ASTM D 1970.
- C. LOW-TEMPERATURE FLEXILITY: PASSES AFTER TESTING AT MINUS 20 DEG F, ASTM D 1970.
- D. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - CARLISLE COATINGS & WATERPROOFING INC., DIV. OF CARLISLE COMPANIES INC., COB WIP 3000H.
 - GRADE CONSTRUCTION PRODUCTS, A UNIT OF GRACE, W. R. & CO., CLTMA.
 - HENRY COMPANY, BLUESKIN PE200 HT.
 - METAL-FAB MANUFACTURING LLC, METSEALD.
 - OCHS CORP., WEATHERLOCK METAL HIGH TEMPERATURE UNDERLAYMENT.
- E. FELTS: ASTM D 227, TYPE 1 (NO 30).
- F. SLIP SHEET: MANUFACTURER'S RECOMMENDED SLIP SHEET, OF TYPE REQUIRED FOR APPLICATION.

7. ACCESSORIES

- A. PANEL FASTENERS: SELF-TAPPING SCREWS, BOLTS, NUTS, SELF-LOCKING NUTS AND BOLTS, ENG-BELTED STUDS, AND OTHER SUITABLE FASTENERS DESIGNED TO WITHSTAND DESIGN LOADS. PROVIDE EXPOSED FASTENERS WITH HEADS MATCHING COLOR OF METAL ROOF PANELS BY MEANS OF PLASTIC CAPS OR FACTORY-APPLIED COATINGS. PROVIDE EPDM, PVC, OR NEOPRENE SEALING WASHERS.
- B. BITUMINOUS COATING: COIL-APPLIED ASPHALT MASTIC, SPEC. PAINT 12, COMPOUNDED FOR 15-MIL DRY FILM THICKNESS PER COAT. PROVIDE HEAT-TYPE NONCORROSIVE COMPOUND FREE OF ASBESTOS FIBERS, SULFUR COMPONENTS, AND OTHER DELETERIOUS IMPURITIES.

8. STANDING-SEAM METAL ROOF PANELS

- A. GENERAL: PROVIDE FACTORY-FORMED METAL ROOF PANELS DESIGNED TO BE INSTALLED BY LAPPING AND INTERCONNECTING RAISED SIDE EDGES OF ADJACENT PANELS WITH JOINT TYPE INDICATED AND MECHANICALLY ATTACHING PANELS TO SUPPORTS USING CONCEALED CLIPS IN SIDE LAPS. INCLUDE CLIPS, CLEATS, PRESSURE PLATES, AND ACCESSORIES REQUIRED FOR WEATHERTIGHT INSTALLATION.
- B. STEEL PANEL SYSTEMS: UNLESS MORE STRINGENT REQUIREMENTS ARE INDICATED, COMPLY WITH ASTM E 1514.
 - AEP-SPAN
 - ARCHITECTURAL BUILDING COMPONENTS
 - ARCHITECTURAL METAL SYSTEMS
 - ATAS INTERNATIONAL INC
 - CENTRA ARCHITECTURAL SYSTEMS
 - DIMENSIONAL METALS, INC
 - METAL-FAB MANUFACTURING, LLC
 - METAL SALES MANUFACTURING CORPORATION
 - MODERN METAL SYSTEMS, INC
- C. METAL PANEL SYSTEMS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - AEP-SPAN
 - ARCHITECTURAL BUILDING COMPONENTS
 - ARCHITECTURAL METAL SYSTEMS
 - ATAS INTERNATIONAL INC
 - CENTRA ARCHITECTURAL SYSTEMS
 - DIMENSIONAL METALS, INC
 - METAL-FAB MANUFACTURING, LLC
 - METAL SALES MANUFACTURING CORPORATION
 - MODERN METAL SYSTEMS, INC
- D. PROFILE: VERTICAL-RIB, SEALED JOINT, AS INDICATED ON DRAWINGS.
- E. MATERIAL: ZINC-COATED (GALVANIZED) STEEL SHEET OR ALUMINUM-ZINC ALLOY-COATED STEEL SHEET, 0.040-INCH NOMINAL THICKNESS.

- EXTERIOR FINISH: 3-COAT FLUOROPOLYMER.
- COLOR: MATCH METRO RAPIDRIDE BUS SHELTER.
- F. CLIPS: FLOATING TO ACCOMMODATE THERMAL MOVEMENT.
 - MATERIAL: METALLIC COATED STEEL
 - JOINT TYPE: DOUBLE FOLDED
 - PANEL COVERAGE: 10"
 - PANEL HEIGHT: 2"

9. ACCESSORIES

- A. ROOF PANEL ACCESSORIES: PROVIDE COMPONENTS APPROVED BY ROOF PANEL MANUFACTURER AND AS REQUIRED FOR A COMPLETE ROOF PANEL ASSEMBLY INCLUDING TRIM, CORNINGS, FASCIAE, CORNER UNITS, ROOF CLOSURES, CLIPS, FLASHINGS, SEALANTS, GASKETS, FILLERS, CLOSURE STRIPS, AND SIMILAR ITEMS. MATCH MATERIAL AND FINISH OF METAL ROOF PANELS UNLESS OTHERWISE INDICATED.
 - CLOSURES: PROVIDE CLOSURES AT EAVES AND RIDGES, FABRICATED OF SAME METAL AS METAL ROOF PANELS.
 - CLOSURE STRIPS: CLOSED-CELL EXPANDED CELLULAR RUBBER OR CROSSLINKED POLYURETH-FOAM OR CLOSED-CELL LAMINATED POLYETHYLENE, MINIMUM 1-INCH THICK, FLEXIBLE CLOSURE STRIPS, CUT OR PERFORATED TO MATCH METAL ROOF PANEL PROFILE. PROVIDE CLOSURE STRIPS WHERE INDICATED OR NECESSARY TO ENSURE WEATHERTIGHT CONSTRUCTION.
 - BACKING PLATES: PROVIDE METAL BACKING PLATES AT PANEL END SADDLES, FABRICATED FROM MATERIAL RECOMMENDED BY MANUFACTURER.
- B. FLASHING AND TRIM: FORMED FROM SAME MATERIAL AS ROOF PANELS, PREPARED WITH COL COATING, MINIMUM 0.018 INCH THICK. PROVIDE FLASHING AND TRIM AS REQUIRED TO SEAL AGAINST WEATHER AND TO PROVIDE FINISHED APPEARANCE. LOCATIONS INCLUDE, BUT ARE NOT LIMITED TO, EAVES, RIDGES, CORNERS, BASES, FRAMED OPENINGS, RIDGES, FASCIAE, AND FELLERS. FLASHING AND TRIM WITH SAME FINISH SYSTEM AS ADJACENT METAL ROOF PANELS.

10. FABRICATION

- A. FAB DATE AND FINISH METAL ROOF PANELS AND ACCESSORIES AT THE FACTORY TO GREATEST EXTENT POSSIBLE, BY MANUFACTURER'S STANDARD PROCEDURES AND PROCESSES AND AS NECESSARY TO FULLY INDICATED PERFORMANCE REQUIREMENTS. COMPLY WITH INDICATED PROFILES AND WITH DIMENSIONAL AND STRUCTURAL REQUIREMENTS.
- B. PROVIDE PANEL PROFILE, INCLUDING MAJOR RIBS AND INTERMEDIATE STIFFENING RIBS, IF ANY, FOR FULL LENGTH OF PANEL.
- C. WHERE INDICATED, FABRICATE METAL ROOF PANEL SIDE LAPS WITH FACTORY-INSTALLED CAPTIVE GASKETS OR SEPARATOR STRIPS THAT PROVIDE A TIGHT SEAL AND PREVENT METAL-TO-METAL CONTACT, IN A MANNER THAT WILL SEAL WEATHERTIGHT AND MINIMIZE NOISE FROM MOVEMENTS WITHIN PANEL ASSEMBLY.
- D. SHEET METAL ACCESSORIES: FABRICATE FLASHING AND TRIM TO COMPLY WITH RECOMMENDATIONS IN SHIMAKA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO THE DESIGN, DIMENSIONS, METAL, AND OTHER CHARACTERISTICS OF ITEM INDICATED.

11. PREPARATION

- A. MISCELLANEOUS FRAMING: INSTALL SUBPURLINS, EAVE ANGLES, CURBS, AND OTHER MISCELLANEOUS ROOF PANEL SUPPORT MEMBERS AND ANCHORAGE ACCORDING TO METAL ROOF PANEL MANUFACTURER'S WRITTEN INSTRUCTIONS.

12. UNDERLAYMENT INSTALLATION

- COVER UNDERLAYMENT WITH 14 DAYS.
- B. FELT UNDERLAYMENT: APPLY AT LOCATIONS INDICATED ON DRAWINGS IN SHINGLE FASHION TO SHED WATER, AND WITH LAPPED JOINTS OF NOT LESS THAN 2 INCHES.
- C. APPLY SLIP SHEET OVER UNDERLAYMENT BEFORE INSTALLING METAL ROOF PANELS.
- D. INSTALL FLASHINGS TO COVER UNDERLAYMENT TO COMPLY WITH REQUIREMENTS SPECIFIED IN DIVISION OF SECTION "SHEET METAL FLASHING AND TRIM".

13. THERMAL INSULATION INSTALLATION

- A. RETAINER STRIPS: INSTALL RETAINER STRIPS AT EACH LONGITUDINAL INSULATION JOINT, STRAIGHT AND TIGHT, NESTING WITH SECONDARY FRAMING TO HOLD INSULATION IN PLACE.

14. METAL ROOF PANEL INSTALLATION

- A. STANDING-SEAM METAL ROOF PANELS: FASTEN METAL ROOF PANELS TO SUPPORTS WITH CONCEALED CLIPS AT EACH STANDING-SEAM JOINT AT LOCATION, SPACING, AND WITH FASTENERS RECOMMENDED BY MANUFACTURER.
 - INSTALL CLIPS TO SUPPORTS WITH SELF-TAPPING FASTENERS
 - INSTALL PRESSURE PLATES AT LOCATIONS INDICATED IN MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS
 - SEALED JOINT: COMB STANDING SEAMS WITH MANUFACTURER-APPROVED MOTORIZED SEAMER "COL SC CLIP" METAL ROOF PANELS, AND FACTORY-APPLIED SEALANT ARE COMPLETELY ENCASED

15. ACCESSORY INSTALLATION

- A. INSTALL ACCESSORIES WITH POSITIVE ANCHORAGE TO BUILDING AND WEATHERTIGHT MOUNTING AND PROVIDE FOR THERMAL EXPANSION COORDINATE INSTALLATION WITH FLASHINGS AND OTHER COMPONENTS.
- B. INSTALL COMPONENTS REQUIRED FOR A COMPLETE METAL ROOF PANEL ASSEMBLY INCLUDING TRIM, CORNINGS, ROOF CLOSURES, SEAM COVERS, FLASHINGS, SEALANTS, GASKETS, FILLERS, CLOSURE STRIPS, AND SIMILAR ITEMS.
- C. FLASHING AND TRIM: COMPLY WITH PERFORMANCE REQUIREMENTS, MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS, AND SHIMAKA'S "ARCHITECTURAL SHEET METAL MANUAL" PROVIDE CONCEALED FASTENERS WHERE POSSIBLE, AND SET LIMITS TRUE TO LNE AND LEVEL AS INDICATED. INSTALL WORK WITH LAPS, JOINTS, AND SEAMS THAT WILL BE PERMANENTLY WEATHERTIGHT AND WEATHER RESISTANT.

16. CLEANUP

- A. REMOVE TEMPORARY PROTECTIVE COVERINGS AND STOPPABLE FILMS IF ANY, AS METAL ROOF PANELS ARE INSTALLED UNLESS OTHERWISE INDICATED IN MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS OR COMPLETION OF METAL ROOF PANEL INSTALLATION. CLEAN FINISHED SURFACES AS RECOMMENDED BY METAL ROOF PANEL MANUFACTURER. MAINTAIN IN A CLEAN CONDITION DURING CONSTRUCTION.

AS CONSTRUCTED	03/2012
REVISION	BY APP. DATE



DESIGNED BY: B. PAVIS-BATEMAN	PROJECT NUMBER: P. ENG	SCALE: AS NOTED
DRAWN BY: B. PAVIS-BATEMAN	DATE: 02/2012	SHEET LOCATION: 1 OF 1
CHECKED BY: D. CAPPEN	DATE: 02/2012	ONE INCH AT FULL SIZE
APPROVED BY: D. CAPPEN	DATE: 02/2012	IF NOT ONE INCH SCALE, ACCORDINGLY

METRO TRANSIT DIVISION
 STANDARD SINGLE-LANE
 DRIVER'S COMFORT STATION
METAL ROOF PANELS SPECIFICATION
 DATE: MARCH 2012
 SHEET NO: A7.04
 OF 18

SHEET METAL FLASHING & TRIM SPECIFICATION 076200

1. SECTION INCLUDES: FORMED WALL SHEET METAL FABRICATIONS

2. QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard. Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

3. WARRANTY

A. SPECIAL WARRANTY ON FINISHES: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR FINISH OR REPLACE SHEET METAL FLASHING AND TRIM THAT SHOWS EVIDENCE OF DETERIORATION OF FACTORY-APPLIED FINISHES WITHIN 20 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

4. SHEET METALS

- A. GENERAL: PROTECT MECHANICAL AND OTHER FINISHES ON EXPOSED SURFACES FROM DAMAGE BY APPLYING A STRIPPABLE, TEMPORARY PROTECTIVE FILM BEFORE SHOPPING.
- B. METALLIC-COATED STEEL SHEET: RESTRICTED FLATNESS STEEL SHEET, METALLIC COATED BY THE HOT-DIP PROCESS AND PREPARED BY THE COL-COATING PROCESS TO COMPLY WITH ASTM A 755/A 755M.
- C. ALUMINUM-ZINC ALLOY-COATED STEEL SHEET: ASTM A 792/A 792M, CLASS 455 COATING DESIGNATION, GRADE 40, STRUCTURAL QUALITY.
- D. SURFACE: MILL PHOSPHATIZED FOR FIELD PAINTING.
- E. EXPOSED COL-COATED FINISH:
 - TWO-COAT FLUOROPOLYMER: AAMA 821, FLUOROPOLYMER FINISH CONTAINING NOT LESS THAN 70 PERCENT PVDF RESIN BY WEIGHT IN COLOR COAT.
 - COLOR: COORDINATE WITH METRO RAPIDRIDE BUS SHELTER.

5. UNDERLAYMENT MATERIALS

- A. SELF-ADHERING, HIGH-TEMPERATURE SHEET: MINIMUM 30 TO 40 MILS THICK, CONSISTING OF SLIP-RESISTING POLYETHYLENE-FILM TOP SURFACE LAMINATED TO LAYER OF BUTYL OR SDS-MODIFIED ASPHALT ADHESIVE, WITH RELEASE-PAPER BACKING; COLD APPLIED, PROVIDE PRIMER WHEN RECOMMENDED BY UNDERLAYMENT MANUFACTURER.
 - THERMAL STABILITY: ASTM D 1970, STABLE AFTER TESTING AT 240 DEG F.
 - LOW-TEMPERATURE FLEXIBILITY: ASTM D 1970, PASSED AFTER TESTING AT MINUS 20 DEG F.
- B. SLIP SHEET: BUILDING PAPER, 3-LB/100 SQ FT, MINIMUM, ROUGH SIZED.

6. MISCELLANEOUS MATERIALS

- A. GENERAL: PROVIDE MATERIALS AND TYPES OF FASTENERS, SOLDER, WELDING RODS, PROTECTIVE COATINGS, SEPARATORS, SEALANTS, AND OTHER MISCELLANEOUS ITEMS AS REQUIRED FOR COMPLETE SHEET METAL FLASHING AND TRIM INSTALLATION.
- B. FASTENERS: WOOD SCREWS, ANNUAL THREADED NAILS, SELF-TAPPING SCREWS, SELF-LOCKING RIVETS AND BOLTS, AND OTHER SUITABLE FASTENERS DESIGNED TO WITHSTAND DESIGN LOADS AND RECOMMENDED BY MANUFACTURER OF PRIMARY SHEET METAL OR MANUFACTURED ITEM.
 - GENERAL: BUILD FASTENERS ON SELF-DRAWING SCREWS, GASKETED, WITH HEX-WASHER HEAD.
 - EXPOSED FASTENERS: HEADS MATCHING COLOR OF SHEET METAL USING PLASTIC CAPS OR FACTORY-APPLIED COATING.
 - BUILD FASTENERS: HIGH-STRENGTH STAINLESS-STEEL RIVETS SUITABLE FOR METAL BEING FASTENED.

• FASTENERS FOR ZINC-COATED (GALVANIZED) STEEL SHEET, HOT-DIP GALVANIZED STEEL: ACCORDING TO ASTM A 153/A 153M OR ASTM F 3329 OR SERIES 300 STAINLESS STEEL.

C. SOLDER

• FOR ZINC-COATED (GALVANIZED) STEEL: ASTM B 32, GRADE 5850, 50 PERCENT TIN AND 50 PERCENT LEAD OR GRADE 5860, 60 PERCENT TIN AND 40 PERCENT LEAD.

D. SEALANT TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS, GRAY POLYBUTYLENE COMPOUND SEALANT TAPE WITH RELEASE-PAPER BACKING. PROVIDE PERMANENTLY ELASTIC, NONSAG, NONTOXIC, NONSTAINING TAPE 1/2 INCH WIDE AND 1/8 INCH THICK.

E. ELASTOMERIC SEALANT: ASTM C 920, ELASTOMERIC POLYMER SEALANT; LOW MOOD, US. OF TYPE, GRADE, CLASS, AND USE CLASSIFICATIONS REQUIRED TO SEAL JOINTS IN SHEET METAL FLASHING AND TRIM AND REMAIN WATER-TIGHT.

F. BUTYL SEALANT: ASTM C 1311, SINGLE-COMPONENT, SOLVENT-RELEASE BUTYL RUBBER SEALANT; POLYBUTYLENE PLASTICIZED, HEAVY BODIED FOR HOOKED-TYPE EXPANSION JOINTS WITH LIMITED MOVEMENT.

7. REGLES

- A. REGLETS: UNITS OF TYPE, MATERIAL AND PROFILE INDICATED, FORMED TO PROVIDE SECURE INTERLOCKING OF SEPARATE REGLET AND COUNTERFLASHING PIECES, AND COMPATIBLE WITH FLASHING INDICATED WITH FACTORY-WATERED AND -WELDED CORNERS AND JUNCTIONS.
 - MATERIAL: GALVANIZED STEEL, 0.022 INCH THICK.
 - FINISH: WITH MANUFACTURER'S STANDARD COLOR COATING.

B. FABRICATION GENERAL

- A. GENERAL: CUSTOM FABRICATE SHEET METAL FLASHING AND TRIM TO COMPLY WITH RECOMMENDATIONS IN SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO DESIGN, DIMENSIONS, GEOMETRY, METAL THICKNESS, AND OTHER CHARACTERISTICS OF ITEM INDICATED. FABRICATE ITEMS AT THE SHOP TO GREATEST EXTENT POSSIBLE.
 - OBTAIN FIELD MEASUREMENTS FOR ACCURATE FIT BEFORE SHOP FABRICATION.
 - FORM SHEET METAL FLASHING AND TRIM WITHOUT EXCESSIVE OIL CANING, BUCKLING, AND TOOL MARKS AND TRUE TO LINE AND LEVELS INDICATED, WITH EXPOSED EDGES FOLDED BACK TO FORM HEWS.
 - CONCEAL FASTENERS AND EXPANSION PROVISIONS WHERE POSSIBLE. EXPOSED FASTENERS ARE NOT ALLOWED ON FACES EXPOSED TO VIEW.
- B. SEALED JOINTS: FORM NONEXPANSION BUT MOVABLE JOINTS IN METAL TO ACCOMMODATE ELASTOMERIC SEALANT.
- C. EXPANSION PROVISIONS: WHERE LAPPED EXPANSION PROVISIONS CANNOT BE USED, FORM EXPANSION JOINTS OF INTERMEDIARY HOOKED FLANGES, NOT LESS THAN 5 INCH DEEP, FILLED WITH BUTYL SEALANT CONCEALED WITH IN JOINTS.
- D. FABRICATE CLEATS AND ATTACHMENT DEVICES FROM SAME MATERIAL AS ACCESSORY BEING ANCHORED OR FROM COMPATIBLE, NONCORROSIVE METAL.
- E. SEAMS: FABRICATE NONMOVING SEAMS WITH FLAT-LOCK SEAMS FORM SEAMS AND SEAL WITH ELASTOMERIC SEALANT UNLESS OTHERWISE RECOMMENDED BY SEALANT MANUFACTURER FOR INTENDED USE.

9. STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. APRON, STEP, CRICKET, AND BACKER FLASHING: FABRICATE FROM THE FOLLOWING MATERIALS:
 - ALUMINUM-ZINC ALLOY-COATED STEEL, 0.022 INCH THICK.

- DRIP EDGES: FABRICATE FROM THE FOLLOWING MATERIALS
- ALUMINUM-ZINC ALLOY-COATED STEEL: 0.022 INCH THICK.
- EAVE, RAKE, EDGE, AND HP FLASHING: FABRICATE FROM THE FOLLOWING MATERIALS:
 - ALUMINUM-ZINC ALLOY-COATED STEEL: 0.022 INCH THICK.

10. WALL SHEET METAL FABRICATIONS

- A. OPENING FLASHINGS IN FRAME CONSTRUCTION: FABRICATE HEAD, SILL, JAMB AND SIMILAR FLASHINGS TO EXTEND 4 INCHES BEYOND WALL OPENINGS FORM HEAD AND SILL FLASHING WITH 2-INCH- HIGH, END DAMS. FABRICATE FROM THE FOLLOWING MATERIALS:
 - ALUMINUM-ZINC ALLOY-COATED STEEL, 0.022 INCH THICK.

11. UNDERLAYMENT INSTALLATION

- A. SELF-ADHERING SHEET UNDERLAYMENT: INSTALL SELF-ADHERING SHEET UNDERLAYMENT, AIR-SCALE FREE, COMPLY WITH TEMPERATURE RESTRICTIONS OF UNDERLAYMENT MANUFACTURER FOR INSTALLATION; USE PRIMER RATHER THAN NAILS FOR INSTALLING UNDERLAYMENT AT LOW TEMPERATURES. APPLY IN SHINGLE FASHION TO SHED WATER, WITH END LAPS OF NOT LESS THAN 6 INCHES STAGGERED 24 INCHES BETWEEN COURSES. OVERLAP SHEET EDGES NOT LESS THAN 3-1/2 INCHES. ROLL LAPS WITH ROLLER. COVER UNDERLAYMENT WITHIN 14 DAYS.

12. INSTALLATION GENERAL

- A. GENERAL: ANCHOR SHEET METAL FLASHING AND TRIM AND OTHER COMPONENTS OF THE WORK SECURELY IN PLACE, WITH PROVISIONS FOR THERMAL AND STRUCTURAL MOVEMENT SO THAT COMPLETED SHEET METAL FLASHING AND TRIM SHALL NOT RATTLE, LEAK, OR LOOSEN, AND SHALL REMAIN WATER-TIGHT. USE FASTENERS, SOLDER, WELDING RODS, PROTECTIVE COATINGS, SEPARATORS, SEALANTS, AND OTHER MISCELLANEOUS ITEMS AS REQUIRED TO COMPLETE SHEET METAL FLASHING AND TRIM SYSTEM.
- B. INSTALL SHEET METAL FLASHING AND TRIM TRUE TO LINE AND LEVELS INDICATED. PROVIDE UNIFORM, NEAT SEAMS WITH MINIMUM EXPOSURE OF SOLDER, WELDS, AND SEALANT.
- C. INSTALL SHEET METAL FLASHING AND TRIM TO FIT SUBSTRATES AND TO RESULT IN WATER-TIGHT PERFORMANCE. VERIFY SHAPES AND DIMENSIONS OF SURFACES TO BE COVERED BEFORE FABRICATING SHEET METAL.
- D. SPACE CLEATS NOT MORE THAN 12 INCHES APART. ANCHOR EACH CLEAT WITH TWO FASTENERS. BEND TABS OVER FASTENERS.
- E. INSTALL EXPOSED SHEET METAL FLASHING AND TRIM WITHOUT EXCESSIVE OIL CANING, BUCKLING, AND TOOL MARKS.
- F. INSTALL SEALANT TAPE WHERE INDICATED.
- G. TORCH CUTTING OF SHEET METAL FLASHING AND TRIM IS NOT PERMITTED.
- H. METAL PROTECTION: WHERE DISSIMILAR METALS WILL CONTACT EACH OTHER OR CORROSIVE SUBSTRATES, PROTECT AGAINST GALVANIC ACTION BY PAINTING CONTACT SURFACES WITH BITUMINOUS COATING OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY SMACNA.
 - COAT BACK SIDE OF UNCOATED ALUMINUM AND STAINLESS-STEEL SHEET METAL FLASHING AND TRIM WITH BITUMINOUS COATING WHERE FLASHING AND TRIM WILL CONTACT WOOD, FERROUS METAL, OR CONCRETE/ROOF CONSTRUCTION.

- 13. UNDERLAYMENT: WHERE INSTALLING METAL FLASHING DIRECTLY ON CONCRETE/ROOF OR WOOD SUBSTRATES, INSTALL A COURSE OF FELT UNDERLAYMENT AND COVER WITH A SLIP SHEET OR INSTALL A COURSE OF POLYETHYLENE SHEET.

- A. EXPANSION PROVISIONS: PROVIDE FOR THERMAL EXPANSION OF EXPOSED FLASHING AND TRIM.
- B. FASTENER SIZES: USE FASTENERS OF SIZES THAT WILL PENETRATE WOOD OR OTHER MATERIAL NOT LESS THAN 1-1/4 INCHES FOR NAILS AND NOT LESS THAN 3/4 INCH FOR WOOD SCREWS.
- C. SEAL JOINTS AS SHOWN AND AS REQUIRED FOR WATER-TIGHT CONSTRUCTION.

14. ROOF FLASHING INSTALLATION

- A. PIPE OR POST COUNTERFLASHING: INSTALL COUNTERFLASHING UMBRELLA WITH CLOSE-FITTING COLLAR WITH TOP EDGE FLARED FOR ELASTOMERIC SEALANT, EXTENDING A MAXIMUM OF 4 INCHES OVER BASE FLASHING. INSTALL STAINLESS-STEEL DRAW BAND AND TIGHTEN.
- B. ROOF-PENETRATION FLASHING: COORDINATE INSTALLATION OF ROOF-PENETRATION FLASHING WITH INSTALLATION OF ROOFING AND OTHER ITEMS PENETRATING ROOF. SEAL WITH ELASTOMERIC SEALANT AND CLAMP FLASHING TO PIPES THAT PENETRATE ROOF.

15. WALL FLASHING INSTALLATION

- A. GENERAL: INSTALL SHEET METAL WALL FLASHING TO INTERCEPT AND EXCLUDE PENETRATING MOISTURE ACCORDING TO SMACNA RECOMMENDATIONS AND AS INDICATED. COORDINATE INSTALLATION OF WALL FLASHING WITH INSTALLATION OF WALL-OPENING COMPONENTS SUCH AS WINDOWS, DOORS, AND LOUVERS.
- B. OPENING FLASHINGS IN FRAME CONSTRUCTION: INSTALL CONTINUOUS HEAD, SILL, JAMB, AND SIMILAR FLASHINGS TO EXTEND 4 INCHES BEYOND WALL OPENINGS.

16. CLEANING AND PROTECTION

- A. CLEAN EXPOSED METAL SURFACES OF SUBSTANCES THAT INTERFERE WITH UNIFORM OXIDATION AND WEATHERING.
- B. REMOVE TEMPORARY PROTECTIVE COVERS AND SHIPPABLE FILMS AS SHEET METAL FLASHING AND TRIM ARE INSTALLED UNLESS OTHERWISE INDICATED IN MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.

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▲	AS CONSTRUCTED			03/2012
No.	REVISION	BY	APP'D	DATE



DESIGNED B. FARRIS-BATEMAN	PROJECT NUMBER # ENG	SCALE AS NOTED
DRAWN B. FARRIS-BATEMAN	CHECKED J. DAVIS	DATE 03/2012
APPROVED D. CHAPMAN	DATE 03/2012	SCALE IF NOT ON THIS SCALE ACCORDINGLY



METRO TRANSIT DIVISION STANDARD SINGLE-UNIT DRIVER'S COMFORT STATION	DATE MARCH 2012
SHEET METAL FLASHING & TRIM SPECIFICATION	DATE A7.05
	SHEET NO. 9/16

DOOR HARDWARE SPECIFICATION

1. ACTION SUBMITTALS

- A. DOOR HARDWARE SETS SHALL CONFORM TO THE REQUIREMENTS OF KING COUNTY METRO TRANSIT, AND SHALL BE AS APPROVED BY THE KING COUNTY PROJECT REPRESENTATIVE.
- B. KEYING SCHEDULE: UPON COMPLETION OF PROJECT, CORE OF KEY HARDWARE WILL BE REPLACED WITH THAT COMPATIBLE WITH KING COUNTY'S KEYING SYSTEM.

2. DELIVERY, STORAGE, AND HANDLING

- A. DELIVER KEYS TO KING COUNTY PROJECT REPRESENTATIVE.

3. WARRANTY

- A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF DOOR HARDWARE THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD, THREE YEARS FROM DATE OF SUBSTANTIAL COMPLETION, EXCEPT AS FOLLOWS:
 - CRT DEVICES: TWO YEARS FROM DATE OF SUBSTANTIAL COMPLETION.
 - MANUAL CLOSERS: 10 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

4. SCHEDULED DOOR HARDWARE

- A. DOOR HARDWARE SET SHALL HAVE THE FOLLOWING:
 - HINGES (3)
 - TYPE: EXTERIOR FINED
 - DOOR CLOSER (1)
 - LOCKSET (1)
 - TYPE: SECURITY, LEVER-TYPE, WITH INTERCHANGEABLE CORE
 - GENERAL LOCKSET CONFIGURATION SHALL COMPLY WITH GOVERNING ACCESSIBILITY AND LIFE SAFETY CODES WHILE PREVENTING ENTRY BY TRANSIT SYSTEM KEY WHILE OCCUPIED.
 - FLUSH BOLT (1)
 - KICK PLATE (1)
 - THRESHOLD (1)
 - LAMB SEALS (1 SET)
 - SILL SEAL (1)
 - DRIP SEAL (1)
 - PREP HOLE (1)
- B. FINISH SHALL BE USED, SATIN CHROME PLATED (BHMA 626)

5. HINGES - GENERAL

- A. TEMPLATE REQUIREMENTS: PROVIDE ONLY TEMPLATE-PRODUCED UNITS.
- B. HINGE BASE METAL: PROVIDE EXTERIOR HINGES STAINLESS STEEL, WITH STAINLESS-STEEL PIN.
- C. NONREMOVABLE PINS: PROVIDE SET SCREW IN HINGE BARREL THAT, WHEN TIGHTENED INTO A GROOVE IN HINGE PIN, PREVENTS REMOVAL OF PIN WHILE DOOR IS CLOSED, FOR OUTSWINGING EXTERIOR DOORS.
- D. FASTENERS SHALL COMPLY WITH THE FOLLOWING:
 - MACHINE SCREWS: FOR METAL DOORS AND FRAMES, INSTALL INTO DRILLED AND TAPPED HOLES.
 - SCREWS: PHILLIPS FLAT-HEAD, MACHINE SCREWS (DRILLED AND TAPPED HOLES) FOR METAL DOORS; FINISH SCREW HEADS TO MATCH SURFACE OF HINGES.

6. HINGES

- A. BUTTS AND HINGES: BHMA A156.1.
- B. TEMPLATE HINGE DIMENSIONS: BHMA A156.7.
- C. MANUFACTURERS:
 - MCKINNEY PRODUCTS COMPANY, AN ASSA ABLDY GROUP COMPANY (MCK)
 - PBB, INC (PBB)
 - STANLEY COMMERCIAL HARDWARE; DIV OF THE STANLEY WORKS (STW)

7. LOCKS AND LATCHES - GENERAL

- A. DOOR HARDWARE MUST BE ACCESSIBLE PER BC CHAPTER 11 AND BE IN COMPLIANCE WITH IBC CHAPTER 10.
- B. PROVIDE OPERATING DEVICES THAT DO NOT REQUIRE TIGHT GRASPING, PUNCHING, OR TWISTING OF THE WRIST AND THAT OPERATE WITH A FORCE OF NOT MORE THAN 5 LBF.
- C. MANUALLY OPERATED FLUSH OR SURFACE BOLTS ARE NOT ALLOWED UNLATCHING SHALL NOT REQUIRE MORE THAN ONE RELEASING OPERATION TO OPERATE DOOR.
- D. LOCK TRIM
 - LEVERS: AS APPROVED BY KING COUNTY PROJECT REPRESENTATIVE, COMPLY WITH THE REQUIREMENTS OF METRO FACILITIES COMPLIANCE PROGRAM.
- E. STRIKES: MANUFACTURER'S STANDARD STRIKE WITH STRIKE BOX FOR EACH LATCHBOLT OR LOCK BOLT, WITH CURVED LIP EXTENDED TO PROTECT FRAME, FINISHED TO MATCH DOOR HARDWARE SET.

8. MECHANICAL LOCKS AND LATCHES, COMPLY WITH THE FOLLOWING:

- A. BORED LOCKS: BHMA A155.2, GRADE 1, SERIES 4000.
 - PREFERRED STANDARD CORBIN RUSSKIN/ASSA ABLDY TO MATCH EXISTING LOCK/KEY SYSTEM WITHIN METRO TRANSIT.
 - LOCKS SHALL REQUIRE USE OF A KEY ON THE EXTERIOR FOR OPERATION.
 - COMPLY WITH **LOCKS AND LATCHES - GENERAL: BOLT MECHANISM, KEYING AND OPERATING TRIM** REQUIREMENTS.
- B. MANUFACTURERS:
 - CORBIN RUSSKIN ARCHITECTURAL HARDWARE, AN ASSA ABLDY GROUP COMPANY (CR)
- C. BASIS OF DESIGN:
 - WORTISE LOCKSET: CORBIN RUSSKIN M13000.5

9. BOLT MECHANISM

- A. DUSTPROOF STRIKES: BHMA A156.16
- B. BOLT MECHANISM: BHMA A156.16

- BOLT HEADS: MINIMUM OF 1/2-INCH DIAMETER RODS OF BRASS, BRONZE, OR STAINLESS STEEL WITH MINIMUM 12-INCH LONG ROD FOR DOORS UP TO 84 INCHES IN HEIGHT.
- BRUSHED CHROME BARREL BOLT
- PROJECTION OF DEADBOLT MUST ACTIVATE PRIVACY INDICATOR
- INSIDE GRIP SIMULTANEOUSLY RETRACTS LATCHBOLT AND DEADBOLT AND UNLOCKS OUTSIDE GRIP
- INSIDE GRIP ALWAYS FREE
- COMPLY WITH **LOCKS AND LATCHES - GENERAL: MECHANICAL LOCKS AND LATCHES, KEYING AND OPERATING TRIM** REQUIREMENTS.
- C. MANUFACTURERS:
 - CORBIN RUSSKIN
 - AHI HARDWARE

10. LOCK CYLINDERS

- A. STANDARD LOCK CYLINDERS: BHMA A156.5.
- B. PERMANENT CORES: MANUFACTURER'S STANDARD, FINISH FACE TO MATCH LOCKSET, WITH INTERCHANGEABLE CORES.
- C. CONSTRUCTION KEYING, CONSTRUCTION CORES:
 - PROVIDE CONSTRUCTION CORES THAT ARE REPLACEABLE BY PERMANENT CORES. PROVIDE TO CONSTRUCTION MASTER KEYS.
 - FINISH PERMANENT CORES TO KING COUNTY PROJECT REPRESENTATIVE FOR INSTALLATION.
- D. MANUFACTURER: SAME AS FOR LOCKS AND LATCHES.
- E. BASIS OF DESIGN: CORBIN RUSSKIN ARCHITECTURAL HARDWARE; AN ASSA ABLDY GROUP COMPANY (CR)

11. KEYING

- A. KEYING SYSTEM: FACTORY REGISTERED, COMPLYING WITH GUIDELINES IN BHMA A156.28, APPENDIX A.
- B. EXISTING SYSTEM: MASTER KEY OR GRAND MASTER KEY LOCKS TO KING COUNTY METRO TRANSIT'S EXISTING SYSTEM.

12. OPERATING TRIM

- A. STANDARD: BHMA A156.6
- B. MATERIALS: STAINLESS STEEL
- C. BASIS OF DESIGN: CORBIN RUSSKIN/ASSA ABLDY
 - M1 2062 "INTRUDER DEADBOLT" WITH PRIVACY INDICATOR.
 - LEVER & ESCUTCHEON: WROUGHT STAINLESS STEEL.
- D. ACCEPTABLE MANUFACTURERS:
 - CORBIN RUSSKIN/ASSA ABLDY
 - AHI HARDWARE
- E. COMPLY WITH **LOCKS AND LATCHES - GENERAL: MECHANICAL LOCKS AND LATCHES, KEYING AND BOLT MECHANISM** REQUIREMENTS.

13. CLOSERS

- A. DOOR CLOSERS FOR MEANS OF EGRESS DOORS COMPLY WITH

- A174-101. DOOR CLOSERS SHALL NOT REQUIRE MORE THAN 30 LBF TO SET DOOR IN MOTION AND NOT MORE THAN 15 LBF TO OPEN DOOR TO MINIMUM REQUIRED WIDTH.
- B. CONCEALED CLOSERS: BHMA A156.4
- C. ACCEPTABLE MANUFACTURERS:
 - LCN CLOSERS: AN INgersoll-RAND COMPANY (LCN)

14. STOPS AND HOLDERS

- A. PROVIDE WALL STOP: BHMA A156.16.
- B. ACCEPTABLE MANUFACTURERS:
 - SARGENT MANUFACTURING COMPANY; AN ASSA ABLDY GROUP COMPANY (SOT).
 - STANLEY COMMERCIAL HARDWARE; DIV OF THE STANLEY WORKS (STW).
 - TRINCO (STW).

15. DOOR GASKETING

- A. STANDARD: BHMA A156.22
- B. GENERAL: PROVIDE CONTINUOUS WEATHER-STRIP GASKETING AND NONCORROSIVE FASTENERS
 - PERimeter GASKETING: APPLY TO HEAD AND LAMB, FORMING SEAL BETWEEN DOOR AND FRAME.
 - DOOR BOTTOM: APPLY TO BOTTOM OF DOOR, FORMING SEAL WITH THRESHOLD WHEN DOOR IS CLOSED.
 - REPLACEABLE SEAL STRIPS: PROVIDE ONLY THOSE UNITS WHERE RESILIENT OR FLEXIBLE SEAL STRIPS ARE EASILY REPLACEABLE AND READILY AVAILABLE FROM STOCKS MAINTAINED BY MANUFACTURER.
 - GASKETING MATERIALS: ASTM D 2000 AND AAMA 701/702
- C. MANUFACTURERS:
 - PEWKO MANUFACTURING CO. (PEW).
 - REESE ENTERPRISES (RE)
 - ZERO INTERNATIONAL (ZRO).

16. THRESHOLDS

- A. STANDARD: BHMA A156.21.
- B. ACCESSIBILITY REQUIREMENTS: BEVEL RASSED THRESHOLDS WITH A SLOPE OF NOT MORE THAN 1:2. PROVIDE THRESHOLDS NOT MORE THAN 1/2 INCH HIGH.
- C. ACCEPTABLE MANUFACTURERS:
 - PEWKO MANUFACTURING CO. (PEW).

AS CONSTRUCTED	03/2012
REVISION	BY DATE



DESIGN	PROJECT NUMBER	SCALE
B. FARNS-BATEMAN	# ENO	AS NOTED
DRAWN	BY LOCATION NO.	
B. FARNS-BATEMAN	D. CAMPBELL	
CHECKED	DATE	ONE INCH AT FULL SIZE
J. DALY	03/2012	IF NOT ONE INCH, SCALE ACCORDINGLY
RECHECKED	DATE	
D. CAMPBELL		



METRO TRANSIT DIVISION
STANDARD SINGLE-UNIT
DRIVER'S COMFORT STATION

DOOR HARDWARE SPECIFICATION

DATE	APR. 2012
ISSUE NO.	A7.06
HEET NO.	10 18

FIBERGLASS REINFORCED PLASTIC PANELS SPECIFICATION 097700

1. THIS SECTION INCLUDES THE FOLLOWING:

A. FIBERGLASS REINFORCED PLASTIC WALL AND CEILING PANELS.

2. QUALITY ASSURANCE

- A. FIRE-TEST-RESPONSE CHARACTERISTICS: PROVIDE IMPACT-RESISTANT LAMBS WITH SURFACE-BURNING CHARACTERISTICS AS DETERMINED BY TESTING IDENTICAL PRODUCTS PER ASTM E 84, NFPA 255, OR UL 723 BY UL OR ANOTHER TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- B. IMPACT RESISTANCE CHARACTERISTICS: ASTM D2583 AND ASTM D5420.

3. DELIVERY, STORAGE, AND HANDLING

A. COMPLY WITH MANUFACTURER'S INSTRUCTIONS FOR STORAGE AND HANDLING.

4. WARRANTY

- A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF FIBERGLASS REINFORCED PANELS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.
 - WARRANTY PERIOD: FIVE YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

5. MANUFACTURERS

- A. IN OTHER PART 2 ARTICLES WHERE TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY TO PRODUCT SELECTION:
 - AVAILABLE MANUFACTURERS SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, MANUFACTURERS SPECIFIED.

6. MATERIALS

- A. GENERAL: PROVIDE ALL MATERIALS REQUIRED FOR COMPLETE INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- B. FIBERGLASS-REINFORCED PLASTIC WALL AND CEILING PANELS:
 - SURFACE: SMOOTH.
 - TYPE: CLASS A.
 - COLOR: WHITE.
- C. ADHESIVE: TYPE RECOMMENDED BY MANUFACTURER FOR USE WITH MATERIAL HEREIN ADHERED TO SUBSTRATE INDICATED.
 - USE ADHESIVES AND SEALANTS THAT COMPLY WITH THE FOLLOWING LIMITS FOR VOC CONTENT WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24):
 - D. GYPSUM BOARD AND PANEL ADHESIVES: 50 G/L
 - D. MULTIPURPOSE CONSTRUCTION ADHESIVES: 70 G/L
 - E. CONTACT ADHESIVE: 80 G/L.

7. FIBERGLASS REINFORCED WALL AND CEILING PANELS

A. SEMI-RIGID, IMPACT-RESISTANT SHEET WALL COVERING FABRICATED FROM PLASTIC SHEET WALL COVERING MATERIAL.

- BASIS-OF-DESIGN PRODUCT: CRANE COMPOSITES, KENITE GLASSBORO/FRP, WITH SURFACE/BLANK FINISH.
- OR COMPARABLE PRODUCT BY ONE OF THE FOLLOWING MANUFACTURERS:
 - D. ALLIED BUILDING PRODUCTS CORP. DBA CHICAGO METALLIC
 - D. COOK CONSTRUCTION SPECIALTIES, INC
 - E. CRANE COMPOSITES
 - D. APPROVED EQUAL.
- B. SIZE: 48 BY 96 INCHES.
- INSTALLED THICKNESS, INCLUDING 5/16" PLYWOOD BACKING: 3/8".
- COLOR AND TEXTURE: WHITE, CLASS A SMOOTH.

B. INSTALLATION

A. INSTALL USING METHODS AND MATERIALS RECOMMENDED IN WRITING BY MANUFACTURER.

PAINING SPECIFICATION 099113

1. THIS SECTION INCLUDES SURFACE PREPARATION AND THE APPLICATION OF PAINT SYSTEMS ON THE FOLLOWING EXTERIOR AND INTERIOR SUBSTRATES:

- A. CONCRETE.
- B. STEEL.
- C. GALVANIZED METAL.

2. QUALITY ASSURANCE

- A. MPI STANDARDS
 - PRODUCTS: COMPLYING WITH MPI STANDARDS INDICATED AND LISTED IN "MPI APPROVED PRODUCTS LIST."
 - PREPARATION AND WORKMANSHIP: COMPLY WITH REQUIREMENTS IN "MPI ARCHITECTURAL PAINTING SPECIFICATION MANUAL" FOR PRODUCTS AND PAINT SYSTEMS INDICATED.

3. PAINT GENERAL

- A. MATERIAL COMPATIBILITY:
 - PROVIDE MATERIALS FOR USE WITH EACH PAINT SYSTEM THAT ARE COMPATIBLE WITH ONE ANOTHER AND SUBSTRATES INDICATED, UNDER CONDITIONS OF SERVICE AND APPLICATION AS DEMONSTRATED BY MANUFACTURER, BASED ON TESTING AND FIELD EXPERIENCE.
 - FOR EACH COAT IN A PAINT SYSTEM, PROVIDE PRODUCTS RECOMMENDED IN WRITING BY MANUFACTURERS OF TOPCOAT FOR USE IN PAINT SYSTEM AND ON SUBSTRATE INDICATED.
- B. COLORS: MATCH COLOR OF METRO RAPID-RIDE BUS SHELTER, AS APPROVED BY THE KING COUNTY PROJECT REPRESENTATIVE.
- C. MANUFACTURERS
 - PPG ARCHITECTURAL FINISHES
 - RONA PAINT
 - VISTA PAINT
 - OR EQUAL.

4. METAL PRIMERS

- A. QUICK-DRYING ALLOY METAL PRIMER, MPI #76
 - VOC CONTENT: E RANGE OF E2.

5. QUICK-DRYING ENAMELS

- A. QUICK-DRYING ENAMEL (SEMI-GLOSS), MPI #81 (GLOSS LEVEL 5).
 - VOC CONTENT: E RANGE OF E2.

6. FLOOR COATINGS

- A. INTERIOR/EXTERIOR CLEAR CONCRETE FLOOR SEALER (WATER BASED), MPI #29.
 - VOC CONTENT: E RANGE OF E2.

7. EXAMINATION

- A. EXAMINE SUBSTRATES AND CONDITIONS, WITH APPLICATOR PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR MAXIMUM MOISTURE CONTENT AND OTHER CONDITIONS AFFECTING PERFORMANCE OF WORK.
- B. MAXIMUM MOISTURE CONTENT OF SUBSTRATES: WHEN MEASURED WITH AN ELECTRONIC MOISTURE METER AS FOLLOWS:
 - CONCRETE: 12 PERCENT.
- C. VERIFY SUITABILITY OF SUBSTRATES, INCLUDING SURFACE

- CONDITIONS AND COMPATIBILITY WITH EXISTING FINISHES AND PRIMERS.
- D. BEGIN COATING APPLICATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED AND SURFACES ARE DRY.
 - BEGINNING COATING APPLICATION CONSTITUTES CONTRACTOR'S ACCEPTANCE OF SUBSTRATES AND CONDITIONS.

8. PREPARATION AND APPLICATION

- A. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS IN "MPI ARCHITECTURAL PAINTING SPECIFICATION MANUAL" APPLICABLE TO SUBSTRATES AND PAINT SYSTEMS INDICATED.
- B. CLEAN SUBSTRATES OF SUBSTANCES THAT COULD IMPAIR BOND OF PAINTS, INCLUDING DIRT, OIL, GREASE, AND INCOMPATIBLE PAINTS AND ENCAPSULANTS.
 - REMOVE INCOMPATIBLE PRIMERS AND REPRIME SUBSTRATE WITH COMPATIBLE PRIMERS AS REQUIRED TO PRODUCE PAINT SYSTEMS INDICATED.
- C. APPLY PAINTS TO PRODUCE SURFACE FILMS WITHOUT CLOUDINESS, SPOTTING, HOLIDAYS, LAPS, BRUSH MARKS, ROLLER TRACKING, RUNS, SAGS, POORNESS, OR OTHER SURFACE IMPERFECTIONS OUT IN SHARP LINES AND COLOR BREAKS.
- D. PROTECT WORK OF OTHER TRADES AGAINST DAMAGE FROM PAINT APPLICATION, CORRECT DAMAGE TO WORK OF OTHER TRADES BY CLEANING, REPAIRING, REPLACING, AND REFINISHING AS APPROVED BY ARCHITECT, AND LEAVE IN AN UNDAMAGED CONDITION.
- E. AT COMPLETION OF CONSTRUCTION ACTIVITIES OF OTHER TRADES, TOUCH UP AND RESTORE DAMAGED OR DEFACED PAINTED SURFACES.

9. EXTERIOR PAINTING SCHEDULE

- A. STEEL SUBSTRATES
 - QUICK-DRYING ENAMEL SYSTEM MPI EXT 31A.
 - PRIME COAT: QUICK-DRYING ALLOY METAL PRIMER.
 - INTERMEDIATE COAT: QUICK-DRYING ENAMEL, MATCHING TOPCOAT.
 - TOPCOAT: QUICK-DRYING ENAMEL SEMI-GLOSS.
- B. GALVANIZED-METAL SUBSTRATES
 - AS DESCRIBED IN SECTION 076200 SHEET METAL FLASHING AND TRIM.

AS CONSTRUCTED	REVISION	BY	DATE



DESIGNED	PROJECT NUMBER	SCALE
B. FARNS-BATTMAN	P. ENG	AS NOTED
CHECKED	APPROVED	SEE EXHIBIT NO.
B. FARNS-BATTMAN	D. CAMPBELL	
DRAWN	DATE	ONE INCH AT FULL SIZE
J. DAVIS	11/11/11	IF NOT ONE INCH SCALE ACCORDING
RECHECKED	CONTRACT NO.	
D. CAMPBELL		



METRO TRANSIT DIVISION
STANDARD SINGLE-LINE
DRIVER'S COMFORT STATION

FIBERGLASS REINFORCED PLASTIC PANELS & PAINTING SPECIFICATIONS

DATE: MARCH 2012

PROJECT NO: A7.07

DATE: 04/11/12

11 16

DOUBLE WALL W/ 2x6 WOOD STUD
EXTERIOR WALL 2x4 METAL STUD
INTERIOR WALL (OUT 4" INTERIOR
WALL AT 1/2" O1 5/8 LAR)

APA STRUCTURAL 1 PLYWOOD
SHEATHING 1/2" THICK W/ 100
GALVANIZED COMMON NAILS @ 4" OC
AT PANEL EDGES, AND 8" OC AT
INTERIOR PANEL SUPPORTS (TYP)

8" LIGHT GAGE STEEL "C" CHANNEL
@ BASE OF WALL W/ (3) 5/8"
STAINLESS STEEL ANCHOR BOLTS

3/4" x 6" STAINLESS STEEL
ANCHOR BOLT W/ STAINLESS
FENDER WASHER (TYP - EACH
END & CENTER OF WALL)

PRESSURE-TREATED WOOD SILL W/
SILL SEAL (TYP)

STOP REINFORCED FIBERGLASS
PANEL AT 5" AFF W/
CONTINUOUS "J" CHANNEL

TYPICAL SLAB CONSTRUCTION

PROVIDE CONTINUOUS
CALCKING AT WALL BASE TO
FLOOR INTERSECTION

ELECTRICAL GROUNDING
SEE E1.01
#4 REBAR @ 12" OC

TYPICAL WALL CONSTRUCTION
SIMPSON HITES AT EACH CORNER AND AT
EDGE OF WALL ADJACENT TO DOOR

3/4" x 16" STAINLESS STEEL ANCHOR BOLT -
TYPICAL AT EACH SIMPSON HITES HOLD-DOWN, AND
AT CENTER OF WALL

3"x3"x1/8" GALVANIZED PLATE WASHER (TYP)

VINYL SIDING STARTER STRIP

R-10 RIGID INSULATION W/
FLASHING

1/2" CEMENT BOARD

PROVIDE FLASHING PER DETAIL
1/2"

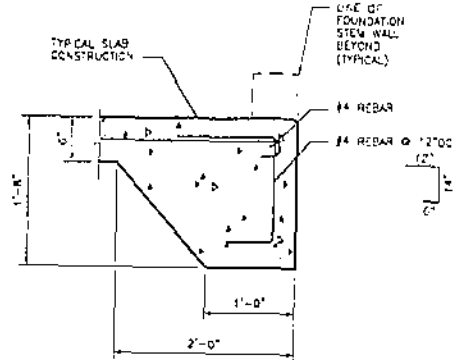
#4 REBAR CONTINUOUS SPLICE AT CORNERS W/ #4 (TYP)

STANDARD HOOK
#5 REBAR CONTINUOUS

#4 REBAR @ 12" OC

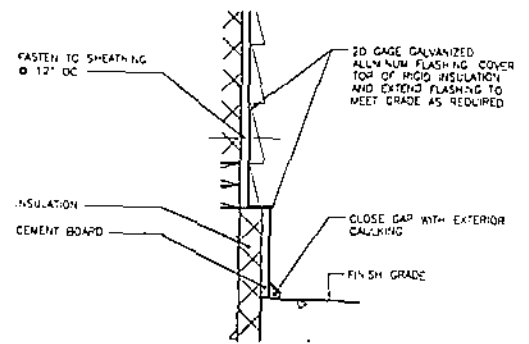
#5 REBAR CONTINUOUS
SPLICE W/ #5 AT
CORNERS (TYP)

#4 REBAR @ 12" OC EACH WAY



FOUNDATION AT DOOR OPENING
SECTION
SCALE: 1-1/2" = 1'-0" AT 01

FOUNDATION
SECTION
SCALE: 1-1/2" = 1'-0" AT 01



FLASHING
DETAIL
SCALE: 3" = 1'-0"

TYPICAL WALL CONSTRUCTION:

HORIZONTAL HORIZONTAL BEVEL VINYL SIDING
10# BUILDING FELT
PLYWOOD SHEATHING (PER A1.02)
2x6 RIGID INSULATION
2x6 WOOD STUDS @ 16" OC MAX
W/ REINFORCED FIBERGLASS PLASTIC PANEL

NOTE:

- SEE DRAWING A7.01 FOR ROUGH LUMBER AND SHEATHING SPECIFICATIONS.

METAL CONSTRUCTION ALTERNATIVE:

METAL SILL CONSTRUCTION:

METAL "C" CHANNEL W/ SILL SEAL (TYP)
3.5CU 1.25x0.45 IN 6" WALL @ 16" OC MAX
OR 8CU 1.25x0.45 IN 8" WALL @ 16" OC MAX

METAL WALL CONSTRUCTION:

5/4" PLYWOOD
TOP PLATE METAL "C" CHANNEL TOP WALL
3.5CU 1.25x0.45 IN 6" WALL @ 16" OC MAX
8CU 1.25x0.45 IN 8" WALL @ 16" OC MAX

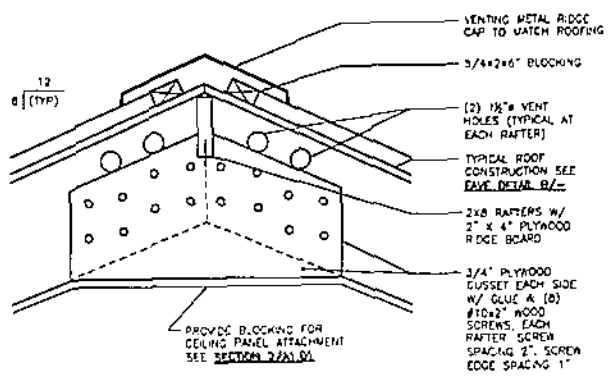
1	AS CONSTRUCTED	03/2012
BY	APPROV	DATE



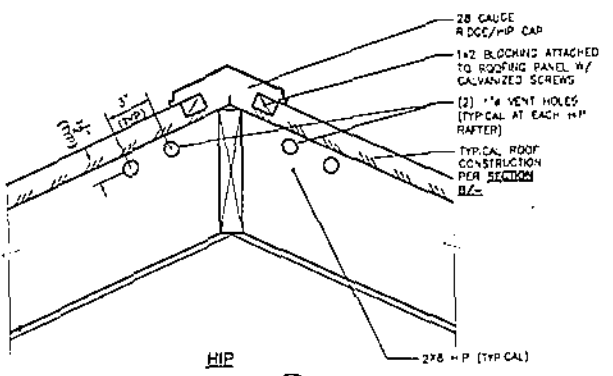
DESIGNED J. CAYNE	PROJECT NUMBER # ENG	SCALE AS NOTED
CHECKED D. CAMPBELL	DATE 03/2012	BY J. CAYNE
APPROVED D. CAMPBELL	CONTRACT NO.	ONE INCH AT FULL SIZE IF NOT ONE INCH, SCALE ACCORDINGLY



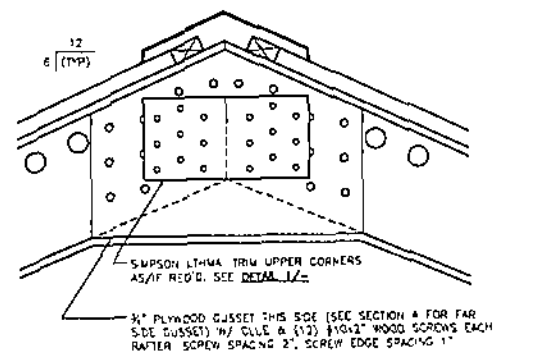
METRO TRANSIT DIVISION STANDARD SINGLE-LINE DRIVER'S COMFORT STATION	SHEET NO. OF 12 16
CONSTRUCTION DETAILS	DATE MARCH 2012
	DRAWING NO. 53.01



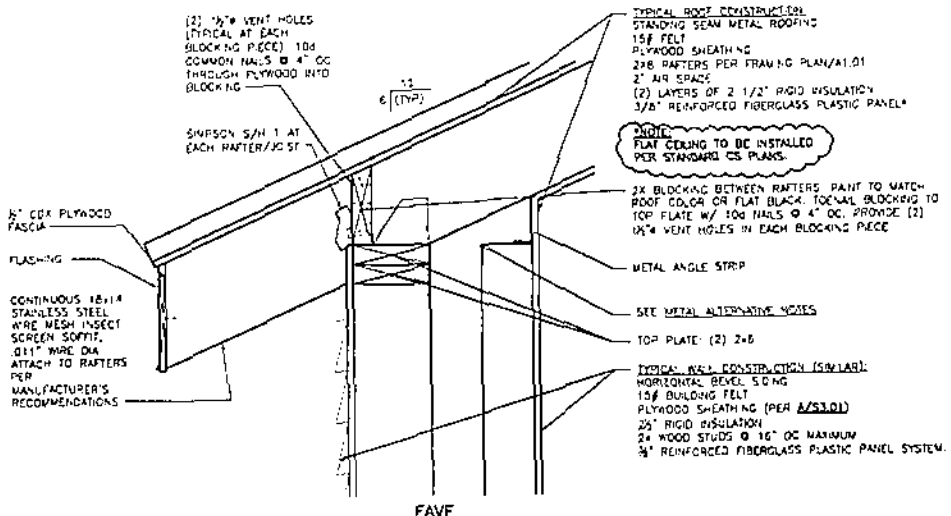
RIDGE SECTION A
SCALE: 3" = 1'-0" A1 01



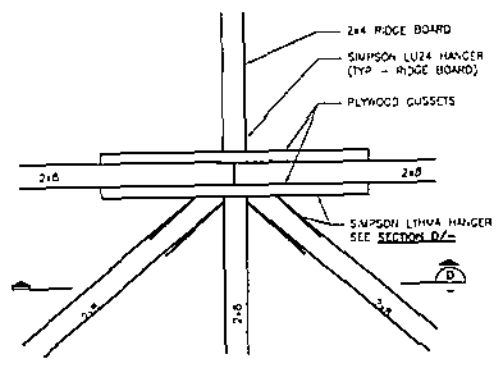
HIP SECTION C
SCALE: 3" = 1'-0" A1 01



RIDGE SECTION D
SCALE: 3" = 1'-0" A1 01
NOTE: HIP JOISTS NOT SHOWN



EAVE SECTION B
SCALE: 3" = 1'-0" A1 01



RIDGE DETAIL 1
SCALE: 3" = 1'-0" A1 01

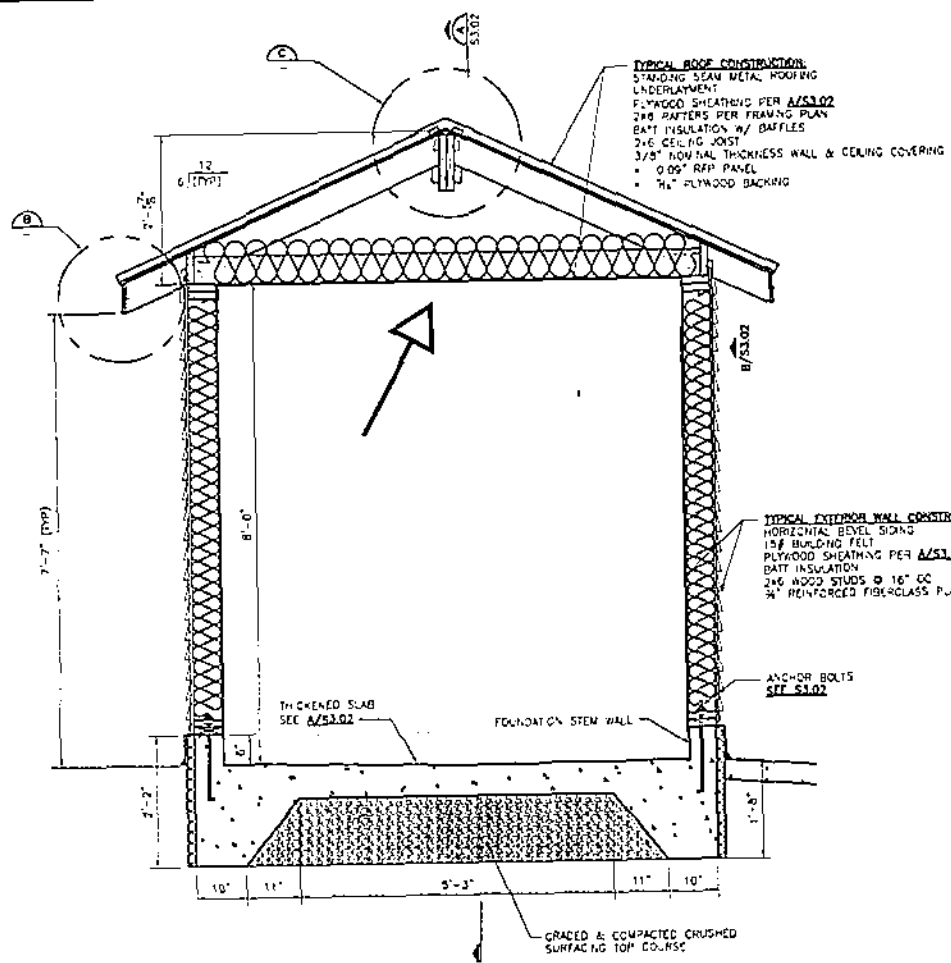
- NOTES:**
- SEE DRAWING A7.02 FOR ROUGH CARPENTRY & SHEATHING SPECIFICATIONS.
 - SEE DRAWING A7.01 FOR THERMAL INSULATION & EXTERIOR FINISH CARPENTRY SPECIFICATIONS
 - SEE DRAWING A7.04 FOR METAL ROOF PANELS SPECIFICATION
 - SEE DRAWING A7.03 SHEET METAL FLASHING & TRIM SPECIFICATION.
 - SEE DRAWING A7.06 FOR DOOR HARDWARE SPECIFICATION.
 - SEE DRAWING A7.07 FOR FIBERGLASS REINFORCED PLASTIC PANELS & PAINTING SPECIFICATIONS



DESIGNER:	D. CHAVIS	PROJECT NUMBER:	SCALE:
CHECKER:	B. FARRIS-BATTMAN	DATE:	AS NOTED
DRAWN:	D. CAMPBELL	DATE:	SEE LENGTH NO.
DATE:	11/21/11	DATE:	ONE VIEW AT FULL SIZE
DATE:	11/21/11	DATE:	IF NOT ONE VIEW, SCALE ACCORDING
DATE:	11/21/11	DATE:	

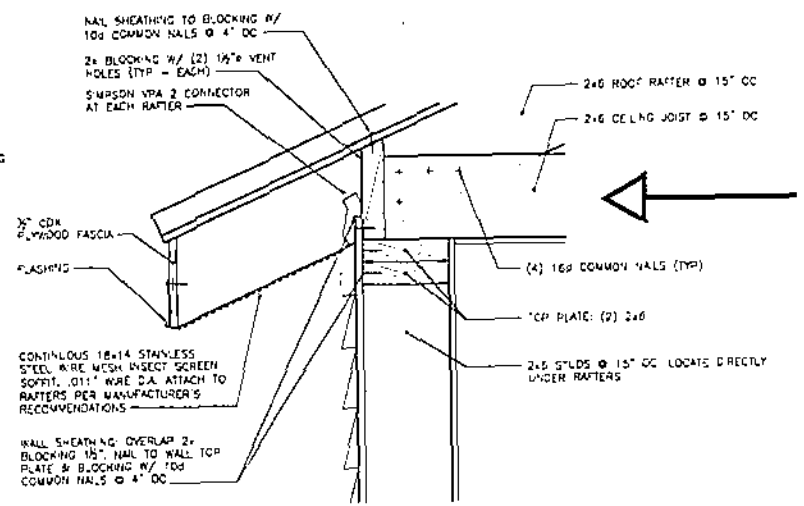


METRO TRANSIT DIVISION STANDARD SINGLE-UNIT DRIVER'S COMFORT STATION	DATE: MARCH 2012
TYPICAL CONSTRUCTION DETAILS	
	DRAWING NO: 53.02
	SHEET NO. OF: 13 18

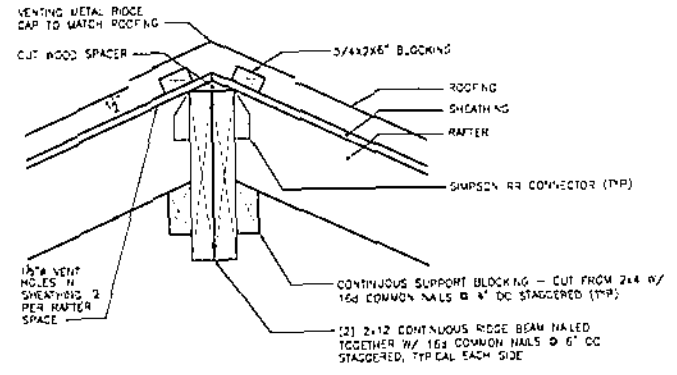


SECTION A
 SCALE 1" = 1'-0"

NOTE: SEE ARCHITECTURAL, MECHANICAL
 AND ELECTRICAL DRAWINGS FOR PIPING
 AND CONDUIT LOCATIONS



EAVE
 DETAIL B
 SCALE 3" = 1'-0"



RIDGE
 SECTION C
 SCALE 3" = 1'-0"

TRANSMITTAL
 FOR INFORMATION ONLY

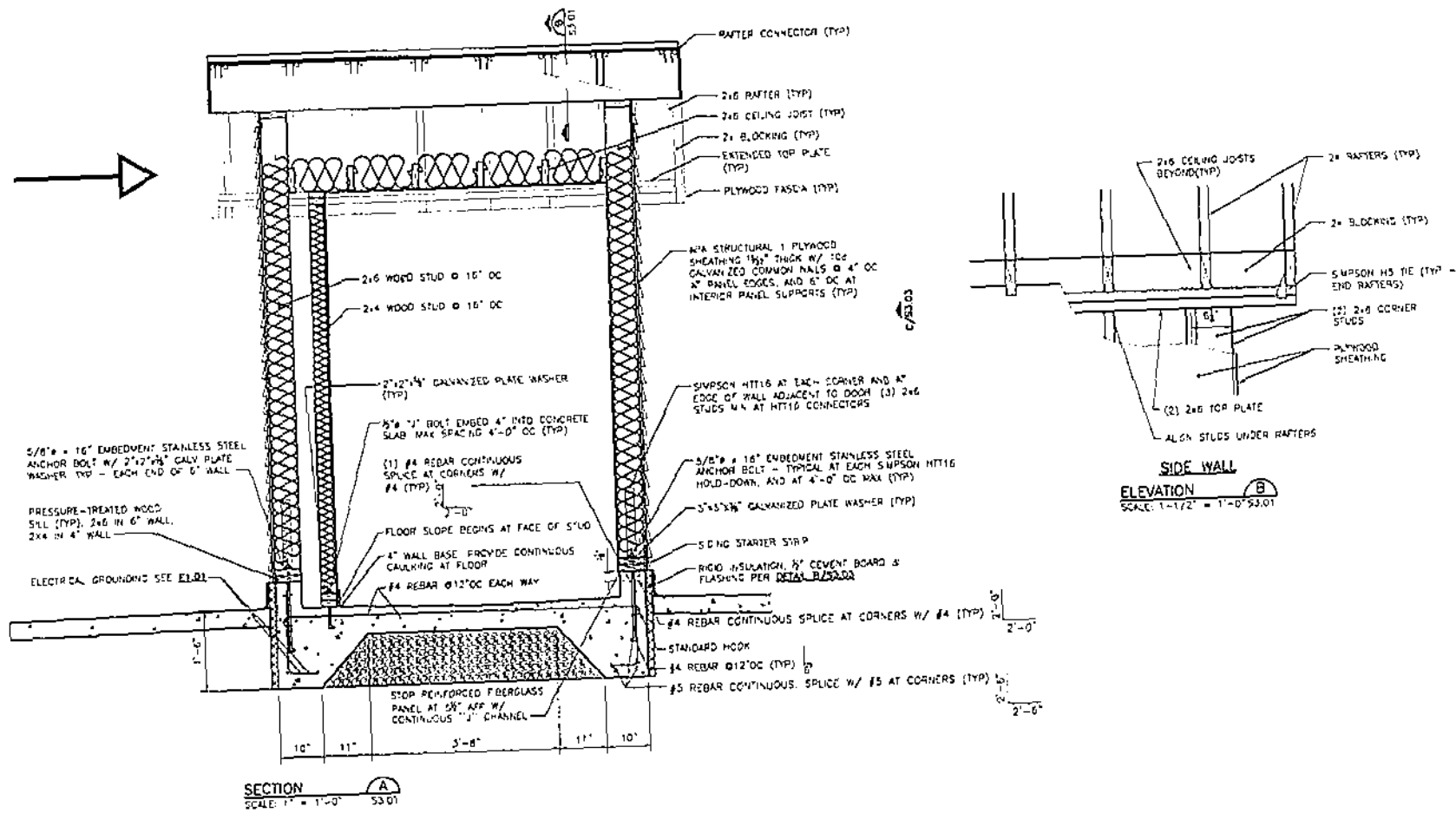
DESIGNED	PROJECT NUMBER	SCALE
J. BROS	B. WOLTER	AS NOTED
DRN	APPROVED	BY: WOLTER
B. FARRE-BATMAN	B. SLEP	ONE INCH @
DRN	DRN	FULL SIZE
J. BROS	CONTRACT NO.	IF NOT ONE INCH
DRN	CONTRACT NO.	SCALE ACCORDING
D. CRIPPE		



METRO TRANSIT DIVISION
 STANDARD SINGLE UNIT
 COMFORT STATION

CONSTRUCTION DETAILS

DATE	MAY 2025
DRAWING NO.	S3.01
SHEET NO.	3



NO.	REVISION	BY	DATE

TRANSMITTAL FOR INFORMATION ONLY

DESIGNED J. CAVE DRAWN J. CAVE	PROJECT NUMBER B. BOSTER APPROVED B. BOSTER	SCALE AS NOTED SEE LEGEND NO.
DATE RECOMMENDED J. CAVE	DATE 4/27/00	ONE INCH AT FULL SIZE IF NOT ONE INCH SCALE ACCORDING TO
DATE CHECKED D. CRIPPHEN	CONTRACT NO.	



METRO TRANSIT DIVISION
STANDARD SINGLE UNIT
COMFORT STATION

CONSTRUCTION DETAILS

DATE
MAY 2008

PROJECT NO.
53.02

SHEET NO.
53.02

6" SANITARY SEWER. SEE CITY OF SHORELINE DRAWING UT7 FOR CONTINUATION

1" WATER SERVICE. SEE CITY OF SHORELINE DRAWING W27 FOR CONTINUATION

2" SANITARY SEWER UP TO LAVATORY

2" TRAP PRIMER UP TO TRAP PRIMER VALVE

2" VENT UP

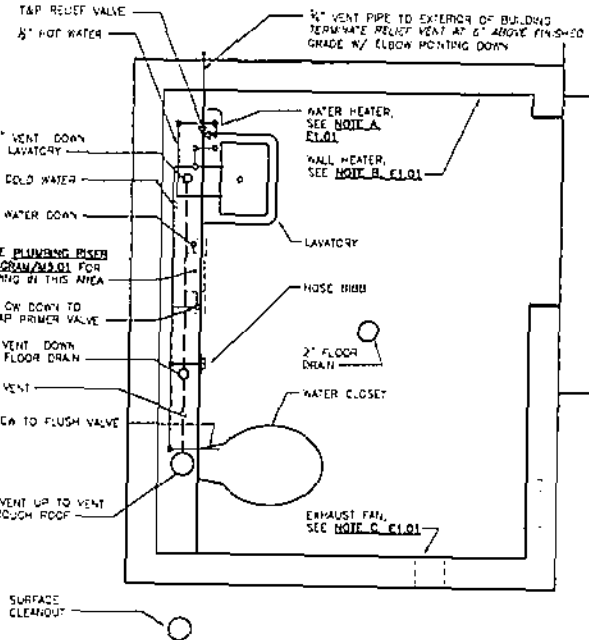
4" SANITARY SEWER UP TO WATER CLOSET

6" SS UP TO TO CLEANOUT

**PLUMBING
FOUNDATION PLAN**
SCALE: 1" = 1'-0"

NOTES:

1. PROVIDE 1" PRESSURE RELIEF VALVE.
2. PROVIDE HOSE BIBB WITH VACUUM BREAKER
3. PROVIDE TEMP AND PRESS RELIEF VALVE AT HOT WATER HEATER. EXTEND DISCHARGE THROUGH PLUMBING WALL TO THE OUTSIDE.
4. SEE DRAWING E1.01 FOR NOTE REFERENCES ON ELECTRICAL APPLIANCES.
5. PROVIDE 2" FLOOR DRAIN WITH STRAINER
6. SEE DRAWING A1.01 FOR FIXTURE OFFSETS
7. WATER PIPE DOMESTIC HOT AND COLD WATER PIPE SHALL BE TYPE K OR L COPPER AND THE FITTINGS SHALL BE WROT COPPER.
8. WATER AND SANITARY SEWER SHALL BE SEPARATED BY 5 FT HORIZONTAL AND 1 FT VERTICAL



**PLUMBING
FLOOR PLAN**
SCALE: 1" = 1'-0"

AS CONSTRUCTED	3/1/2012
DESIGNER	BY DATE



DESIGNED D CAMPBELL	PROJECT NUMBER P ENG	SCALE AS NOTED
CHECKED D CAMPBELL	DATE 1/23/12	DATE 3/1/12
APPROVED D CAMPBELL	CONTRACT NO.	ONE INCH AT FULL SIZE IF NOT ONE INCH SCALE ACCORDINGLY



METRO TRANSIT DIVISION
STANDARD SINGLE-UNIT
DRIVER'S COMFORT STATION

PLUMBING PLANS

DATE MARCH 2012
DRAWING NO. M1.01
SHEET NO. OF 14 OF 18

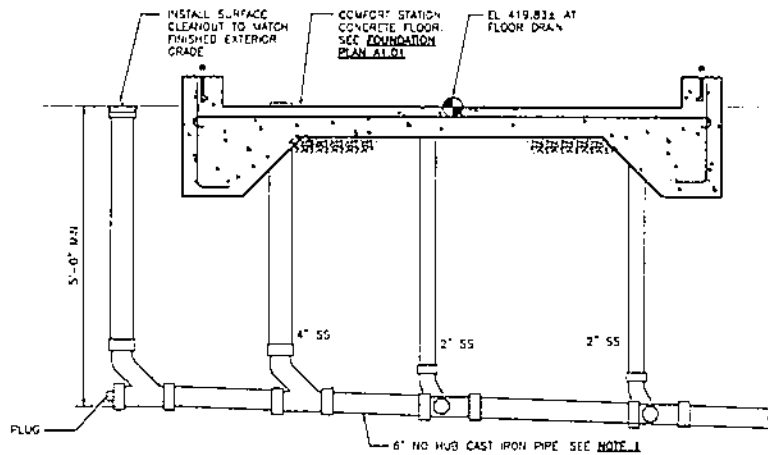
PLUMBING EQUIPMENT SCHEDULE

ITEM	MANUFACTURER	MODEL NUMBER	DIMENSIONS
TOILET SUPPORT, FLOOR-MOUNTED	COMPACT	CS44FY	13.3" OVERALL HEIGHT, 3" MIN./8" MAX TO CENTER OF WASTE PIPE FROM FINISH FLOOR
'FLUSHMETER' FLUSH VALVE	SLOAN ROYAL	111 (1.6 GPF)	GREATER THAN 11.5" ABOVE TOILET
PRESSURE REDUCING VALVE	WATTS REGULATOR	SERIES 28AUB-23	PER P.F.E SIZE
FLOOR DRAIN	J.R. SMITH	2510 WITH INTEGRAL TRAP AND PRWING CONNECTION	DESIGN BASIS: 2" DIAMETER
SHUT-OFF VALVE	1" GATE VALVE	-	-
HOSE BIBB	-	-	-
TRAP PRIMER VALVE	PPP	P-2	-
WATER HAMMER ARRESTOR	PPP, JOSAN, JR SMITH OR WADE	-	PER PIPE SIZE
PLUMBING VALVE BOX	-	FABRICATED	18" X 30" X 4". CONTRACTOR SHALL VERIFY SIZE TO FIT EQUIPMENT AND LOCATION PRIOR TO INSTALLATION. PROVIDE BLOCKING AS REQUIRED.
FAUCETS (NO STOPPER)	CHICAGO FAUCETS	B02-VE26C5-336CP	4" CENTERS

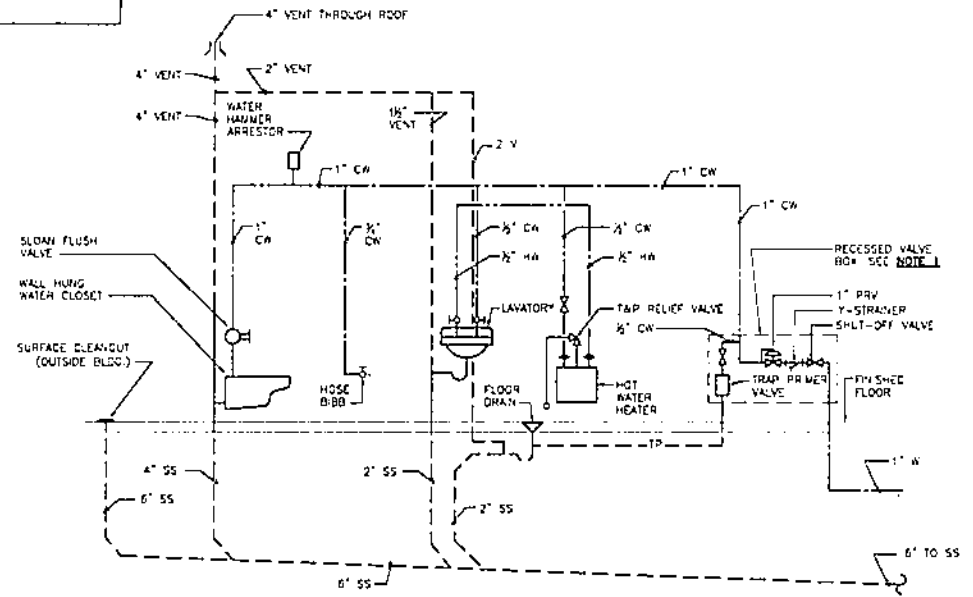
NOTE: SEE DRAWING A2.02 FOR WASH-ROOM FIXTURES SCHEDULE.

NOTES

- GRAVITY SANITARY WASTE AND VENT PIPING:
A. 6" DIA. CAST IRON SGL PIPE WITH NO HUB ENDS, ASTM A858.
- FITTINGS, CAST IRON, NO FLB.
- JOINTS: NO HUB COUPLINGS SHALL BE MADE OF HEAVY DUTY CORRUGATED ANS 304 STAINLESS STEEL, SHIELD WITH A MINIMUM OF TWO (2) HEAVY DUTY CLAMPS WITH ANS 305 STAINLESS STEEL SCREWS. GASKETS SHALL BE ONE-PIECE MOLDED NEOPRENE, ASTM C564.
- PPING BELOW GROUND SHALL BE DOUBLE C/WAFED.



SEWER & CLEANOUT SECTION
SCALE: 1"=1'-0"
M1.01

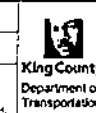


PLUMBING RISER DIAGRAM
SCALE: NONE
M1.01

NO.	REVISION	BY	APP'D	DATE
1	AS CONSTRUCTED			03/2012



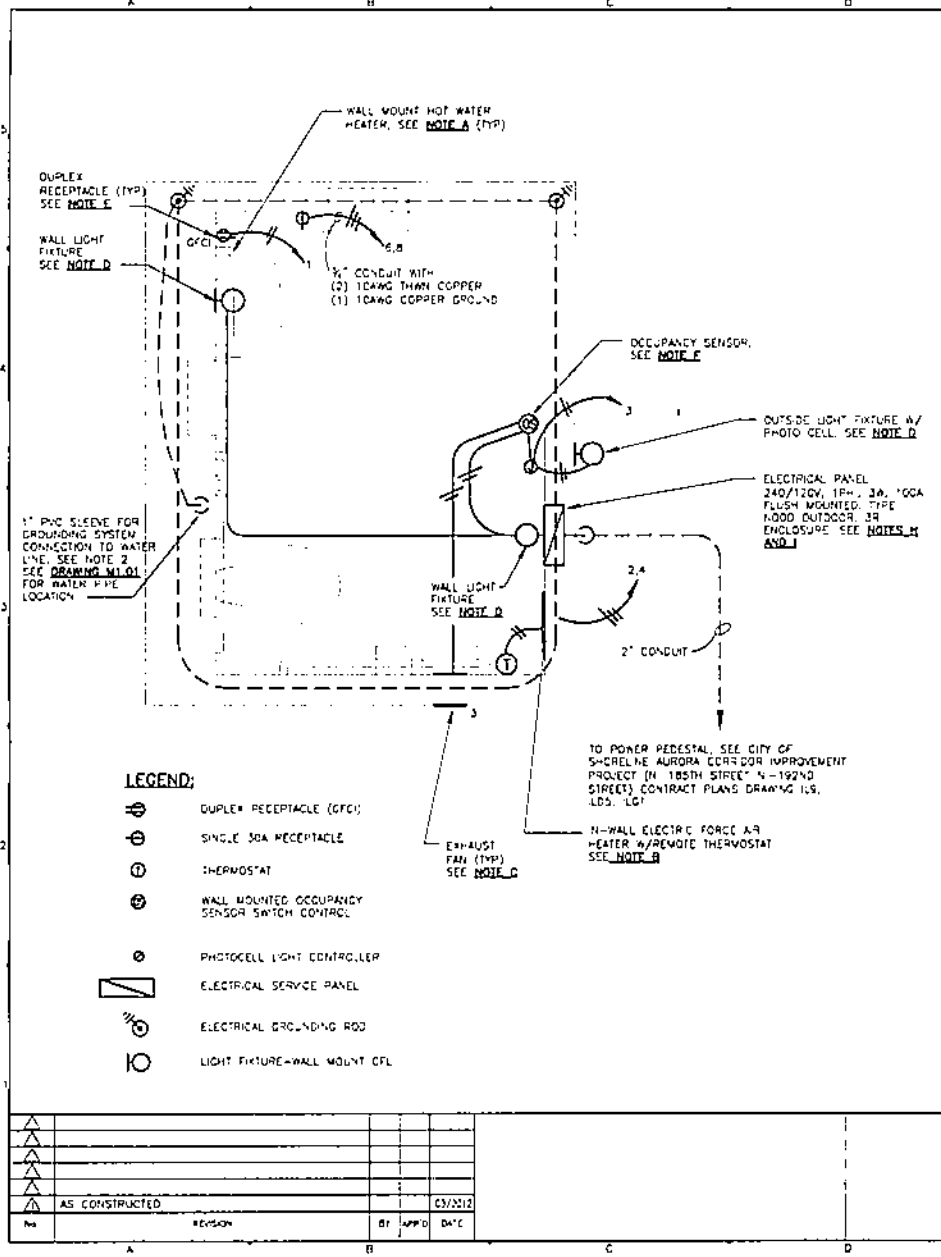
DESIGNED J. LAM	PROJECT MANAGER P. ENG	NOTES AS NOTED
DRAWN J. BOKERS'NIT	APPROVED D. CAMPBELL	DATE LOCATED NO
CHECKED J. LAM	DATE SET 4/30/12	ONE INCH AT FULL SIZE
RECOMMENDED D. CAMPBELL	CONTRACT NO.	IF NOT ONE INCH, SCALE ACCORDINGLY



METRO TRANSIT DIVISION
STANDARD SINGLE-UNIT
DRIVER'S COMFORT STATION

SECTION AND PLUMBING RISER DIAGRAM

DATE MARCH 2012
PROJECT NO. MS.01
SHEET NO. OF 15 16



SITE WORK NOTES:

1. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LICENSES, PERMITS AND INSPECTIONS REQUIRED BY LAWS, ORDINANCES AND RULES GOVERNING WORK SPECIFIED HEREIN.
2. FURNISH AND INSTALL (2) 10' x 1/2" GROUNDING ELECTRODES AND #4 BARE COPPER GROUNDING ELECTRODE CONDUCTOR TO THE SERVICE PANEL THROUGH 1" CONDUIT. RUN STUB CONDUIT 6" ABOVE THE CONCRETE FLOOR (BELOW THE SERVICE PANEL LOCATION) AND PROVIDE 15' OF SLACK ON THE GROUNDING ELECTRODE CONDUCTOR FOR TERMINATION AT THE SERVICE PANEL GROUND LUG. PROVIDE ENOUGH ADDITIONAL #4 BARE COPPER 2" FROM THE BOTTOM OF THE CONCRETE SLAB TO SEE CONCRETE ENCASED ELECTRODE NEC-250.52 (4) (3). ENCASE THE STRUCTURE AS SHOWN. (APPROX 30')
3. ALL WIRING SHALL BE IN EMT CONDUIT, WITH A MINIMUM OF 3/4" TRADE SIZES
4. UNLESS SHOWN OTHERWISE, ALL WIRING SHALL BE 12AWG COPPER

BUILDING ELECTRICAL CONSTRUCTION NOTES:

- A. FURNISH AND INSTALL A WALL-MOUNTED, 0.5 CFM IN-LINE WATER HEATER, RATED 240 VOLTS/4000 WATT CIRCUMFLEX LABORATORIES, INC. INSTANT TEMP. 5-40 FLP-225. THE WATER HEATER SHALL BE POWERED FROM A 30A GFI BREAKER THROUGH A DEDICATED SINGLE FLUSH MOUNTED RECEPTACLE.
- B. FURNISH AND INSTALL A FLUSH MOUNTED FORCED AIR FAN HEATER RATED 240 VOLTS, 3000/1000 WATTS, 8 1/2" x 2 1/2" x 10 1/2" DISCONNECT BULB-TYPE THERMOSTAT AND CONNECT REMOTE LINE VOLTAGE THERMOSTAT WHITE RECESS 152-10.
- C. FURNISH AND INSTALL AN 8-INCH DIAMETER WALL EXHAUST FAN WITH AUTOMATIC BACKDRAFT DAMPER WITH OUTSIDE WEATHER HOOD, RATED 120 VOLTS, 1.5 A, 160 CFM BROWN MODEL #809
- D. FURNISH AND INSTALL 120V. WALL MOUNTED SURFACE FLUORESCENT LIGHTING FIXTURES, (TYP 3) WEATHER PROOF 1 3/4" LAMP. UL LIST RATED FOR INDOOR AND OUTDOOR USE. COPPER LIGHTING MODEL #CT-DW-PP-32-A-120-LLR-55 OPTION PA-120V FOR OUTDOOR FINTURE SEE DRAWING #2.02 FOR MOUNTING HEIGHT.
- E. ALL THE RECEPTACLES SHALL HAVE GFCI PROTECTION AND SHALL BE FLUSH MOUNTED 4"-6" ABOVE FINISHED FLOOR.
- F. FURNISH AND INSTALL DUAL TECHNOLOGY OCCUPANCY SENSOR SWITCHES FOR THE LIGHTS AND THE EXHAUST FANS WITH STOPPER DW-100
- G. FURNISH AND INSTALL COMPLETE ELECTRICAL SYSTEM PER PANEL SCHEDULE AND AS SHOWN.
- H. THE CONTRACTOR SHALL USE 2" TRADE SIZE CONDUIT COMING INTO THE COMFORT STATION FOR THE NEW 100A ELECTRICAL PANEL
- I. THE CONTRACTOR SHALL INSTALL A NEW 100A, 120/240V ELECTRICAL PANEL WITH A 100A MAIN BREAKER.

PANEL NO	VOLTS	BRANCH BREAKERS	PANEL LOCATION	COMFORT STATION	PANEL TYPE	RATING
	120/240	PLUG IN	SHORELINE PARK & RIDE COMFORT STATION		SE RATING	120/240 VOLTS, 100A, 1R, 3W, G
		BULB-TYPE			REP. DISC. NO.	SEE REF. 100
						SEE REF. 100A BUS SYSTEM
DESCRIPTION & LOCATION		CIRC. BREAK	WIRING	CONDUIT	CAC. BREAK	DESCRIPTION & LOCATION
RECEPTACLES, GFCI	1 1/2	1	3/4"	1 1/2"	2 0 A	WALL HEATER, BUILT IN DCBY, 2000W
LIGHT FIXTURES/EXH FAN/OUTSIDE LIGHT	3	3	3/4"	1 1/2"	4 24	
					6 21	HOT WATER HEATER, TANKLESS (GFCI)
					8	
					10	
					11	
					12	
					13	
					14	
					15	
					16	
					17	
					18	
					19	
					20	
TOTALS	1 1/2	3			28 4	24 4
					TOTALS	TOTALS

PANEL LOAD CALCULATIONS

LOAD TYPE	CONNECTED	DEMAND FACTOR	DEMAND
LIGHTS	.105 KVA	125%	.131 KVA
RECEPT	.180 KVA	100%	.180 KVA
MOTORS	.100 KVA	100%	.100 KVA
LARGEST	(.180 KVA)	25%	.045 KVA
SPACE HEATER	2.0 KVA	125%	2.50 KVA
WATER HEATER	4.6 KVA	125%	5.75 KVA
TOTAL	7.1 KVA		8.8 KVA
	CONNECTED AMPS		DEMAND AMPS
	29.6		36.7

NO	REVISION	BY	APP'D	DATE
AS CONSTRUCTED				03/2012



DESIGNED	PROJECT NUMBER	SCALE
P. ENG		1"=1'-0"
DRAWN	APPROVED	BY (DATE)
D. MARSHALL	D. CAMPBELL	
CHECKED	BY NO	ONE INCH AT FULL SIZE
E. REYNOLDS	432-0000	IF NOT ONE INCH, SCALE ACCORDINGLY
PERMITS	DATE	
D. CAMPBELL	CONTRACT NO	



METRO TRANSIT DIVISION
STANDARD SINGLE-UNIT
DRIVER'S COMFORT STATION

**ELECTRICAL PLAN AND
PANEL SCHEDULE**

DATE: MARCH 2012
PROJECT NO:
E1.01
SHEET NO. OF 18 16

APPENDIX D

KING COUNTY TRANSIT POWER & FACILITIES

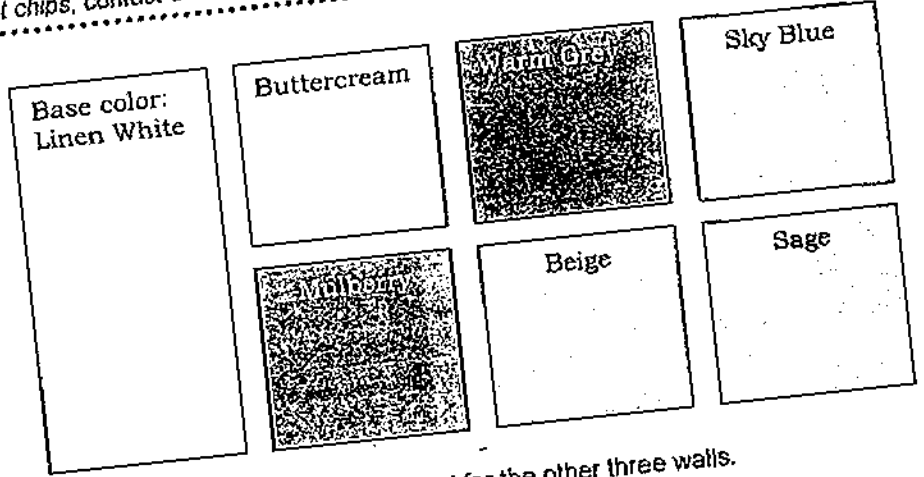
PAINT STANDARDS FOR TRANSIT FACILITIES

FACILITY COLOR PALETTES

WARNING: Colors shown are representational only. If you download this brochure from an email attachment or from the P&F Public Folders, the color hues and tones may vary when displayed on your computer monitors or when printed. For samples of the actual paint chips, contact South Facilities Maintenance.

INTERIORS

This interior color palette is for offices, office-related spaces and common use areas. Excluded are maintenance bays, shops, stores and safety markings. The palette consists of a "base" color (linen white) and six (6) accents. A workgroup can select up to two (2) accent colors along with the "base" color for its defined spaces, however, **these choices must be agreed-upon as a group.**

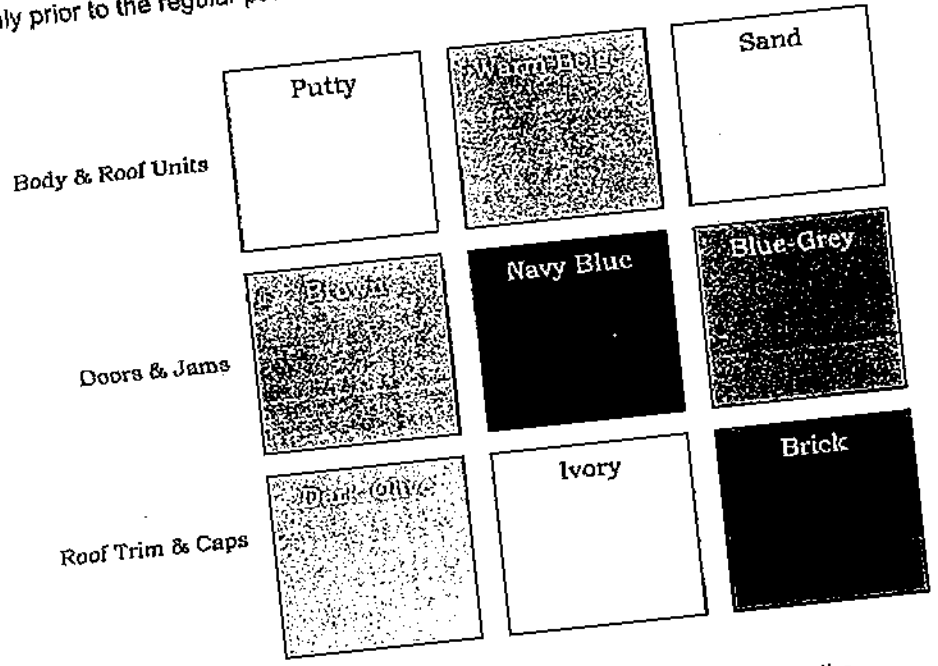


Selection Guidelines:

- Offices: One accent color for one wall. "Linen White" (base) will be used for the other three walls.
- Office related spaces: Either "Linen White" or the accent color selected for offices.
- Common use areas: You may opt for a 2nd accent color for these areas. Each area will be painted one color from your selected "mini 3-color palette," i.e., 2 accents plus "Linen White".
- Color Change: Changes are allowed only prior to the regular paint schedule set for your building.

EXTERIORS

This exterior color palette is in three categories: 1) body & roof units, 2) doors & jams, and 3) roof trim & caps. Exceptions are braces, brackets, supports and other architectural detailing composed of steel, aluminum, wood and other materials that would not require maintenance painting. The selection of **one color in each category** will comprise the mini color palette for the building exteriors.



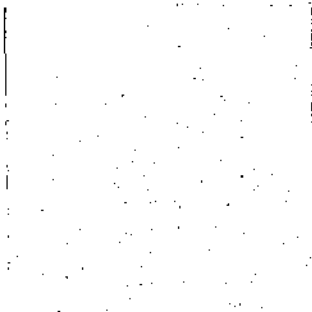
Selection Guidelines:

- For visual consistency at a property, the colors selected for one building shall be applied to all buildings located on that property.
- Depending on timing, new construction or major remodels can either "drive" the exterior color palette for other buildings located on the same property, or must follow the established color palette for building exteriors.
- New paint colors for buildings without planned changes will be phased in per Facilities' paint maintenance schedule.

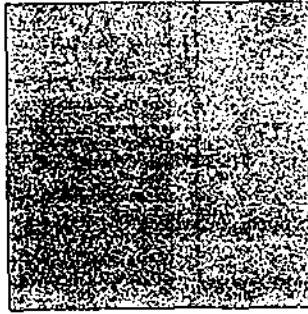
**Power
Facilities**

PAINT COLOR STANDARDS FOR BUILDING EXTERIORS

Body and Roof Units



Putty

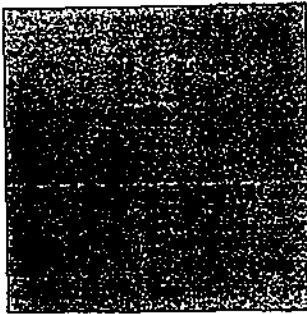


Warm Beige

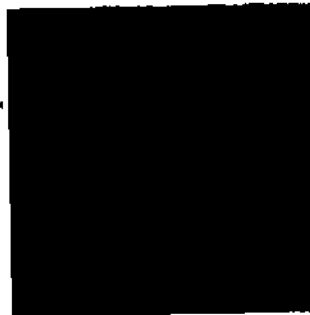


Sand

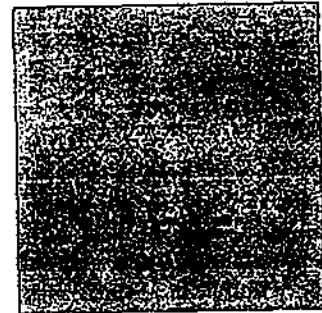
Doors and Jams



Brown

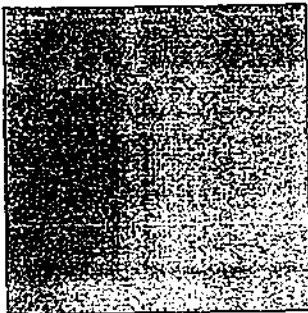


Navy Blue



Blue Gray

Roof Trim and Caps



Dark Olive



Brick

Ivory

Application for building exteriors, doors, and roof trim.
Refer to Facilities' brochure for more information.

Facilities Contact: _____

Return Paint Sample to: _____

PAINT COLOR STANDARDS FOR BUILDING INTERIORS

BASE COLOR: Linen White



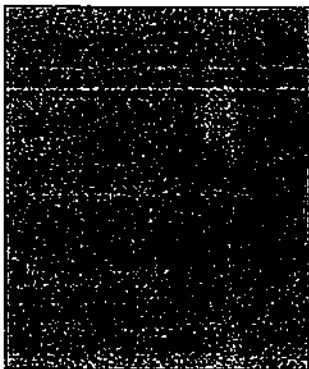
Blue



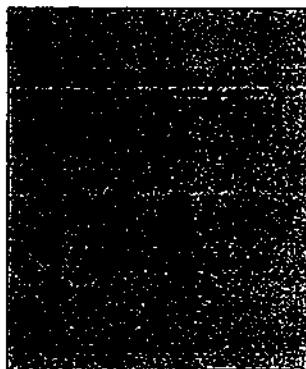
Buttercream



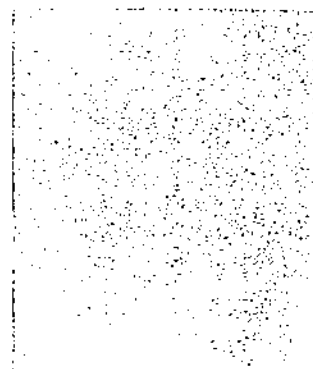
Sage



Mulberry



Warm Gray



Beige

Application for offices, office-related spaces, common use areas.
Refer to Facilities' brochure for more information.

Facilities Contact: _____

Return Paint Sample to: _____

SOUTH KIRKLAND TOD
PERFORMANCE SPECIFICATIONS

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099623 GRAFFITI-RESISTANT COATINGS

DIVISION 10 SPECIALTIES

101400 SIGNAGE
101453 TRAFFIC SIGNAGE
104413 FIRE EXTINGUISHER CABINETS
104416 FIRE EXTINGUISHERS

DIVISION 11 EQUIPMENT

110513 MOTORS

DIVISION 12 FURNISHINGS

129300 SITE FURNISHINGS

DIVISION 14 CONVEYING EQUIPMENT

142000 ELEVATORS

DIVISION 21 FIRE SUPPRESSION

210500 BASIC FIRE SUPPRESSION SYSTEM DESIGN-BUILD REQUIREMENTS
210533 HEAT TRACING FOR FIRE SUPPRESSION PIPING
211100 FACILITY FIRE SUPPRESSION WATER SERVICE PIPING

DIVISION 22 PLUMBING

220500 COMMON WORK RESULTS FOR PLUMBING
220519 METERS AND GAGES FOR PLUMBING PIPING
220523 GENERAL DUTY VALVES FOR PLUMBING PIPING
220529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
220533 HEAT TRACING FOR PLUMBING PIPING
220553 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
220700 PLUMBING INSULATION
221113 FACILITY WATER DISTRIBUTION PIPING
221116 DOMESTIC WATER PIPING
221316 SANITARY WASTE AND VENT PIPING
221413 FACILITY STORM DRAINAGE PIPING
223000 PLUMBING EQUIPMENT
224000 PLUMBING FIXTURES

DIVISION 23 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

230500 COMMON WORK RESULTS FOR HVAC

230548 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT
230593 TESTING, ADJUSTING, AND BALANCING FOR HVAC
230800 COMMISSIONING OF HVAC
231100 FACILITY FUEL PIPING
231126 FACILITY LIQUEFIED PETROLEUM GAS PIPING
233113 METAL DUCTS
233300 AIR DUCT ACCESSORIES
233713 DIFFUSERS, REGISTERS, AND GRILLES
238126 SPLIT-SYSTEM AIR CONDITIONERS
238223 UNIT VENTILATORS
238239 UNIT HEATERS

DIVISION 26 ELECTRICAL

260126 MAINTENANCE TESTING OF ELECTRICAL SYSTEMS
260500 COMMON WORK RESULTS FOR ELECTRICAL
260510 ELECTRICAL SITE WORK
260519 LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS
260923 LIGHTING CONTROL DEVICES
261216 DRY-TYPE MED-VOLTAGE TRANSFORMERS
262400 SWITCHBOARDS AND PANELBOARDS
262726 WIRING DEVICES
262816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
262913 ENCLOSED CONTROLLERS
263000 FACILITY ELECTRIC POWER GENERATING AND STORING EQUIPMENT
263300 BATTERY EQUIPMENT
263600 TRANSFER SWITCHES
264313 TRANSIENT VOLTAGE SUPPRESSION FOR LOW VOLTAGE ELECTRICAL
POWER CIRCUITS
265000 LIGHTING

DIVISION 27 COMMUNICATIONS

271000 STRUCTURED CABLING
273000 VOICE COMMUNICATIONS

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

280000 SECURITY GENERAL REQUIREMENTS
280513 CONDUCTORS AND CABLES
280800 CONFIGURATION AND COMMISSIONING OF SECURITY SYSTEMS
281000 ELECTRONIC ACCESS CONTROL SYSTEM
282300 VIDEO SURVEILLANCE SYSTEM
283000 SECURITY CALL SYSTEM
283100 FIRE DETECTION AND ALARM

DIVISION 31 EARTHWORK

310000 EARTHWORK

DIVISION 32 EXTERIOR IMPROVEMENTS

321313 CONCRETE PAVING
321713 PARKING BUMPERS
321723 PAVEMENT MARKINGS
328000 IRRIGATION
329100 PLANTING PREPARATION

DIVISION 33 UTILITIES

331000 WATER UTILITIES
333000 SANITARY SEWERAGE UTILITIES
334000 STORM DRAINAGE UTILITIES
335100 NATURAL GAS DISTRIBUTION
337173 ELECTRICAL UTILITY SERVICES

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies procedures for Developer submittals. Where required by the Specifications, submit descriptive information, which will enable King County METRO to assess whether the Developer's proposed materials, equipment or methods of work are in conformance to the design criteria and in compliance with the Performance Specifications.

1.02 DEFINITIONS

- A. Design Submittals: Include Design Review of the Developer's Construction Design Documents by King County Transit Design & Construction at milestones set forth in the Design Criteria.
- B. Performance Criteria Submittals: Include product data, certificates, shop drawings, design mixes, test data, calculations, design data, operations and maintenance data, schedules of materials, and other information prepared for the Work by the Developer or the Developer's Subcontractor, as set forth in the Performance Specifications ("Submittals").

1.03 QUALITY ASSURANCE

- A. Submittals: The Developer shall review all Submittals for accuracy, completeness, and compliance with the Design Criteria and Performance Specifications prior to furnishing the Submittals to King County Transit Design & Construction for review.
 - 1. The County shall review the submittals and respond in writing with reasonable promptness so as not to unreasonably delay the progress of the Work.
 - 2. The County shall review the Submittals only for conformance with the Design Criteria and Performance Specifications of the Work. Review of Submittals by the County does not relieve the Developer of responsibility for the accuracy of dimensions, quantities or calculations; the performance of materials, systems, or equipment; or construction means, methods, techniques, sequences or procedures.
 - 3. Subsequent to each of King County's 30%, 60%, 90% reviews, the Developer shall not continue the design until King County has received either proof that the review comments have been incorporated, or the Developer has provided sufficient evidence, to the satisfaction of King County, that the comments will be incorporated prior to the next review.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 TRANSMITTAL PROCEDURE

- A. General: A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections for which the submittal is required. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. The Developer is to provide temporary power service, see Divisions 0 & 1.

PART 1 PRODUCTS

1.02 TEMPORARY LIGHTING

- A. Temporary lighting per Washington Industrial Safety and Health Act (WISHA) requirements.

1.03 TEMPORARY DISTRIBUTION

- A. Provide temporary transformers (both utility primary voltage to 480Y/277 volt and 480-208Y/120 volt), distribution panels, panelboards, power outlets, conduit, wire, cables, and boxes as required.

PART 2 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

2.01 MAINTAIN SERVICES

- A. All services to be maintained for duration of the Contract.

2.02 UTILITY COORDINATION

- A. Coordinate the availability of construction power with Puget Sound Energy prior to bid, and provide vaults, and power distribution equipment, raceways, conduit/wire, cable, and "spider" power distribution boxes as required.

END OF SECTION

SECTION 018113

SUSTAINABLE DESIGN REQUIREMENTS

PART 1 GENERAL

1.01 STANDARDS

- A. General: King County has requirements for the use of sustainable building practices and materials which are included as preferences in the Design Criteria and Performance Specifications. Preferences include the selection of materials with high recycled content, which are locally sourced to the extent feasible to reduce the environmental effects of transport, and which have low VOC contents for both interior and exterior use. Materials which are extracted or manufactured within 500 miles of the project are preferred; plants should be sourced within 250 miles. Particularly heavy materials should be sourced within 50 miles.

1.02 REFERENCE DOCUMENTS

- A. King County Ordinance 16147, requiring the use of green building and sustainable development practices in all capital projects that the County plans, designs, constructs, remodels, renovates, and operates or to which the County lends or grants funds enabling construction or executes long-term leases or other legal financial instruments causing the construction of capital projects, as long as certain financial requirements are met; and adding new sections to KCC Chapter 2.95
- B. King County Ordinance 16027, relating to achieving greater energy efficiency as well as reductions in greenhouse gas emissions in capital improvements projects; and adding a new section to KCC chapter 4.16
- C. 2010 King County Energy Plan

PART 2 PRODUCTS

2.01 LOW-EMITTING MATERIALS

- A. For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 1. Wood Glues: 30 g/L.
 2. Metal-to-Metal Adhesives: 30 g/L.
 3. Adhesives for Porous Materials (Except Wood): 50 g/L.
 4. Subfloor Adhesives: 50 g/L.
 5. Plastic Foam Adhesives: 50 g/L.
 6. Carpet Adhesives: 50 g/L.

7. Carpet Pad Adhesives: 50 g/L.
8. VCT and Asphalt Tile Adhesives: 50 g/L.
9. Cove Base Adhesives: 50 g/L.
10. Gypsum Board and Panel Adhesives: 50 g/L.
11. Rubber Floor Adhesives: 60 g/L.
12. Ceramic Tile Adhesives: 65 g/L.
13. Multipurpose Construction Adhesives: 70 g/L.
14. Fiberglass Adhesives: 80 g/L.
15. Contact Adhesive: 80 g/L.
16. Structural Glazing Adhesives: 100 g/L.
17. Wood Flooring Adhesive: 100 g/L.
18. Structural Wood Member Adhesive: 140 g/L.
19. Single-Ply Roof Membrane Adhesive: 250 g/L.
20. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine-covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
21. Top and Trim Adhesive: 250 g/L.
22. Plastic Cement Welding Compounds: 250 g/L.
23. ABS Welding Compounds: 325 g/L.
24. CPVC Welding Compounds: 490 g/L.
25. PVC Welding Compounds: 510 g/L.
26. Adhesive Primer for Plastic: 550 g/L.
27. Sheet-Applied Rubber Lining Adhesive: 850 g/L.
28. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight.
29. Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight.
30. Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight.
31. Other Adhesives: 250 g/L.
32. Architectural Sealants: 250 g/L.
33. Nonmembrane Roof Sealants: 300 g/L.
34. Single-Ply Roof Membrane Sealants: 450 g/L.
35. Other Sealants: 420 g/L.
36. Sealant Primers for Nonporous Substrates: 250 g/L.
37. Sealant Primers for Porous Substrates: 775 g/L.
38. Modified Bituminous Sealant Primers: 500 g/L.
39. Other Sealant Primers: 750 g/L.

B. For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Flat Paints and Coatings: VOC not more than 50 g/L.
2. Nonflat Paints and Coatings: VOC not more than 150 g/L.

3. Dry-Fog Coatings: VOC not more than 400 g/L.
 4. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
 7. Pretreatment Wash Primers: VOC not more than 420 g/L.
 8. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 9. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 10. Floor Coatings: VOC not more than 100 g/L.
 11. Shellacs, Clear: VOC not more than 730 g/L.
 12. Shellacs, Pigmented: VOC not more than 550 g/L.
 13. Stains: VOC not more than 250 g/L.
- C. Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 031700

EMBEDDED ITEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Plates and anchors for embedment into cast-in-place or precast concrete.
 - 2. Embedded supports for architectural items.
- B. Provide embedded plate and anchor fabrications fashioned from structural steel materials for the purpose of structural attachment and restraint of architectural elements.

1.02 REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents.
 - 1. ACI 315 – Details and Detailing of Concrete Reinforcement.
 - 2. AISC – Manual of Steel Construction.
 - 3. ASTM A 36 – Standard Specification for Carbon Structural Steel.
 - 4. ASTM A 53 – Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 5. ASTM A 123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 6. ASTM A 153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 7. ASTM A 167 – Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 8. ASTM A 496 – Standard for Steel, Wire, Deformed, for Concrete Reinforcement.
 - 9. ASTM A 500 – Standard Specifications for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 10. ASTM A 615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

1.03 SUBMITTALS

- A. General: Submit the following:
 - 1. Shop Drawings.
 - 2. Manufacturer Product Data Sheets.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plate: ASTM A 36.
- B. Structural Shapes: ASTM A 36, Grade B; EXCEPT:
 - 1. Hot-rolled Shapes: ASTM A 572, Grade 50.

- C. Structural Tubing: ASTM A 500, Grade B.
- D. Pipe: ASTM A 53, Type E or S, Grade B.
- E. Stainless Steel Plate, Sheet and Strip: ASTM A 167; Grade 316.
- F. Reinforcing Bars: ASTM A 615, Grade 60.
- G. Wire: Sixteen (16) gage or heavier; black annealed finish; provide materials conforming to ASTM A 82; and ASTM A 496.

2.02 ACCESSORIES

- A. Provide hot dip galvanized hardware in conformance with ASTM A 153 where hot dip galvanized hardware is indicated.
- B. Headed Welded Studs:
 - 1. Provide headed anchors, and shear connector studs.
 - 2. Characteristics:
 - a. ASTM A 108, Grades C1015 or C1020; forged steel.
 - b. Approved and listed with ICBO.
 - c. Welded to structural steel in accordance with AWS standards.
 - 3. Provide one of the following:
 - a. Tru-Weld; ICBO #37341.
 - b. Nelson; ICBO #2614.
 - c. Stud Welding Associates; ICBO #4601.
- C. Positioner Devices:
 - 1. Materials: Steel wire; precast concrete; and plastic are acceptable.
 - a. Steel wire bar supports shall be used against formwork, and shall be in accordance with CRSI Manual of Standard Practice for Class 2 – Moderate Exposure; Type B.
 - b. Precast concrete bar supports shall be used against ground surfaces.
 - c. Plastic concrete bar supports are acceptable when used in accordance with manufacturer directions and as indicated.
 - 2. Provide side-form spacers where appropriate to maintain side cover.
- D. Shims:
 - 1. Provide shims of non-tempered steel for purposes of stabilizing structural supports.
 - 2. Finish: Hot dip galvanized in accordance with provisions of this Section.

2.03 MIXES

- A. Precision Non-Shrink Grouting:
 - 1. Characteristics:
 - a. Performance: In accordance with ASTM C 1107.
 - b. Hydraulic cement-based; for precision grouting; high early strength.
 - c. Mixing water per fifty-five (55) pound bag: Per manufacturer directions, but not more than one and three tenths (1.3) gallons.

2. Provide one of the following products:
 - a. Degussa/Master Builders. (800) 433-9517 – 'Master Flow 928'
 - b. Fox Industries. (888) 760-0369 - 'FX-228'.
 - c. CTS Cement Manufacturing Corporation. (800) 929-3030 - 'Rapid-Set Cement AU'.

2.04 FABRICATION

- A. Headed Welded Studs:
 1. Comply with applicable ICBO evaluation criteria.
- B. Reinforcing Bars for Work of this Section:
 1. Reinforcing bars shall be shop-fabricated.
 2. Conform to typical bar bends, and end hooks indicated in the CRSI Manual of Standard Practice.
 - a. Bends and hooks shall be formed cold.

2.05 FINISHES

- A. Work of this Section shall be hot-dip galvanized finish in accordance with ASTM A 123, and these requirements.
 1. Provide coating thickness grade 75 or higher; and not less than 1.75 ounces per square foot when measured in accordance with the sampling plane methodology (6.3 or as modified) described in ASTM A 123.
 2. Surface Preparation:
 - a. Hot Dip Galvanizing: Use the following methods, together, alone or in combinations in accordance with SSPC SP-COM:
 - i. SSPC-SP 2 – Hand Tool Cleaning.
 - ii. SSPC-SP 3 – Power Tool Cleaning.
 - iii. Conventional solvent and chemical cleaning processes conducted by the hot dip galvanizer.
- B. Cold-Galvanizing Repair Paint:
 1. Use: For repair of coating removed and or damaged during installation and field welding.
 2. System Dry Film Thickness (DFT): Three (3) mils.
 - a. Application DFT thickness shall be within manufacturer's indicated maximum and minimum values for system DFT.
 3. Provide one of the following:
 - a. Nu-Wave Solutions – 'Galv Match Plus.'
 - b. ZRC Worldwide – 'Cold Galvanizing Compound'.
 - c. Alvin Products. (978) 423-7681 - 'Galvax'.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

END OF SECTION

SECTION 032100

REINFORCING STEEL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Reinforcing steel for cast-in-place or precast concrete.

1.02 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents.
 - 1. ACI 315 – Details and Detailing of Concrete Reinforcement.
 - 2. ASTM A 496 – Standard for Steel, Wire, Deformed, for Concrete Reinforcement.
 - 3. ASTM A 615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

1.04 SYSTEM DESCRIPTION

- A. Provide embedded plate and anchor fabrications fashioned from structural steel materials for the purpose of structural attachment and restraint of architectural elements.

1.05 SUBMITTALS

- A. General: Submit the following:
 - 1. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - 2. Material Certificates: For each of the following, signed by manufacturers
 - i. Steel reinforcement and accessories.

1.06 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all products shall meet the relevant VOC/emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 MATERIALS

- A. Provide steel with high recycled content of at least 40%.
- B. Reinforcing Bars: ASTM A 615, Grade 60. Coordinate with the requirements of the Design Criteria and Division 03 Section "Cast in Place Concrete."
- C. Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length
- D. Wire: Sixteen (16) gage or heavier; black annealed finish; provide materials conforming to ASTM A 82; and ASTM A 496.
- E. Epoxy-Coated Wire ASTM A 884, Class A, Type 1 coated, steel wire, with less than 2 percent damaged coating in each 12-inch wire length.
- F. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- G. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A coated, Type 1, steel.

2.03 ACCESSORIES

- A. Headed Welded Studs:
 - 1. Provide headed anchors, and shear connector studs.
 - 2. Characteristics:
 - i. ASTM A 108, Grades C1015 or C1020; forged steel.
 - ii. Approved and listed with ICBO.
 - iii. Welded to structural steel in accordance with AWS standards.
 - 3. Provide one of the following:
 - i. Tru-Weld; ICBO #37341.

- ii. Nelson; ICBO #2614.
 - iii. Stud Welding Associates; ICBO #4601.
- B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.
- C. Positioner Devices:
- 1. Materials: Steel wire; precast concrete; and plastic are acceptable.
 - i. Steel wire bar supports shall be used against formwork, and shall be in accordance with CRSI Manual of Standard Practice for Class 2 – Moderate Exposure; Type B.
 - ii. Precast concrete bar supports shall be used against ground surfaces.
 - iii. Plastic concrete bar supports are acceptable when used in accordance with manufacturer directions and as indicated.
 - iv. Provide side-form spacers where appropriate to maintain side cover.

2.04 FABRICATION

- A. Headed Welded Studs:
- 1. Comply with applicable ICBO evaluation criteria.
- B. Reinforcing Bars for Work of this Section:
- 1. Reinforcing bars shall be shop-fabricated.
 - a. Conform to typical bar bends, and end hooks indicated in the CRSI Manual of Standard Practice.
 - i. Bends and hooks shall be formed cold.

PART 3 EXECUTION

3.01 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- 1. Weld reinforcing bars according to AWS D1.4 where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh

spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.02 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Developer will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.02 DEFINITIONS

- A. Cementitious Materials: Portland cement alone, or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix.
- C. The submitted mix designs shall include the following:
 - 1. Supporting test data not more than 12 months old
 - 2. Statistical analysis in compliance with ACI 301.
 - 3. Gradation of fine and coarse aggregates not more than 90 days old (ASTM C 33). Proportions of all ingredients, including all admixtures added either at time of batching or at job site. Aggregate weights shall be based upon saturated surface dry conditions.
 - 4. Water/cement ratio.
 - 5. Slump (ASTM C 143): When high range water-reducing admixtures are used, slump before and after addition of admixture is required.
 - 6. Air content of freshly mixed concrete (ASTM C 231).
 - 7. Strength is measured at 7 and 28 days. Strengths shall be as tested using 4" x 8" cylinders in accordance with ASTM C 31 and ASTM C 39.
 - 8. Certification that all ingredients in each mix design are compatible.
 - 9. Locations or intended use of each mix design.
 - 10. Source of all materials.
- D. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement."

Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement.

- E. Concrete Forming Drawings: Drawings indicating the in-place cast shape, size, and location of formed concrete surfaces.
- F. Embedded Item Placement Drawings: Drawings indicating the location and type of plates, anchorages, or other items to be embedded in the finished concrete surfaces.
- G. Material Certificates: certifying that each of the following items complies with requirements:
 - 1. Paints and Coatings: GS-11 Green Seal Standard for Paints and Coatings.
 - 2. Forest Stewardship Council (FSC) GS-36 Green Seal Standards for Adhesives.
 - 3. Cementitious materials and aggregates. Include mill certificates for cement.
 - 4. Form materials and form-release agents.
 - 5. Steel reinforcement and reinforcement accessories. For ASTM A 706 reinforcing, include results of physical and chemical analysis.
 - 6. Fiber reinforcement.
 - 7. Admixtures.
 - 8. Waterstops.
 - 9. Curing materials.
 - 10. Floor and slab treatments.
 - 11. Bonding agents.
 - 12. Adhesives.
 - 13. Vapor retarders.
 - 14. Epoxy joint filler.
 - 15. Joint filler strips.
 - 16. Repair materials.
- H. ICC Reports: For each of the following items:
 - 1. Mechanical splice couplers.
- I. Refer to Section 011813 Sustainable Building Requirements for additional requirements.

1.05 QUALITY ASSURANCE

- A. Installer Requirements: Installer shall be experienced with elevated concrete installation.
- B. Testing and Inspection: Testing and inspection shall be provided. Specific concrete inspection requirements are outlined in Paragraph 3.17 of this section.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

- E. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - F. CRSI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. Manual of Standard Practice.
 - 2. Documents 63 and 65.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Store materials in accordance with ACI 301. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used.
 - B. Deliver, store, and handle steel reinforcement to prevent bending and damage.
 - C. Store formwork above ground on framework or blocking in a ventilated or protected area to prevent deterioration from water and damage.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all products shall meet the relevant VOC/emissions criteria. King County Transit prefer that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 FORM-FACING MATERIALS

- A. King County prefers the use of FSC Certified Wood and Materials.
- B. Plywood Forms for Exposed Concrete: APA high density overlaid plyform Class I and Class II (Burke "Neotex," Georgia-Pacific "Fiber Ply," or approved equal). Use nonstaining oil guaranteed not to affect subsequent finish treatment.
- C. Steel Forms for Exposed Concrete: Preformed steel forms, minimum 16-gage, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- D. Rough-Formed Finished Concrete: Provide lumber dressed on at least two edges and one side for tight fit.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4-inch by 3/4-inch, minimum.
 - 1. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
 - 2. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 - G. Form Ties: Factory-fabricated, removable or snap-off metal or glass fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1-inch to the plane of the exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes not larger than 1-inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- 2.03 STEEL REINFORCEMENT
- A. Comply with requirements of Division 03 Section Reinforcing Steel.
- 2.04 REINFORCEMENT ACCESSORIES
- A. Comply with requirements of Division 03 Section Reinforcing Steel.
- 2.05 CONCRETE MATERIALS
- A. Portland Cement: No mixing of brands or types. Types are as follows:
 - 1. Portland Cement: ASTM C 150, Type I. Supplemental cementitious materials: Fly ash or slag may be used for 20% to 30% of cement by weight.
 - B. Fly Ash: ASTM C 618, Class F, from a single source for the entire project. King County Metro prefers that Fly Ash be used as an admixture only in non-structural elements and paving.
 - C. Normal Weight Aggregate: ASTM C 33, uniformly graded and as follows:
 - 1. Class: Moderate weathering region, but not less than 3M.
 - 2. Unless maximum aggregate size is listed specifically under "Project Mix Requirements," the maximum aggregate size shall not exceed:
 - a. Three-fourths of the minimum clear spacing between reinforcing bars.
 - b. One-fifth of the narrowest dimension between the sides of the forms.
 - c. One-third of the thickness of the slabs or toppings.
 - D. Water: Potable and complying with ASTM C 94.
- 2.06 ADMIXTURES
- A. General
 - 1. Admixtures certified by manufacturer to contain not more than 0.05 percent water-soluble chloride ions by mass of cementitious material. Do not use admixtures containing calcium chloride or thiocyanate.

2. Where more than one admixture is used in the mix, furnish manufacturer's certification to the Project Representative that the admixtures to be used are compatible in combination with the cement and aggregates.
 3. Accelerating admixtures shall be used only as approved by King County.
 4. Provide admixtures from one of the suppliers listed below or approved equal.
 5. Concrete slab at the top level shall have a waterproofing additive.
 6. Rheobuild 1000; Master Builders.
 7. ADVA 100; W.R. Grace.
 8. Eucon 37; Euclid Chemical Company.
- B. Air-Entraining Admixture: ASTM C 260.
1. Micro-Air; Master Builders.
 2. Davavair 1000; W.R. Grace.
 3. Air Mix; Euclid Chemical Company.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
1. Low-Range Water-Reducing Admixture
 2. Pozzolith 200-N; Master Builders.
 3. WRDA G4; W.R. Grace.
 4. Eucon WR; Euclid Chemical Company.
- D. Mid-Range Water-Reducing Admixture
1. Polyheed; Master Builders.
 2. Mira 20; W.R. Grace.
 3. Eucon MR; Euclid Chemical Company.
- E. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- F. Waterproofing Admixtures: Concrete at the top level and all other concrete directly exposed to rain shall be waterproofed by the addition of Everdure "Callite" or equivalent product.
1. Performance Requirements: Waterproof concrete to comply with the following:
 - a. British Standard (BS) 1881-122, "Testing Concrete Methods for Determination of Water Absorption:"Corrected 30-minute water absorption not greater than 1.0 percent at test age of 7 days.
 - b. Manufacturer Qualifications: Manufacturer and products to have demonstrated experience on projects of similar size and complexity.
 - c. Performance Warranty: Provide warranty to repair water leakage through industry accepted and approved means for a period of 10 years after complete installation.
 2. Areas requiring waterproof concrete.
 - a. The entire Roof slab.
 - b. Any slab or ramp that is exposed to weather.
- G. Corrosion Inhibiting Admixture: ASTM Classification C 494 Type C
1. Eucon BCN by Euclid Chemical Co,

2. DCI by Grace Construction Products
3. DCIS by Grace Construction Products
4. Conplast DN by Fosroc

2.07 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513 for embedding in concrete to prevent passage of fluids through joints. Factory-fabricate corners, intersections, and directional changes.
 1. Profile: Flat, dumbbell without center bulb.
 2. Profile: Ribbed without center bulb.
- B. Flexible PVC Waterstops: CE CRD-C 572 for embedding in concrete to prevent passage of fluids through joints. Factory-fabricate corners, intersections, and directional changes.
 1. Profile: Flat, dumbbell without center bulb.
 2. Profile: Ribbed without center bulb.
- C. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.

2.08 VAPOR RETARDERS

- A. Vapor Retarder: ASTM E 1745, Class C, of one of the following materials; or polyethylene sheet, ASTM D 4397, not less than 10 mils thick:
 1. Nonwoven, polyester-reinforced, polyethylene-coated sheet, 10 mils (0.25-millimeter) thick.

2.09 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 ounces/square yard dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap polyethylene sheet.
- D. Water: Potable.
- E. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.10 RELATED MATERIALS

- A. Premolded Joint Filler: Neoprene closed cell bonded (ASTM D 1752-1), with a compression deflection of 50 percent for a pressure range of 50 to 150 psi. Use in all premolded joint filler applications

- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Types I and II, nonload-bearing for bonding hardened or freshly mixed concrete to hardened concrete.
 - 2. Types IV and V, load-bearing for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Reglets: Fabricate reglets of not less than 0.0217-inch thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

- A. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4-inch.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4-inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5,700 psi at 28 days when tested according to ASTM C 109.

2.12 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases as follows:
 - 1. Proportion normal weight concrete according to ACI 211.1 and ACI 301.
 - 2. Proportion lightweight structural concrete according to ACI 211.2 and ACI 301.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- C. Concrete mix design shall comply with the requirements of the design criteria.
- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
- E. Shrinkage: Limit concrete shrinkage of post-tensioned beams and slabs to 0.00035 inches per inch. Concrete shrinkage to be tested according to the Quality Control article of this section.

- F. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6 percent, plus or minus 1 1/2 percent, unless otherwise indicated.
- G. Limit water soluble, chloride ion content in hardened concrete to the following percentages by weight of cement:
 - 1. 0.06 percent for post-tensioned concrete.
 - 2. 0.15 percent for all other concrete.
- H. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture or high range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for parking structure slabs, concrete required to be watertight, and concrete with a water cementitious materials ratio below 0.45.
 - 4. Use water-proofing admixture at weather-exposed decks of parking garage.
 - 5. See Section 2.06 for additional admixtures and information.
- I. Maximum permissible water/cementitious materials ratio for all columns, beams, structural slabs, etc. shall be 0.45.

2.13 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- B. Fabricate in accordance with ACI 315, providing concrete cover as specified or indicated.
- C. Bending and straightening in accordance with ACI 318, Chapter 7. No bending or straightening of reinforcement will be permitted after partial embedment in concrete.
- D. Welding and tacking of reinforcing bars is not permitted, unless specifically shown on the structural drawings. When welding of reinforcement is indicated and required, provide welds in accordance with AWS D1.4.
- E. Splicing
 - 1. Reinforcing bars shall be lap spliced for tension.
 - 2. At the Developer's option, mechanical splicing may be used, provided that the mechanical splices develop the same values of strength provided by the full penetration butt welds. Threaded splices shall be capable of developing in tension at least 125 percent of the specified yield strength (F_y) of the bar.
 - 3. Welding or tack welding of reinforcing bars to other bars or to plates, angles, etc., is prohibited.

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1 1/2 hours to 75 minutes. When air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
 - 2. Batch Tickets: Include the amount of water in the batch from the plant and the remaining water that may be added at the site, if any.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated within the tolerance limits of ACI 117.
- C. Construct forms for "Standard" concrete surfaces to meet Class C surface per ACI 117.
- D. Construct forms for architectural concrete surfaces to meet Class A surface with additional requirement that a 10-foot template be used to measure irregularities.
- E. At architectural concrete surfaces, vertically stagger formboards at midpoint of sheet. Use full sheets to the extent possible.
- F. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8-inch.
 - 2. Class B, 1/4-inch.
 - 3. Class C, 1/2-inch.
 - 4. Class D, 1-inch.
- G. Chamfer exterior corners and edges of permanently exposed concrete (3/4-inch minimum).
- H. Form openings, chases, offsets, shrinkages, keyways, reglets, blocking, screeds, and bulkheads required in the work. Coat contact surfaces of forms with form release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

3.03 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, foundations, and similar parts of the work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements; that supports weight of concrete in place until concrete has achieved the following:
 - 1. Minimum 7 days and at least 75 percent of 28-day whichever is longer.
 - 2. Post-Tensioned Construction: Do not strip formwork supporting cantilever slabs or edge beams until backshores have been placed.
- C. Remove formwork progressively so no unbalanced loading is imposed on structure.
- D. Clean and repair surfaces of forms to be reused in the work.

3.04 SHORES AND SUPPORTS

- A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.
- B. Keep reshores or backshores in place a minimum of 15 days after placing upper tier, or longer, if required, until concrete has attained its required 28-day strength and heavy loads due to construction

3.05 VAPOR RETARDERS

- A. Vapor Retarder: Place, protect, and repair vapor retarder sheets according to ASTM E 1643 and manufacturer's written instructions.

3.06 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Epoxy Coated Reinforcement
 - 1. Special care required during delivery, storage, placement, inspection and concrete placing to protect epoxy coating from damage. Repair damaged epoxy coating where required.

3.07 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 4. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 6. Provide roughened surfaces at joints where shown on the drawings. Roughen to a full amplitude of approximately 1/4-inch.
- C. Contraction Joints in Slabs-on-Grade: Form weakened plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8-inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.08 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints according to manufacturer's written instructions, bonding or mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.09 CONCRETE PLACEMENT

- A. Before placing concrete, water may be added at project site, only up to the amount listed on the batch ticket, subject to limitations of ACI 301.

1. Do not add water to concrete after high range, water-reducing admixtures have been added to mix at the project site.
- B. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. Deposit concrete to avoid segregation.
- C. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic to avoid cold joints.
1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items, and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screenshot slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 degrees F , uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- F. Hot Weather Placement: Place concrete according to recommendations in ACI 305R and, as follows, when hot weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8-inch in height. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified. Apply to concrete surfaces not exposed to view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel and Fine Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. Immediately after second troweling and when concrete is still plastic, slightly scarify surface with a fine broom.
- C. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, parking garage floors, and ramps.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber bristle broom perpendicular to main traffic route.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.13 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying, and excessive cold or hot temperatures. Comply with ACI 306.1 for cold weather protection and with recommendations in ACI 305R for hot weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 pounds/square foot x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water-saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than 7 days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least 3 months. Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints. Leave contact faces of joint clean and dry.
- C. Install semirigid epoxy joint filler full depth in saw cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.
- D. Refer to Section 079000 Joint Protection for additional requirements.

3.15 CONCRETE SURFACE REPAIRS (PATCHING)

- A. Defective Concrete: Repair and patch defective areas. Remove and replace concrete that cannot be repaired and patched.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2 1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2-inch in any dimension in solid concrete. Remove concrete to not less than 1-inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness. Use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch wide, or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to

manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts, and expose steel reinforcement, with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

3.16 CONCRETE REPAIR (STRUCTURAL)

- A. This includes the materials, testing and workmanship to structurally repair cracks in new concrete. Epoxy resin adhesive shall be used in an injection mode to effect the repairs.
- B. Cracks larger than 0.01-inch and which extend through the full depth of the slab or wall, or are subject to allowing water leakage through the crack, shall be repaired by epoxy injection.
- C. Provide the following quality control tests for every lot of adhesive supplied:
 1. Certification and Test Report: Manufacturer shall certify that every batch of material meets test requirements and shall furnish test reports.

3.17 QUALITY CONTROL

- A. This section specifies the minimum testing and inspection required. Additional testing and inspection may be required by the Testing Agency. The County, at its discretion, may engage its own Testing Agency to perform additional tests, over and above what is required of the Contractor. Contractor shall provide all necessary access and accommodation to allow County engaged Testing Agency to conduct any and all tests as requested by the County.
- B. Testing Agency: The contractor shall engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement.
- C. Testing Agency/Special Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Independent Testing Agency shall check batch tickets for compliance with required mix design(s).

- E. Continuous Field Inspection: The Independent Testing Agency shall be present at all times during the placing of structural reinforced concrete. Work shall not proceed until all inspections are completed. Prior to placing concrete, the Inspector shall inspect:
1. Accuracy, configuration, and cleanliness of all formwork
 2. Quantity, cleanliness, and placement of all reinforcing steel.
- F. Reinforcing Steel Testing: Independent Testing Agency will perform the following:
1. All steel bars that can be positively identified as to heat number and mill analysis shall have one tensile test bending test for each 10 tons, or fraction thereof, for all #5 bars and larger.
 2. All steel bars that cannot be identified shall have one tensile and one bend test made for each 2 1/2 tons, or fraction thereof, of each size and kind of reinforcing steel.
 3. Testing procedure shall conform to ASTM A 615.
 4. Testing Agency need not be present during entire reinforcing steel placing operations, provided he has inspected for conformance with the approved placement drawings prior to closing of forms or the delivery of concrete to the job site.
- G. Reinforcement Welding: All shop and field welds of reinforcing steel will be inspected. The Special Welding Inspector will check the materials and equipment, the qualifications and ability of the welder, and details of construction and procedure, as well as the welds themselves. The Inspector may use gamma ray, magneflux, trepanning, ultrasonics, or any other aid to visual inspection which the Inspector may deem necessary to determine the adequacy of the welding.
- H. No concrete shall be placed until placement of reinforcement steel has been inspected and approved.
- I. Concrete Sampling: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cubic yards, but less than 25 cubic yards, plus one set for each additional 50 cubic yards or fraction thereof.
 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal weight concrete; and ASTM C 173, volumetric method, for structural lightweight concrete. One test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of standard cylinder specimens for each composite sample as follows:
 - a. Four cylinders for concrete with $f_c \leq 5,000$ psi.
 - b. Six cylinders for concrete with $f_c \geq 5,000$ psi.

6. **Compressive Strength Testing of Cylinders:** Cylinders shall be tested in accordance with ASTM C 31. The testing of cylinders for each mix tested shall be as follows:

Age at Test (days)	NUMBER OF CYLINDERS TESTED		
	Post-Tensioned Concrete	Nonpost-Tensioned Concrete ($f'_c \leq 5,000$ psi)	Nonpost-Tensioned Concrete ($f'_c \geq 5,000$ psi)
3	1	0	0
7	1	1	1
28	1	2	2
56	2	0	2

7. Strength level of an individual class of concrete for laboratory-cured specimens shall be considered satisfactory if both of the following requirements are met:
- Average of all sets of three consecutive strength tests equals or exceeds the specified compressive strength.
 - No individual strength test (average of two cylinders) falls below the specified compressive strength by more than 500 psi.
 - Report exact mix tested, minimum size aggregate, location of pour in the work, cylinder identification, date of receipt of cylinder in laboratory, cement brand and type, and admixtures used).
 - Field-cured cylinders for determining post-tension stressing or form removal time or when a structure may be put in service shall be made in numbers directed to check the adequacy of curing and protection of concrete in the structure. The specimens shall be removed from the molds at the age of 24 hours, and shall be cured and protected, insofar as practicable, in the same manner as that given to the portion of the structure the samples represent. All field-cured cylinders are taken and tested at the Contractor's expense.
- J. **Linear Shrinkage Tests:** Test for linear shrinkage in accordance with ASTM C 157 (air storage method for 28 days). Take a minimum of 3 test samples from each mix at the Project Representative's direction of concrete for elevated slabs and beams. Take samples at truck and discharge end of pumped mix. Consistency of the concrete must not be altered after test samples have been taken.
- K. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- L. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.
- M. Reports of compressive strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in work, design compressive strength at 28 days, concrete mix

proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- N. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air-entrainment, compressive strengths, or other requirements have not been met. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42.

3.18 WASTE MANAGEMENT

- A. Separate cardboard and paper packaging, pallet materials, and metals used in shipping materials related to cast-in-place concrete for later disposal and recycling at firms listed in the King County "Construction Recycling Directory", latest edition.

END OF SECTION

SECTION 033800

POST-TENSIONED CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. This section specified post-tensioned concrete, including tendons, encapsulation systems, anchorages, and placement procedures.

1.02 SUBMITTALS

- A. Product Data: Indicate specifications, sizes, and materials used for the following:
 - 1. Strand.
 - 2. Anchorages.
 - 3. Sheathing.
 - 4. Grout.
 - 5. Encapsulation.
 - 6. Accessories.
 - 7. Repair tape.
- B. Shop Drawings.
- C. Calculations.
- D. Grout.
- E. Submit project record drawings (as-builts) at the conclusion of the project. Record locations of tendons, accurate to within 1-inch, stressing sequence, tension loads established, and elongation of tendon.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all products shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 POST-TENSIONING MATERIALS

- A. Post-tensioning systems shall comply with the PTI Specifications.
- B. Tendons shall meet the following additional requirements:
 - 1. ASTM A 416, Grade 270, low relaxation, stranded steel cable; ultimate tensile stress of 270 ksi, unbonded system.
- C. Encapsulated Systems
 - 1. The "Zero Void" system by General Technologies, Inc., is an acceptable encapsulated system.
 - 2. The "Hayes Corrosion Protection System," by Hayes Industries, Inc., is an acceptable encapsulated system.
 - 3. The "Corrosion Protection System (CPS)" by General Technologies, Inc., is an acceptable encapsulated system.
- D. Anchorages
 - 1. Anchoring devices shall be of such nature that wires will not kink, break down, or otherwise be damaged.
 - 2. Anchorage devices shall hold the prestressing strand without slip of more than 1/8-inch at a load equal to the applied load on the wire at prestressing.
 - 3. Distribution Plates: Welded steel or cast steel-bearing assemblies that will permanently support and distribute the load from the anchoring devices, and shall develop at least 95 percent of the minimum specified ultimate strength of the prestressing steel without exceeding anticipated set.
 - a. Bearing stress in the concrete shall not exceed that permitted by Equation 26-1 of ACI 318.
 - b. Bending stresses in the plates shall not exceed 20,000 psi for structural steel and 15,000 psi for cast steel, except as experimental data may indicate that higher stresses are satisfactory. For higher strength steel, corresponding stresses may be permitted.
 - c. Materials shall meet requirements of ASTM A 36 for structural shapes or ASTM A 148 for cast steel or higher quality materials as required to meet stress requirements.
 - d. Design and fabrication shall meet the latest AISC Standards—Welding - AWS Standards, including Qualification Test of Welders.
 - e. Distribution plates may be omitted if the bearing area of any anchoring device is sufficiently large so that the local concentrated bearing compressive stresses do not exceed the stresses permitted above or cause local failure.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 FABRICATION

- A. Protect all prestressing strand from rust or other corrosion prior to placement. Provide sufficient protection for exposed prestressing strand at the ends of the members to prevent deterioration by corrosion.

3.02 INSTALLATION

- A. Install post-tensioning tendons in accordance with the PTI Specification for Unbonded Single Strand Tendons.
- B. Tolerances on installation of post-tensioning tendons shall be in accordance with ACI 117.

3.03 STRESSING

- A. Compressive strength shall be a minimum of 3,000 psi for application of prestressed force.
- B. Stress the post-tensioning tendons using hydraulic jacks with calibrated pressure gages to permit the stress in the prestressing steel to be computed any time. A calibration chart shall accompany each jack.
- C. Measure and record elongation of the prestressing strand to the nearest 1/8-inch and compare with predicted elongations.
- D. Do not exceed 80 percent of the specified minimum ultimate tensile strength of the prestressing steel. Anchor the prestressing steel at stresses (initial stress) that result in effective forces not less than those shown on the contract drawings. In no case shall the initial stress at the anchorage exceed 70 percent of the specified minimum ultimate tensile strength of the prestressing strand.

3.04 SEQUENCING

- A. The Contractor shall provide complete stressing records. Provide reports on stressing of each tendon in a format which is acceptable to the Building Official and the Inspector. Stressing records shall include the following for each tendon.
 - 1. Calculated elongation based upon elastic modulus and cross-sectional area of tendons used.
 - 2. Actual field elongation of each tendon.
 - 3. Calculated gage pressure and jacking force applied to each tendon.
 - 4. Actual gage pressures and jacking forces applied at each tendon.
 - 5. Required concrete strength at time of jacking.
 - 6. Actual concrete strength at time of jacking.
 - 7. Range of allowable elongations for jacking force.
- B. Submit copies of actual field records.

3.05 INSPECTION AND MONITORING

- A. Special inspection will be conducted by an Independent Testing Agency.
- B. Independent Testing Agency will perform the following:
 - 1. Ensure that procedures for the handling and storage of tendons do not result in damage to tendons.
 - 2. Inspector need not be present during the post-tensioning installation, provided he has inspected for conformance with the approved placement and shop drawings prior to closing of forms or the delivery of concrete to the job site. This inspection shall include tendon profiles, plan locations and clearances, and integrity of sheathing and encapsulation systems.
 - 3. During concrete placement, ensure that tendons are not disturbed from their specified profile and location.
 - 4. Monitor stressing operations, including cutting of tendon tails and grouting of anchor pockets. Submitted report shall be in a format acceptable to the Building Official and the Engineer. At a minimum, record for each tendon:
 - a. Calculated elongation from approved placement drawings, including allowable range.
 - b. Actual field elongation.
 - 5. Report shall also include:
 - a. Calibration gage pressure and jack up force for each jack used in stressing.
 - b. Required and actual concrete strength at time of stressing.

END OF SECTION

SECTION 034100

PRECAST STRUCTURAL CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Precast structural concrete.
 - 2. Precast structural concrete with commercial architectural finish.

1.02 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Precast structural concrete units and connections shall withstand design loads per IBC.
- B. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318.
 - 1. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of 0 to plus 100 deg F.
- C. Fire-Resistance Rating: Select material and minimum thicknesses to provide per City of Kirkland Municipal Code.
- D. Vehicular Impact Loads: Design spandrel beams acting as vehicular barriers for passenger cars to resist a single 6000-lbf (26.7-kN) service load and 10,000-lbf (44.5-kN) ultimate load applied horizontally in any direction to the spandrel beam, with anchorages or attachments capable of transferring this load to the structure. Design spandrel beams assuming the load to act at a height of 18 inches (460 mm) above the floor or ramp surface on an area not to exceed 1 sq. ft. (0.93 sq. m).

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

- C. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Installer fabricator testing agency Qualification Data.
- F. Welding certificates.
- G. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Reinforcing materials and prestressing tendons.
 - 3. Admixtures.
 - 4. Bearing pads.
 - 5. Structural-steel shapes and hollow structural sections.
 - 6. Brick units and accessories.
 - 7. Stone anchors and accessories.
- H. Material Test Reports: For aggregates.
- I. Source quality-control reports.
- J. Field quality-control and special inspection reports.
- K. Refer to Section 018113 Sustainable Building Requirements for additional requirements.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 - 1. Participates in PCI's Plant Certification program and is designated a PCI-certified plant as follows:
 - a. Group C, [Category C4 - Prestressed Deflected Strand Structural Members.
- B. Installer Qualifications:
 - 1. A precast concrete installer with a minimum of 2 years of experience who has completed structural precast concrete work similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance and who meets the following requirements:
 - a. Retains a PCI Certified Field Auditor, at erector's expense, to conduct a field audit of a project installed by erector in Category S2 - Complex Structural Systems prior to start of erection. Submits Erectors Post Audit Declaration

according to "PCI Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products" MNL 127.

- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- F. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."

PART 2 PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all products shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.
- B. MOLD MATERIALS
 - 1. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - 2. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- C. Form Liners: Units of face design, texture, arrangement, and configuration. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- D. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed. Provide reinforcing bars with minimum 50% recycled content.

- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Provide Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length. In lieu of epoxy coated rebar contractor may utilize a concrete mix for all slabs, beams, and horizontal members, containing manufacturer's recommended amounts of a corrosion inhibiting admixture approved by King County. such as calcium nitrite, Eucon BCN by Euclid Chemical Co, DCI or DCIS by Grace Construction Products, Conplast DN by Fosroc."

2.03 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A 886/A 886M, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand.
- B. Unbounded Post-Tensioning Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand.
 - 1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.6 and sheath with polypropylene tendon sheathing complying with ACI 423.6. Include anchorage devices and coupler assemblies.
- C. Post-Tensioning Bars: ASTM A 722, uncoated high-strength steel bar.

2.04 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - 2. Metakaolin Admixture: ASTM C 618, Class N.
 - 3. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
 - 4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 4S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate unless otherwise approved by Architect.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M.
 8. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.05 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- D. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
- E. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
- F. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.
- G. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
- H. Welding Electrodes: Comply with AWS standards.
- I. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.06 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.
- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.07 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 2. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Release strength as required by design.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.
- F. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft. (1842 kg/cu. m), plus or minus 3 lb/cu. ft. (48 kg/cu. m), according to ASTM C 567.

- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- I. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.08 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and defensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
 - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
- B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - 1. Form joints are not permitted on faces exposed to view in the finished work.
 - 2. Edge and Corner Treatment: Uniformly chamfered.

2.09 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware:
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
- C. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
- D. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- E. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- F. Comply with PCI MNL 116 procedures for hot-weather concrete placement.
- G. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture.

2.10 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

2.11 COMMERCIAL FINISHES

- A. Grade B Finish: Fill air pockets and holes larger than 1/4 inch (6 mm) in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch (3 mm) in width that occur more than once per 2 sq. in. (1300 sq. mm). Grind smooth form offsets or fins larger than 1/8 inch (3 mm). Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.
- B. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
- C. Apply roughened surface finish according to ACI 318 (ACI 318M) to precast concrete units that will receive concrete topping after installation.

2.12 COMMERCIAL ARCHITECTURAL FINISHES

- A. Manufacture member faces free of joint marks, grain, and other obvious defects with corners, including false joints, uniform, straight, and sharp. Finish exposed-face surfaces of precast concrete units to match approved.
 - 1. Smooth-Surface Finish: Provide surfaces free of excessive air voids, sand streaks, and honeycombs, with uniform color and texture.

2.13 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.
- B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements.
- C. Strength of precast structural concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
 - 1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 4. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 - 1. Do not permit connections to disrupt continuity of roof flashing.
- D. Field cutting of precast units is not permitted without approval of the Architect.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units without approval of the Engineer of Record..
- F. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 - 2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- (0.1-mm-) thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
 - 3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
 - 4. Remove, reweld, or repair incomplete and defective welds.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
- H. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.
 - 1. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
 - 2. Fill joints completely without seepage to other surfaces.
 - 3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
 - 4. Place grout end cap or dam in voids at ends of hollow-core slabs.
 - 5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

6. Keep grouted joints damp for not less than 24 hours after initial set.

3.02 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

3.03 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified independent testing and inspection agency to perform field tests and inspections.
- B. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
- C. Testing agency will report test results promptly and in writing to Contractor.
- D. Prepare test and inspection reports.

3.04 REPAIRS

- A. Repairs will be permitted providing structural adequacy, serviceability, durability, and appearance of units has not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

3.05 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION

SECTION 034123

PRECAST CONCRETE STAIRS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Precast concrete stair treads and landings.

1.02 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM A 615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 2. ASTM C 33 – Standard Specification for Concrete Aggregates.
 - 3. ASTM C 150 – Standard Specification for Portland Cement.
 - 4. ASTM C 1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - 5. PCI – MNL 117 – Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
 - 6. PCI – Architectural Precast Concrete Design Manual.

1.04 QUALITY ASSURANCE

- A. Work of this Section shall be in conformance with the requirements, standards, procedures, and levels of quality identified in PCI's Architectural Precast Concrete Design Manual.
- B. Manufacturers of products under this Section shall be in compliance with the standards, procedures, workmanship, and quality control measures outlined in PCI's MNL 117 – Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

1.05 SUBMITTALS

- A. Provide manufacturer's data for each precast product for approval
- B. Refer to Section 018113 Sustainable Building Requirements for additional submittal requirements.

SECTION 042113.13

BRICK VENEER MASONRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Face brick.
 - 2. Reinforcements, anchorages, and accessories.
 - 3. Mortar and grout.
 - 4. Related flashings.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM A 615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 2. ASTM C 91 – Standard Specification for Masonry Cement.
 - 3. ASTM C 216 – Standard Specification for Facing Brick.
 - 4. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
 - 5. ASTM C 476 – Standard Specification for Grout for Unit Masonry.
 - 6. ASTM D 1056 – Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
 - 7. International Masonry Industry All-Weather Council (IMIADC) – Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SUBMITTALS

- A. General:
 - 1. Product Data: Submit for all accessory components, mortar mixes, and additives.

1.05 PROJECT/SITE CONDITIONS

- A. Comply with IMIADC recommendations for cold weather masonry construction.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all interior and exterior paints shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 MATERIALS

- A. Exterior Face Brick:
 - 1. Standard: Conform to ASTM C 216, Type FBX, Grade MW.
 - 2. Surface Finish: Furnish wire cut finish.
 - 3. Fabricate each brick type in one continuous operation with the exact same materials, equipment, and conditions to assure uniformly matching brick.
- B. Manufacturers: Provide brick masonry units from one of the following:
 - 1. Mutual Materials Company, Bellevue, WA – 206-455-2869.
 - 2. Glen Gery Corporation, Wyomissing, PA – 610-374-4011.
 - 3. The Belden Brick Company, Canton, OH – 216-456-0031.
 - 4. Acme Brick Company, Fort Worth, TX – 800-792-1234.

2.03 ACCESSORIES

- A. Systems for Attachments to Structure:
 - 1. Characteristics:
 - a. Provide anchor, tie, clip and fasteners compatible with brick masonry and substrates, and suitable to receive continuous wire reinforcing.
 - b. Provide special configurations where necessary to accommodate installation in vertical joints.
 - c. Include continuous gasket for installation at exterior sheathing over steel stud framing.
 - d. Include hot dip galvanized anchor channel and fasteners for installation at reinforced concrete substrates.
 - 2. Provide one of the following complete systems:
 - a. Hohmann & Barnard, Inc. – 516-234-0600 – 'DW-10 Series'.
 - b. The Burke Group – 210-658-4671 – 'Fleming Masonry Anchor System'.
 - 3. Anchors:
 - a. Anchors for the Project shall be of the seismic masonry veneer type, with a metal anchor section, plus a connector section designed to engage continuous wire reinforcement.
 - b. Provide anchors that permit vertical adjustment, but develop tension resistance for resolution of compression forces perpendicular to the plane of wall.

4. Designs:
 - a. Structural Performance: Capable of withstanding a one hundred (100) pound load in both tension and compression without deformation, or developing play in excess of five-hundredths (0.05) inch.
 - b. Metal Stud Framing: Anchors shall be of a design that allows attachment to exterior sheathing and metal stud framing assemblies as indicated on the Drawings.
 - c. Reinforced Concrete: Anchors shall be of a design that allows attachment to reinforced concrete assemblies as indicated on the Drawings.
 5. Characteristics:
 - a. Material: Twelve (12) gage.
 - b. Finish: Hot dip galvanized after fabrication.
 6. Brick Tie:
 - a. Fabricate from three-sixteenths inch ($\frac{3}{16}$ ") diameter steel wire.
 - b. Finish: Hot dip galvanized after fabrication.
 - c. Parallel overlapping legs.
 - d. Fabricate to extend a minimum of one-and-one-half inches ($1\frac{1}{2}$ ") into mortar joints, in addition to accommodation of the full width of the masonry cavity.
 - e. Tie Head for use at Reinforced Concrete Walls:
 - f. Material: Twelve (12) gage.
 - g. Nominal Width: One inch (1") width; fabricated to mate with channel slots, as necessary.
 - h. Finish: Hot-dip galvanized.
 - i. Incorporate brick tie.
 7. 7 Fasteners for Steel Framing: #12 galvanized self-drilling type with neoprene washers, for attachment of anchors through exterior sheathing into metal stud framing.
 8. 8 Fasteners for Reinforced Concrete Walls: One-quarter inch ($\frac{1}{4}$ ") diameter; one (1) inch minimum embedment length; galvanized finish; provide one of the following:
 - a. Hilti Fastening Systems - 'Item No. 661397 - Metal Hit'.
 - b. Rawlplug Co. - 'Rawl Zamac Nail-in'.
 - c. Or Approved Equal.
- B. Reinforcement:
1. Wire: Provide 0.188 inch diameter, hot dip galvanized finish, continuous carbon steel wire.
 2. Bars:
 - a. Material: Uncoated steel reinforcing; ASTM A 615 or ASTM A 996, Grade 60.
- C. Building Paper: Provide one of the following:
1. Standard: FS UU-B-790 A, Grade D, 60 minute.
 2. Provide one of the following:
 - a. Fortifiber Corporation - 800-773-4777 - 'Super JumboTex'.
 - b. Simplex Products Division - 517-263-8881 - 'R-Wrap'.

- c. DuPont Company – 800-448-9835 – 'Tyvek HomeWrap'.
- D. Weeps:
- 1. Characteristics:
 - a. Plastic tube type; round; three-eighths inch ($\frac{3}{8}$ ") outside diameter; four inches (4") in length.
 - b. Provide with integral insect screen.
- E. Cavity Drainage Insert:
- 1. Characteristics:
 - a. Castellated profile.
 - b. Thickness equal to depth of cavity.
 - 2. Provide one of the following:
 - a. Hohmann & Barnard, Inc. – 'Mortar Net'.
 - b. Or Approved Equal.
- F. Flexible Flashing:
- 1. Primer for Flexible Flashing: Provide compatible flexible flashing primer in accordance with manufacturer's written instructions.
 - 2. Seam Tape for Flexible Flashing: Provide in accordance with manufacturer's written installation instructions.
 - 3. Provide one of the following:
 - a. WR Grace – 'Perm-A-Barrier Wall Flashing'.
 - b. Monsey Bakor – 'Blueskin'; forty (40) mil thickness.
- G. Metal Flashing:
- 1. Material: Stainless steel.
 - 2. Refer to Section 07600 – Custom Sheet Metal.
 - 3. Lap Sealant for Metal Flashing: Provide one of the following:
 - a. Amanda Distribution Co. – 'Seal-Once'.
 - b. Tremco – 'Curtain Wall Sealant'.
 - c. Adco Products, Inc. – 'Adcoseal BP-400'.
- H. Compressible Filler:
- 1. Premolded filler strips complying with ASTM D 1056, Grade 2A1.
 - 2. Material: Neoprene.
 - 3. Compressible up to thirty-five (35) percent.
- I. Dampproofing:
- 1. ASTM D 1227, Type III.
 - 2. Characteristics: Non-fibrated, emulsified asphalt.
 - 3. Provide one of the following:
 - a. Sonneborn 'Hydrocide 600'.
 - b. Or Approved Equal.

2.04 MIXES

A. Mortar:

1. ASTM C 270, Type S; Portland cement-lime type with pigment.
2. Comply with ASTM C 91 for masonry cement.
3. Pigment:
 - a. Pigments shall be metallic oxide type; use of lampblack is prohibited.
 - b. Provide products of one of the following:
 - c. LM Scofield Co., Los Angeles, CA – 800-800-9900.
 - d. Solomon Chem-Grind Service (SGS), Springfield, IL – 800-624-0261.

B. Grout: ASTM C 476; two thousand (2,000) psi compressive strength.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

A. Building Paper:

1. Sequence with the installation of building paper.
2. Install one (1) ply of building paper over sheathing or substrate; lap vertical joints twelve inches (12"); weatherlap horizontal joints eight inches (8").

B. Dampproofing:

1. Apply dampproofing continuous to cavity side of concrete unit masonry and cast in place concrete walls prior to installation of brick masonry.

C. Systems for Attachments to Structure:

1. Anchorages:
 - a. Install anchorages at maximum sixteen inches (16") on center spacing horizontally and vertically, and as indicated in this Section.
 - b. Furnish additional anchorages at top courses, openings, corners, and at each side of expansion and control joints, and at other special conditions.
 - c. Steel Stud Framed Walls:
 - i. Install manufacturer's recommended gasket in continuous vertical strips at each stud location to receive anchorages.
 - ii. For steel studs at sixteen inches (16") on center spacing, install each anchorage at maximum eighteen inches (18") vertical spacing along each stud, spacing as necessary to correspond with masonry coursings and to special conditions.
 - iii. Space anchorages for support of not more than two (2) square feet of brick masonry in any location.
 - iv. Where anchor channel is used in lieu of individual anchorages, fasten channels to studs not more than sixteen inches (16") on center spacing

oriented vertically, and with approved self-drilling fasteners at twelve inches (12") on center spacing.

2. Anchorages above Relief Angles, Lintels and other Structural Supports:
 - a. Install anchorage assemblies in the first course below structural supports of brick masonry
 - b. Install anchorage assemblies between the second and third course above structural supports of brick masonry.
 - c. Space these anchorages in accordance with manufacturer's written installation instructions.
3. Reinforcement:
 - a. Install reinforcement in sequence with brick masonry.
 - b. Connect clip assembly to anchorages, and securely snap reinforcing into the clip assembly.
 - c. Provide continuous wire reinforcement; lap as recommended by the anchorage system manufacturer.
 - d. Set clips and reinforcing wire in a bed of mortar, and cover with mortar for secure and complete embedment.

D. Brick Masonry:

1. Weeps:
 - a. Provide weep openings in head joints in first course immediately above all flashing.
 - b. Maximum horizontal spacing is two feet (2') on center.
 - c. Maintain weeps and area above flashing free from mortar droppings.

E. Flashings:

1. Position flashing accurately, and to within a range of one-eighth ($\frac{1}{8}$ ") to one-quarter inch ($\frac{1}{4}$ ") of face of brick masonry.
2. Metal Flashing:
 - a. Locations:
 - i. Where through-wall flashing is indicated.
 - ii. Where flashing will be exposed in the finished Work.
 - b. Lap metal flashing minimum four inches (4").
 - c. Use approved lap sealant at lap joints.
 - d. Punch flashing neatly and seal at all penetrations.
 - e. Dam flashing at expansion and control joints, and at ends of lintels by means up turning up the flashing vertically four inches (4").
3. Flexible Flashing:
 - a. Locations: Locations which are not metal flashing.
 - b. Except where metal flashing is required, install flexible flashing at relief angles by adhering flashing toe edge one-quarter ($\frac{1}{4}$ ") to three-eighths ($\frac{3}{8}$ ") inch from the face of the brick in order to expose sufficient brick surface for adherence of joint protection.

- c. Extend flashing back to adhere to relieving angle and up onto substrate a minimum of one and one-half inches (1½") above top of relieving angle vertical leg.
- d. Form flexible flashing over bolts.
- e. Extend under building paper at steel stud framed walls.
- f. At dampproofed walls, adhere directly to dampproofing, and terminate top edge of flashing with a troweled bead of approved mastic.
- g. Dam flashing at expansion and control joints, and at ends of lintels by means up turning up the flashing vertically four inches (4").

3.02 FIELD QUALITY CONTROL

A. Allowable Tolerances:

- 1. Maximum Variation from Plumb:
 - a. In lines and surfaces of columns, pilasters, walls and arrises:
 - b. One-quarter inch (¼") in ten feet (10').
 - c. Three-eighths inch (¾") in any story, or twenty feet (20') maximum.
 - d. One-half inch (½") in forty feet (40').
 - e. For external corners; at expansion joints; and other conspicuous lines:
 - f. One-quarter inch (¼") in any story, or twenty feet (20') maximum.
 - g. One-half inch (½") in forty feet (40').
- 2. Maximum variation from level; or grades for exposed lintels; sills; parapets; horizontal grooves; and other conspicuous lines:
 - a. One-quarter inch (¼") in any bay, or twenty feet (20') maximum.
- 3. Maximum variation of linear building line from an established position in plan, and related portions of columns, walls, and partitions:
 - a. One-half inch (½") in any bay, or twenty feet (20') maximum.
 - b. Three-quarter inch (¾") in forty feet (40').
- 4. Head Joints: Plus or minus one-eighth inch (⅛").

END OF SECTION

SECTION 042200

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Concrete Block.
 - 2. Mortar and Grout.
 - 3. Reinforcement and Anchorage.
 - 4. Flashings.
 - 5. Lintels.
 - 6. Accessories.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM A 82 – Standard Specification for Steel Wire, Plain for Concrete Reinforcement.
 - 2. ASTM A 615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. ASTM A 641 – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 4. ASTM C 91 – Standard Specification for Masonry Cement.
 - 5. ASTM C 129 – Standard Specification for Non-loadbearing Concrete Masonry Units and Related Units.
 - 6. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
 - 7. ASTM C 150 – Standard Specification for Portland Cement.
 - 8. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
 - 9. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
 - 10. ASTM C 404 – Standard Specification for Aggregates for Masonry Grout.
 - 11. ASTM C 476 – Standard Specification for Grout Masonry.
 - 12. ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry Structures.
 - 13. ACI 530.1/ASCE 6/TMS 602 – Specification for Masonry Structures.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SUBMITTALS

A. General

1. Product data: Submit for all units, accessory components, mortar mixes and additives.
2. Refer to Section 018113 Sustainable Building Requirements for additional submittal requirements.

1.05 PROJECT/SITE CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 or applicable building code, whichever is more stringent.
- B. Maintain materials and surrounding air temperature to maximum ninety degrees Fahrenheit (90°F) prior to, during, and forty-eight (48) hours after completion of masonry work.

PART 2 PRODUCTS

2.01 GENERAL

- A. King County Transit prefers that all interior and exterior paints shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 MATERIALS

- A. Masonry Cement: ASTM C91, Type N.
- B. Portland Cement: ASTM C150, Type I.
 1. Not more than 0.60 percent alkali.
 2. Hydrated Lime: ASTM C207, Type S.
 3. Mortar Aggregate: ASTM C 144.
 4. Grout Aggregate: ASTM C 404.
- C. Water: Clean and potable.
- D. Accelerating Admixture: Non-chloride type for use in cold weather.
- E. Reinforcing Steel: ASTM A 615/A 615M Grade 40 deformed billet bars; galvanized.
- F. Single Wythe Joint Reinforcement: Truss type; ASTM A 82/A 82M steel wire, mill galvanized to ASTM A 641/A 641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide no more than one inch (1") and not less than one-half inch (½") of mortar coverage on each exposure.
- G. Strap Anchors: Bent steel shapes configured as required for specific situations, one-and-one-fourth inch (1¼") width, 0.105 in thick, lengths as required to provide not much than one inch (1") and not less than one-half inch (½") of mortar coverage from masonry

face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153, Class B.

- H. Flexible Anchors: Two-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than one-half inch ($\frac{1}{2}$ ") of mortar coverage from masonry face.
- I. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153, Class B, sized to provide not more than 1 inch and not less than one-half inch ($\frac{1}{2}$ ") of mortar coverage from masonry face and to allow vertical adjustments of up to one and one-fourth inches ($1\frac{1}{4}$ ").
- J. Flashings:
 - 1. Stainless Steel: ASTM A 666, Type 304, soft temper; 26 gage thickness; finish 2B to 2D.
 - 2. Lap Sealant: Butyl type as specified in Section 07900 – Joint Protection.
- K. Whenever possible, materials shall be sourced from supplies within 500 miles of project site.

2.03 ACCEPTABLE PRODUCTS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of sixteen (16) x eight (8) inches and nominal depth of eight inches (8").
 - 2. Special Shapes:
 - a. Provide non-standard blocks configured for corners.
 - b. Provide ground-face corner block units as appropriate.
 - 3. Non-load-bearing units shall comply with ASTM C 129.
 - 4. Acceptable Manufacturers: Provide block from one of the following manufacturers:
 - a. Mutual Materials
 - b. Basalie Concrete Products, LLC. 253-964-5000.
 - c. Eastside Masonry Products. 425-868-0303.
- B. Reinforcement and Anchorage: Provide products of one of the following manufacturers:
 - 1. Dur-O-Wal.
 - 2. Hohmann & Barnard, Inc.
 - 3. Masonry Reinforcing Corporation of America.

2.04 MIXES

- A. Mortar for Unit Masonry: ASTM C 270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - 2. Exterior, non-loadbearing masonry: Type N.

B. Grout:

1. ASTM C 476.
2. Consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of two inches (2") or less.
3. Provide coarse grout for spaces with smallest horizontal dimension greater than two inches (2").
4. All cells shall be grouted solid.

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

A. Concrete Masonry Unit Coursing:

1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal eight (8) inches.
3. Mortar Joints: Concave.

B. Weeps and Cavity Vents:

1. Install weeps in veneer and cavity walls at twenty-four inches (24") on center horizontal above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
2. Install cavity vents in veneer and cavity walls at thirty-two inches (32") on center horizontally below shelf angles and lintels, and near top of walls.

C. Cavity Mortar Control:

1. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

D. Reinforcement and Anchorages – General:

1. Install horizontal joint reinforcement sixteen inches (16") on center.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings.
3. Extend minimum sixteen inches (16") each side of opening.
4. Place continuous joint reinforcement in first and second joint below top of walls.
5. Lap joint reinforcement end minimum six inches (6").
6. Reinforce stack bonded unit joint corners and intersections with strap anchors sixteen inches (16") on center
7. Unless otherwise indicated on drawings, space anchors at maximum of thirty-six inches (36") horizontally and twenty-four inches (24") vertically.

- E. Reinforcement and Anchorages – Single Wythe Masonry:
1. Install horizontal joint reinforcement eight inches (8") on center.
 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings.
 3. Extend minimum sixteen inches (16") each side of opening.
 4. Place continuous joint reinforcement in first and second joint below top of walls.
 5. Lap joint reinforcement ends minimum six inches (6").
- F. Reinforcement and Anchorages – Cavity Wall Masonry:
1. Install horizontal joint reinforcement sixteen inches (16") on center.
 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings.
 3. Extend minimum sixteen inches (16") each side of openings.
 4. Place continuous joint reinforcement in first and second joint below top of walls.
 5. Lap joint reinforcement ends minimum six inches (6").-
 6. Space anchors at maximum of twenty four inches (24") horizontally and sixteen inches (16") vertically.
- G. Masonry Flashing:
1. Install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - a. Extend flashings full width at such interruptions and at least four inches (4") into adjacent masonry or turn up at least four inches (4") to form watertight pan at non-masonry construction.
 2. Extend metal flashings through exterior face of masonry and turn down to form drip.
 3. Install joint sealer below drip edge to prevent moisture migration under flashing.
 4. Extend plastic flashings to within one-fourth inch ($\frac{1}{4}$ ") of exterior face of masonry.
 5. Lap end joints of flashings at least four inches (4") and seal watertight with mastic or elastic sealant.
- H. Lintels: Install loose steel lintels over openings.
- I. Grouted Components:
1. Lap splices minimum twenty-four (24) bar diameters.
- J. Control and Expansion Joints:
1. Do not continue horizontal joint reinforcement through control and expansion joints.
 2. Install preformed control joint device in continuous lengths.
- K. Built-in Work:
1. Install built-in items plumb, level, and true to line.
 2. Bed anchors of metal door and glazed frames in adjacent mortar joints.
 3. Fill frame voids solid with grout.

3.02 FIELD QUALITY CONTROL

- A. Mortar Tests: Test each type of mortar in accordance with ASTM C 780, testing with same frequency as masonry samples.
- B. Construction Tolerances:
 - 1. Maximum Variation from Alignment of Columns: One-quarter inch ($\frac{1}{4}$ ").
 - 2. Maximum Variation From Unit to Adjacent Unit: One-sixteenth inch ($\frac{1}{16}$ ").
 - 3. Maximum Variation from Plane of Wall: One-quarter inch ($\frac{1}{4}$ " in ten feet (10') and one-half inch ($\frac{1}{2}$ " in twenty feet (20') or more.
 - 4. Maximum Variation from Plumb: One-quarter inch ($\frac{1}{4}$ " per story non-cumulative, one-half inch ($\frac{1}{2}$ " in two stories or more.
 - 5. Maximum Variation from Level Coursing: One-eighth inch ($\frac{1}{8}$ " in three feet (3') and one-fourth inch ($\frac{1}{4}$ " in ten feet (10'); one-half inch ($\frac{1}{2}$ " in thirty feet (30').
 - 6. Maximum Variation of Joint Thickness: One-eighth inch ($\frac{1}{8}$ " in three feet (3').
 - 7. Maximum Variation from Cross Sectional Thickness of Walls: One-quarter inch ($\frac{1}{4}$ ").

END OF SECTION

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all products shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 MATERIALS

- A. Concrete: Provide mix designs with compressive strengths at 28 days at or exceeding 5,000 PSI.
- B. Cement: Portland cement; gray; conforming to the requirements of ASTM C 150, Type I or Type III, of same type, brand and source.
- C. Aggregates: Conform to the requirements of ASTM C 33.
- D. Reinforcements:
 - 1. Conform to the requirements of ASTM C 615; Grade 60.
 - 2. All reinforcing steel shall be weldable.
- E. Refer to Section 033000 Cast-in-Place Concrete for minimum required recycled content for rebar and concrete components.

2.03 FABRICATION

- A. Manufacture steel forms to produce raised, non-slip continuous parallel ridges under the tread nosings as indicated on the Drawings.
- B. The underside of all precast stair treads and landings shall have a smooth trowel finish; screed finish is not acceptable.
- C. Set reinforcing steel accurately, and weld at intersections.

2.04 MIXES

- A. Grout:
 - 1. Premixed, non-metallic, non-corrosive, non-staining, non-shrink grout.
 - 2. Grout shall be composed of select silica sands, Portland cement, shrinkage compensating agents, plasticizer, and water-reducing agents complying with ASTM C 1107.

2.05 FINISH

- A. Provide manufacturer's standard light sand-blast finish. Surfaces to be free of tool marks, fins, stains and surface laitance.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Set units plumb, true, and square.
- B. Anchor units securely and rigidly to supports.
- C. Grout joints between precast stair and landing units.
- D. Patch holes for lifting devices to match adjacent surfaces for color, texture, and finish.

3.02 ADJUSTING

- A. Repair damage, chipped, checked, cracked, blemished, and defective units.

3.03 CLEANING

- A. Remove soil from precast units by approved means.
- B. Repair units that have minor visual defects.

END OF SECTION

SECTION 051000

STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Structural steel.
 - 2. Architecturally exposed structural steel.
 - 3. Grout.

1.02 DEFINITIONS

- A. Architecturally exposed Structural Steel (AESS): Structural steel designated as architecturally exposed structural steel in the contract documents.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural steel components.
- C. Welding certificates.
- D. Refer to Section 018113 Sustainable Building Requirements for additional requirements.

1.04 QUALITY ASSURANCE

- A. Welding Standards: Comply with AWS D1.1, "Structural Welding Code--Steel."
- B. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."

PART 2 PRODUCTS

2.01 STRUCTURAL STEEL MATERIALS

- A. Structural Sections:
 - 1. Wide flange beams: ASTM A992
 - 2. Channels: ASTM A36
 - 3. Structural Tubing: ASTM A500
 - 4. Pipe: ASTM A53
 - 5. Angles and Plate: ASTM A36

- B. Welding Materials: AWS A5.
 - 1. Welding electrodes shall have a minimum tensile strength of 70 ksi using AWS A5 classification test.
- C. Structural Sections should be sourced, if possible from within a 50-mile radius of the project and include recycled content of 50% minimum.

2.02 BOLTS, CONNECTORS, ANCHORS, AND BEARINGS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon steel nuts; and ASTM F 436 hardened carbon steel washers.
 - 1. Finish: Plain or Hot-dip zinc coating, ASTM A 153, Class C.
- B. Welded Headed Stud Connectors: ASTM A 108, Grades 1015 through 1020, headed stud-type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Anchor Rods: ASTM F 1554, Grade 36.
- D. Threaded Rods: ASTM A 36.

2.03 PRIMER

- A. Shop Coat Primer Paint.
 - 1. Shop-Applied Zinc-Rich Primer (for steel not galvanized and exposed to weather in its final position, including all AESS).
 - 2. Galvanized Finish Touch-Up: Touch-up paint shall be an organic cold-galvanizing compound having a minimum of 94 percent zinc dust in dry film. "CarboZink 859" as manufactured by Carboline, St. Louis, MO, or Tnemec-Zinc 90-97" by Tnemec Company.

2.04 GROUT

- A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

- A. Structural Steel: Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges".
- B. Architecturally exposed Structural Steel (AESS): Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
 2. Remove blemishes by filling or grinding, or by welding and grinding before cleaning, treating, and shop priming.
- C. Welded Headed Stud (WHS) Connectors: Prepare steel surfaces as recommended by manufacturer of WHS connectors. Use automatic end welding of headed stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- D. Holes: Provide holes required for securing other work to structural steel and for the passage of other work through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

2.06 DIMENSIONAL TOLERANCES

- A. Fabrication Tolerances: Unless otherwise noted, fabricate structural members to referenced AISC Specifications for allowable tolerances.
- B. For members designated as AESS, tolerances shall be as allowed by the AESS Section of the AISC Code of Standard Practice for Buildings and Bridges.

2.07 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field-welded.
 3. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 4, "Power Tool Cleaning to Bare Metal." For all steel, except steel receiving an epoxy or zinc-rich primer.
 2. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." For nongalvanized steel receiving an epoxy or zinc-rich primer.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

2.08 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated, according to ASTM A 123.
 - 1. Fill vent holes and grind smooth and touch-up after galvanizing.
 - 2. Galvanize all steel plates, angles, and other items embedded in concrete after fabrication.
- B. Where indicated to be galvanized, bolts, nuts and washers, and iron and steel hardware components shall be galvanized by the hot-dip process in accordance with ASTM A 153.
- C. Surface Preparation: Steel shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter: Clean steel in accordance with Steel Structures Painting Council (SSPC) SSPC-SP-6, "Commercial Blast Cleaning."
- D. Coating Requirements
 - 1. Weight: The weight of the galvanized coating shall conform to Table 2 of ASTM A 123 or Table 1 of ASTM A 153, as appropriate.
 - 2. Mechanical Damage: Repair areas damaged by welding; flame cutting; or during handling, transport, or erection in accordance with ASTM A 780 by one of the following methods:
 - a. Cold Galvanizing Compound (zinc-rich paint): Per Part 2, "Primer" Article, in accordance with ASTM A 780, Annex A2.
 - i. Spray- or brush-apply the touch-up paint in multiple coats to a dry film minimum thickness of a 6 mils (4 mils for material less than 1/4-inch thick). Apply a finish coat of aluminum paint to provide a color blend with the surrounding galvanizing.
 - b. Zinc-Based Solder: In accordance with ASTM A 780, Annex A1.
 - i. Apply the zinc-based solder in a minimum thickness of 4 mils (3 mils for material less than 1/4-inch thick).

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 ERECTION

- A. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- B. Do not use thermal cutting during erection.
- C. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of the shop paint. Apply paint to exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

- D. **Touch-Up and Repair of Galvanizing:** Immediately after erection, clean and repair any damaged galvanizing as outlined in previous section regarding galvanizing.

3.02 CONNECTIONS

- A. **High-Strength Bolts:** Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
- B. **Welded Connections:** Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance and quality of welds, and for methods used in correcting welding work.

3.03 FIELD QUALITY CONTROL

- A. **Testing Agency:** Contractor will engage a qualified independent testing and inspecting agency to inspect structural steel.

END OF SECTION

SECTION 051213

ARCHITECTURALLY EXPOSED STRUCTURAL FRAMING
FOR TRANSIT SHELTERS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section is provided in the event that custom shelters are required by the Project.
- B. This Section includes the following:
 - 1. Transit shelters.
 - 2. Custom column cap and base elements for transit shelters.
 - 3. Custom column bases for transit center identity signs. -
 - 4. Downspouts.
 - 5. Galvanizing.
- C. Provided by King County: Transit Shelter Benches.
- D. Related Sections:
 - 1. Section 099100 – Painting: Preparation, paints and coatings for work of this Section EXCEPT galvanizing.

1.02 REFERENCE:

- A. This Section incorporates by reference the latest revisions of the following documents. They are part of this Section insofar as specified and modified herein. In case of conflict between the requirements of this Section and the listed documents, the requirements of this Section shall prevail.

<u>Reference</u>	<u>Title</u>
ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A36	Standard Specification for Carbon Structural Steel
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A276	Standard Specification for Stainless Steel Bars and Shapes
ASTM A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B26	Standard Specification for Aluminum-Alloy Sand Castings
ASTM B221	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B633	Standard Specification for Silver-Tungsten Carbide Electrical Contact Material
ASTM C1107	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

1.03 DEFINITIONS

- A. 'Hard Way': For purposes of this Section, 'hard way' pertains to the bending or forming of a steel shape in the longer, more difficult direction or axis of the cross section.

1.04 PERFORMANCE REQUIREMENTS

- A. Provide the metal fabrications identified on the Drawings and in accordance with this Section.
- B. Provide other metal fabrications required for the Project to be complete and in accordance with the Contract Documents, including metal fabrications described in other Sections.
- C. Provide design and fabrication of forms and molds as necessary to construct, provide and install custom caps and bases indicated on the Drawings and as described in this Section.

1.05 RELATED SECTIONS

- A. Section 018113 Sustainable Building Requirements.

1.06 SUBMITTALS

- A. Shop Drawings:
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections.
- B. Indicate anchorages, attachments, assemblies, and accessory items.
- C. Indicate and provide dimensions for holes, chases, and pathways for electrical items to be installed concealed in transit shelter framing.
- D. Indicate and provide descriptions for holes and access points intended for use to aid the fabrication, erection, construction, and installation of the transit shelters.
- E. Custom Column Cap and Bases:
 - 1. Provide complete profile dimensions to produce the profiles indicated on the Drawings.

2. Show acceptable means of fabricating elements to permit installation.
3. Show means of concealing attachments.
4. Indicate means of construction whether cast, or formed.

F. Samples:

1. Provide one (1) representative sample of formed or cast metal elements similar or identical to the work of this Section, for the purpose of establishing the expected level of acceptable workmanship.
2. Provide one (1) complete set of all mounting hardware for the transit shelters, including but not limited to:
 - a. Attachment hardware for custom caps and bases.
 - b. Sex bolts.
 - c. Security head screws.
 - d. Other hardware.

1.07 QUALITY ASSURANCE

A. Shapes Bent and Formed Including 'Hard Way':

1. The Drawings may show steel elements bent and/or formed 'hard way'.
2. The Contactor shall be responsible to review such conditions with the A/E Representative during the required shop drawing process.
3. The Contractor shall identify and propose appropriate alternative means to achieve the appearance and quality indicated on the Drawings.

B. Requirements for Metal Former/Caster Manufacturer:

1. Firm proposed for providing required custom formed/cast elements shall have been engaged in continual business activity performing similar successful work for the last five (5) years.

1.08 OWNER'S INSTRUCTIONS

A. Transit Shelter Benches:

1. General: Transit Shelter Benches are provided by the County from its stock of standard transit shelter benches for Contractor installation. County contact for benches: Paul Sorenson; 11911 East Marginal Way S, Tukwila, WA 98168
2. The Contractor shall verify dimensions and coordinate to ensure the Owners available stock of standard benches is accommodated.

B. Manufactured Custom Column Caps and Bases:

1. Extra Materials:
 - a. Provide the following additional quantities, together with hardware, to account for post-construction damage:
 - i. Transit Shelters: Produce six (6) additional caps and six (6) additional bases in excess of what is shown on the Drawings.
 - ii. Transit Center Identify Signs: Produce two (2) additional bases in excess of what is shown on the Drawings.

2. Storage of Additional Stock, Forms and Molds:
 - a. Purpose of these requirements is to insure means exist following construction to obtain additional caps and bases at economical cost should the need arise.
 - b. The County does not have appropriate location to store the materials such that the parts would not be separated or lost.
 - c. Provide the Owner with appropriate contact information.
 - d. Save and retain forms, molds and other elements constructed in order to produce the profiles indicated on the Drawings.
 - e. Keep one (1) full set of each individual mold used in the construction of the Project.
 - f. In the event more than one (1) set of the same identical molds or forms are produced, retain the newest, least used set.
 - g. Retain the molds or forms at the fabricators' shop for a period of three (3) years after Substantial Completion.
 - i. At the end of the required duration, contact the County to determine if the County would like to retain the forms or molds. -
 - ii. In the event the County does not want the additional stock, forms or molds, these should become possession of the Contractor unless prohibited by law.

PART 2 PRODUCTS

2.01 GENERAL

King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used. King County Transit prefers that all interior and exterior adhesives and sealants, paints, and coatings shall meet the relevant VOC /emissions criteria.

2.02 MANUFACTURED ITEMS

- A. Custom Column Caps and Bases:
 1. Locations:
 - a. Transit shelters – caps and bases.
 - b. Transit center identity signs – bases only.
 2. Produce shapes indicated on the Drawings by means of casting or forming metal.
 3. Use aluminum alloy, cast iron alloy, or approved metal alloy.
 4. Finish: Provide two (2) coat fluoropolymer finish conforming to AAMA 621; containing not less than seventy (70) percent PVDF resin by weight in color coat.
 5. Design and Fabrication:
 - a. Fabricate to permit installation, disassembly, and re-installation with a minimum of tools.
 - b. Units shall be adjustable within a reasonable range to be determined by the Contractor, sufficient to close gaps, and to facilitate adjustability for appearance true to line and profile.

- c. Cap and base elements indicated on the Drawings are round in profile, and smooth, continuous and uninterrupted.
 - i. Two vertical seams are permissible, provided:
 - The seams come together with horizontal pins or some other means of assuring precise alignment of the two halves.
 - The two permissible seams are 180 degrees apart.
 - d. Fastenings shall be concealed to the degree possible, and as approved.
 - i. Attachment(s) to structure shall be concealed behind the permissible seams.
 - e. Maintain sufficient separation between dissimilar metals, and provide bituminous coating to concealed surfaces in close proximity and in contact.
6. Subject to requirements, manufacturers who produce products which may be incorporated into the Project include, but are not limited to the following:
- a. East Jordan Iron Works, Marysville, WA.
 - b. Urban Accessories, Tacoma, WA.
 - c. Or Approved Equal.

2.03 METALS

A. Metal Surfaces, General:

- 1. Provide materials with smooth, flat surfaces without blemishes and/or defects, including superficial and/or appearance defects.
- 2. Materials employed in the work of this Section shall be of sufficient quality to achieve architectural grade work and workmanship.

B. Ferrous Metals:

- 1. Steel Plates, Shapes, and Bars: ASTM A 36.
- 2. Stainless Steel Bars and Shapes: ASTM A 276, Type 304.
- 3. Steel Tubing: ASTM A 500 Grade B, cold-formed steel tubing.
- 4. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- 5. Slotted Channel Framing:
 - a. Cold-formed metal channels complying with MFMA-3, 1-5/8 by 1-5/8 inches.
 - b. Channels made from galvanized steel complying with ASTM A 653, structural steel, Grade 33, with G90 coating; 0.079-inch nominal thickness.
- 6. Cast Iron: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.

C. Nonferrous Metals:

- 1. Aluminum Extrusions: ASTM B 221, alloy 6063-T6.
- 2. Aluminum Castings: ASTM B 26, Alloy 443.0-F, or approved.

2.04 FASTENERS

A. General:

1. Materials: Fasteners for work of this Section shall be one of the following two types of metal:
 - a. Type 316 stainless steel.
 - b. Zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5.
 2. Fasteners for Aluminum: Provide stainless steel.
 3. Select fasteners for type, grade, and class appropriate to the work.
 4. Sex Bolts:
 - a. Provide sex bolts in the configuration indicated on the Drawings.
 - b. The bolts shown on the Drawings are commonly utilized in the assembly of the County's transit shelters throughout the County's service area.
 - c. The Contractor is advised to research, source and obtain the appropriate sex bolts prior to fabrication of steel elements.
- B. Cast-in-Place Anchors in Concrete: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153.

2.05 FINISHES

A. Galvanizing:

1. Locations: As indicated on the Drawings.
2. Hot-dip galvanize items as indicated to comply with ASTM A 123 or ASTM A 153 as applicable.

B. Items Indicated to Receive Paint: Refer to Section 09900 – Painting.

2.06 MISCELLANEOUS MATERIALS

- A. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107.
- B. Concrete: Comply with requirements in other Sections – refer to Division 03.

2.07 FABRICATION

A. General:

1. Pre-assemble items in the shop to greatest extent possible.
2. Use connections that maintain structural value of joined pieces.
3. Cut, drill, and punch metals cleanly and accurately.
4. Remove burrs and ease edges.
5. Remove sharp or rough areas on exposed surfaces.
6. Weld corners and seams continuously.
7. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
8. Obtain fusion without undercut or overlap.

9. Remove welding flux immediately.
 10. Finish exposed welds smooth and blended.
 11. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
 12. Locate joints where least conspicuous.
 13. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water.
 14. Provide weep holes in locations where water may otherwise accumulate.
- B. Special Fabrication Requirements for Transit Shelters:
1. Provide steel framing and supports as indicated on the Drawings and as needed to complete the Work.
 2. Fabricate units from steel shapes, plates, and bars of welded construction.
 - a. Use solid steel sections where indicated, including where necessary to maintain smooth, even, true and plumb lines and levels.
 - b. Provide handholes, access covers, lighting mounting, and other special features indicated on the Drawings, and as required and approved.
 3. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 4. Fabricate steel elements from continuous steel shapes.
 5. Fabricate steel pipe columns with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness, unless indicated otherwise on the Drawings.
- C. Downspouts:
1. Fabricate downspouts from stainless steel tube.
- D. Miscellaneous Steel Trim:
1. Fabricate from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges.
 2. Miter corners and use concealed field splices where possible.
 3. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXAMINATION

- A. Verify conditions are satisfactory to receive Work of this Section. Do not commence work until unsatisfactory conditions have been corrected.
- B. Beginning work constitutes acceptance of conditions.

3.02 PREPARATION

- A. Field Measurements: Verify in field before beginning work.
- B. Protect surrounding areas and surfaces from damage prior to beginning work of this Section.

3.03 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing work of this Section.
- B. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.
 - 1. Fit exposed connections accurately together.
 - 2. Weld connections that are not to be left as exposed joints but cannot be shop welded.
 - 3. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
 - 4. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
 - 5. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- C. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts.
- D. After bearing members have been positioned and plumbed, tighten anchor bolts and pack solidly with non-shrink, non-metallic grout.
- E. Custom Caps and Bases:
 - 1. Install after all other metal work associated with the transit shelters and transit center identity signs is complete and in proper adjustment.
 - 2. Fasten securely to metal framing, in a manner to facilitate ease of disassembly later for maintenance and repair.
 - 3. Install both halves of each element, taking care to not damage adjacent materials and finishes.
 - 4. Check to be certain each unit is securely attached, and does not move when firmly pushed against; correct any problems in an acceptable manner.
 - 5. Repair any damage to finishes by means of field touch-ups, or replace the entire damaged item with an undamaged item.
- F. Transit Shelter Benches:
 - 1. King County Metro Transit will provide and install standard Transit Shelter Benches.

END OF SECTION

SECTION 051516

STEEL WIRE ROPE ASSEMBLY

PART 1 GENERAL

1.01 SUMMARY

- A. Work includes but is not limited to following:
 - 1. Provide Manufacturer/Contractor designed cable restraint system materials.

1.02 REFERENCES

- A. This section incorporates by reference the latest revisions of the following documents:
 - 1. ASTM A416: Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
 - 2. ASTM A475: Standard Specification for Zinc-Coated Steel Wire Strand.
 - 3. ASTM A780: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 4. Post Tensioning Institute (PTI): "Specification for Seven Wire Strand Barrier Cable Applications".

1.03 SUBMITTALS

- A. Submit the following:
 - 1. Shop Drawings
- B. Refer to Section 018113 Sustainable Building Requirements for additional requirements..

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cable Restraint System and Prestressing/Post-Tensioning Anchors:
 - 1. Steel Strand: ASTM A416, seven wire. 0.5 inch diameter, stress-relieved prestressing strand, minimum ultimate tensile strength 250,000 psi. All strand manufactured by single source in North America.
 - 2. Galvanizing: ASTM A475, continuous hot-dip coating, minimum weight of zinc coating 0.90 oz./sq. ft.
 - 3. Anchor Bodies: Galvanized (wedge grippers electro-galvanized), compatible with strand system provided. Comply with PTI Specification, Environment; corrosive.
 - 4. Anchor Back Seating Force: Do not exceed 80% of ultimate tensile strength unless otherwise noted.
 - 5. Clevises and turnbuckles: ASTM A108

2.02 FABRICATION

- A. Allow for thermal movement in design, fabrication, and installation of assemblies to prevent over stressing resulting from maximum change (range) in ambient temperature as follows:
 - 1. Temperature Change (Range): 80 degrees F.
- B. Fabricate and space anchoring devices to secure cable restraint system rigidly in place and to support indicated loads.
 - 1. Fabricate joints that will be exposed to weather in a manner to exclude water.
- C. Provide intermediate steel cable spacing / separation members to prevent cables from deflecting and allowing a trailer hitch to pass through the cable restraint system.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Post-Tensioning of Cable Restraint System:
 - 1. Back stress all fixed and stressing anchorages.
 - 2. Back stress after cable restraint system has been stressed.
 - 3. Back stress cable restraint system to a force equal to 80 percent of minimum Ultimate Tensile Strength (MUTS) of the strand.
 - 4. Prevent damage to column or other members to which cable restraint system is anchored.
 - 5. Refer to PTI Specifications for related procedures.

END OF SECTION

SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Cold-formed metal framing.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. AISI SG-971 - Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. ASTM A 36 - Standard Specification for Carbon Structural Steel.
 - 3. ASTM A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A 153 - Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 - 5. ASTM A 653 - Standard Specification for Steel-Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 6. ASTM A 1008 - Standard Specification for Steel, Sheet, Cold-rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability.
 - 7. ASTM C 955 - Standard Specification for Load-Bearing Steel Studs, Runners, and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.
 - 8. ASTM C 1007 - Standard Specification for Installation of Loading Bearing (Transverse and Axial) Steel Studs and Related Accessories.
 - 9. AWS D1.3 - Structural Welding Code - Sheet Steel.
 - 10. AWS QC 1 - Standard for AWS Certification of Welding Inspectors.

1.03 SYSTEM DESCRIPTION

- A. Cold-formed metal studs, tracks and accessories to form a complete framing system for rated and non-rated wall assemblies.
- B. Structural Design:
 - 1. The Developer is responsible for selection of the appropriate cold formed metal framing material section profiles, sizes, and dimensions identified in this Section.
- C. Design Criteria:
 - 1. Horizontal Deflection: Maximum 1/180 of the span.
 - 2. Vertical Deflection: Accommodate not less than one-half (1/2) inch.

3. Design systems to move without damage, failure of fastenings and connections, and other detrimental effects.
4. Design for day/night temperature differential.
5. Design to accommodate construction tolerances, deflection of building structural steel, deflection of post-tensioned slabs and beams and clearances for openings.

1.04 SUBMITTALS

- A. Show Drawings.
- B. Refer to Section 018113 Sustainable Building Requirements for additional submittal requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products of one of the following:
 1. Steeler, Inc. (800) 275-2279.
 2. LGS Systems. (360) 424-7434.
 3. Dietrich Metal Framing. (425) 251-1497.

2.02 MATERIALS

- A. Steel Shapes and Plates: ASTM A36, zinc-coated by hot-dip process according to ASTM A123, after fabrication.

2.03 MANUFACTURED UNITS

- A. Cold-Formed Members:
 1. Conform to the following reference standards:
 - a. AISI Specification for the Design of Cold-Formed Steel Structural Members.
 - b. AISI SG-971.
 - c. ASTM C 955.
 - d. ASTM C1007.
 2. Material: ASTM A 607, Grade 50.
 - a. 16 Gage and Heavier: Structural Quality Steel Sheet; 50,000 psi minimum yield strength in accordance with ASTM A 653.
 - b. 18 Gage and Lighter: Structural Quality Steel Sheet; 33,000 psi minimum yield strength in accordance with ASTM A 653.
 3. Finish: Galvanized.

2.04 ACCESSORIES

- A. General: Provide manufacturers standard steel runners, blocking, lintels, clip angles, shoes, reinforcements, straps, and braces for a complete system meeting the design intent.

- B. Metal-to-Metal Fasteners:
 - 1. Characteristics: Self-drilling, self-tapping metal screws, with manufacturer's premium, highest quality, corrosion-resistant coating.
- C. Metal-to-Concrete Fasteners:
 - 1. Provide premium quality, powder-actuated, low velocity fasteners.
 - 2. ICBO approved.
 - 3. Provide products of one of the following:
 - a. Hilti.
 - b. Ramset/Red Head.
 - c. Powers.
- D. Hot Dip Galvanized Hardware: ASTM A 153.
- E. Welding Electrodes:
 - 1. Comply with provisions of the AWS code.
 - 2. Comply with recommendations of the cold formed metal framing manufacturer.

2.05 FABRICATION

- A. Fabrication Tolerances:
 - 1. Fabricate assemblies to a maximum allowable variation from plumb, level and true to line not to exceed 1/8 inch from locations indicated on the Drawings.
 - 2. Fabricate each member to a maximum out of square condition not to exceed 1/8-inch true to line.
- B. Connections Within Fabrications:
 - 1. Use screw fasteners in conditions where permitted by this Section.
 - 2. Welded connections can be substituted for some or all of the fastener connections.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Fasten framing members together in accordance with provisions of AISI SG-787.
 - 1. Non-load bearing elements and furring may be fastened with two sheet metal screws, bolts, or rivets at each corner.
 - 2. Welding: Utilize a fusion welding machine, whether AC or DC type, with a welding heat of 60 to 100 amperes.
 - 3. Use electrodes that are compliant with AWS Classification E60.

- B. Layout steel framing stud tracks.
 - 1. Secure tracks in manner consistent with manufacturer recommendations for the wall conditions, and as indicated on the Drawings.
 - a. Do not exceed sixteen (16) inches on center spacing between fasteners.
 - b. Provide fasteners at ends and corners of tracks.
- C. Stud Applications:
 - 1. Fasten steel studs to stud tracks on both flanges of the track.
 - 2. Set studs plumb, except:
 - a. Diagonal bracing.
 - b. Inclined walls where indicated on the Drawings.
 - 3. Install horizontal stiffeners in the framing system spaced at not more than 54 inches on center.
 - a. Weld at each intersection.
 - 4. Install fire stopping in frame walls in conformance with applicable code requirements.
- D. Joist Applications:
 - 1. Provide steel joist framing for a complete installation.
 - 2. Reinforcement:
 - a. Reinforce ends with end clips, steel hangers, steel angle clips, steel stud sections.
 - b. Reinforce steel joist framing at supports with short lengths of steel joist framing material located directly over the support.
 - 3. Secure joist framing to structural elements of the building in a manner to restrain the joist system, and to prevent lateral movement and displacement.
 - 4. Bridging:
 - a. Use channel type bridging welded between joists.
 - b. Provide bridging at five (5) feet on center spacing minimum, unless indicated otherwise by the material manufacturer or designer.

3.02 FIELD QUALITY CONTROL

- A. Erection Tolerances:
 - 1. Horizontal Alignment: Within 1/960 of the span.
 - 2. Vertical Alignment: Within 1/960 of respective lengths.

3.03 PROTECTION

- A. Repair of Finish:
 - 1. Restore galvanized coating in areas damaged during erection.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the following:

1. Architecturally-Exposed Structural Steel (AESS), including, but not limited to:
 - a. Shop-fabricated and field-fabricated ferrous metal assemblies exposed to view in the finished Work.
 - b. Security Grilles and Gates.
 - c. Trellis Panel Supports.
 - d. Visual Screens.
 - e. Decorative Screens.
 - f. Steel stair towers.
 - g. Guardrails.
 - h. Stainless steel handrails.
 - i. Headlight Screens.
 - j. Bollards.
2. Non-Architecturally-Exposed Structural Steel (AESS), including, but not limited to:
 - a. Shop-fabricated and field-fabricated ferrous metal assemblies not exposed to view in the finished Work.
 - b. Elevator tower roof framing.
 - c. Canopy framing.
 - d. Concealed CMU wall lateral braces.

1.02 REFERENCES

A. The following is a list of standards referenced in this Section:

1. ASTM A 36 – Standard Specification for Carbon Structural Steel.
2. ASTM A 53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A 153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A 276 – Standard Specification for Steel Bars and Shapes.
5. ASTM A 307 – Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.
6. ASTM A 312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
7. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120 Minimum Tensile Strength.

8. ASTM A 500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. ASTM A 554 – Standard Specification for Welded Stainless Steel Mechanical Tubing.
10. ASTM A 572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
11. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A 666 – Standard Specification for Steel Screw Spikes.
13. ASTM A 792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
14. ASTM A 1011 – Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability, and Ultra-High Strength.

1.03 SYSTEM DESCRIPTION

- A. Architecturally-exposed structural steel (AESS): Provide AESS quality level.
- B. Non- Architecturally-exposed structural steel:
 1. Fabricate in accordance with requirements of Section 05120 - Structural Steel.

1.04 SUBMITTALS

- A. Submit the following:
 1. Shop Drawings.
 2. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. Building Code: Meet applicable requirements of IBC Chapter 22.
 2. Handrails and Guardrails: Meet or exceed applicable requirements of IBC Chapter 10.
 3. Regulations - Shop Primer:
 - a. Comply with State of Washington Volatile Organic Compounds (VOC) Rules and Regulations (Chapter 173-490 WAC) for shop applied, non- toxic metal primer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Hot-rolled Shapes: ASTM A 572, Grade 50.
- B. Coated Sheet:

1. Zinc Coated: ASTM A 653, Grade 50, with G90 coating.
 2. Aluminum-zinc Alloy Coated: ASTM A 792, Grade 50, with AZ50 coating.
- C. Steel:
1. All steel to be in accordance with referenced ASTM A-36, unless more stringent requirements are indicated.
- D. Tubular steel: In accordance with ASTM A500, grade B for steel tube members.
- E. Stainless Steel: Type 316.
1. Tubing: ASTM A554, Grade MT.
 2. Pipe: ASTM A312, Grade TP.
 3. Checkered Plate: ASTM A666.
 4. Bars and Shapes: ASTM A276
- F. Steel Pipe, As Applicable: In accordance with ASTM A53, Type E or S, Grade B. Sizes, dimensions, and configurations as indicated or required.
- G. Flat Plates and Sheets: ASTM A570, standard mill steel, Grade 30 where 3/16 inch or less thick, otherwise ASTM A36.
- H. Welding Electrodes: Conform to AWS Standard D1.1.

2.02 ACCESSORIES

- A. Bolts, Nuts, and Washers:
1. 316 stainless steel, unless noted otherwise.
- B. Bushings:
1. Location: HSS Trellis Panel Supports.
 2. Material: ASTM A325; or as approved.
- C. Expansion Anchors: Phillips wedge rod anchors.
1. Characteristics:
 - a. Reverse cone, self-wedging, expansion type.
 - b. Tightening of nut or increased tension on bolt shank shall act to force wedges outward to create positive increased resistance to withdrawal.
 2. Provide one of the following products:
 - a. Wej-It.
 - b. Kwik-bolt.
 - c. HiHi.
- D. Tamperproof Fasteners:
1. Tamperproof Bolts:
 - a. Locations: Steel Guardrails; and Stainless Steel Handrails.
 - b. Characteristics: 3/8 inch diameter by 16 thread pitch; cone shape head and nut with security recess; lengths as required.

- c. Materials: 316 stainless steel.
 - i. Zamak, zinc alloy, and aluminum materials are not acceptable.
 - d. Provide one of the following products:
 - i. Bryce Fastener. (800) 558-1082 - 'Penta Nut' with '1GPNS37' socket.
 - ii. Tanner Bolt. (718) 434-4500 - 'Torx Tamper-Resistant Cap Screws' with '37CNBAWS - 3/8 -16 Break-A-Way Nut'.
 - iii. Global Fasteners. (800) 553-7998 - 'Penta Nut'.
2. Tamperproof Screws:
- a. Locations: Stainless steel handrails.
 - b. Characteristics: #10; self-tapping; 316 or 410 stainless steel; button and flat head configurations as appropriate for the application; lengths as required; and with tamperproof heads in one of the following styles:
 - i. 'Socket Pinhead'.
 - ii. 'Torx Pinhead'.
 - iii. 'TP3' Triangular Recessed Drive.
- E. Bearing Blocks and Shims:
- 1. Location: HSS Security Grille Framing.
 - 2. Materials:
 - a. Bearing Blocks: ASTM A 36.
 - b. Shims: Stainless steel.
- F. Non-Shrinking Non-Metallic Grout:
- 1. Mix and install in accordance with Manufacturer's directions.
 - 2. Except as otherwise indicated, install any steel set in concrete, in cast-in sleeves, with one of the following products:
 - a. Master Builder's - 'Master Flow 713'.
 - b. Sonneborne - 'Sonogrout'.
 - c. Degussa/Sonneborn. (800) 433-9517 - 'Sonogrout 10k'.
- G. Bolts and similar threaded fasteners, in accordance with referenced Standards, including ASTM A-307 Class A, B, C, and D, as applicable.
- H. Zinc-Coated Ferrous Metal Exterior Nuts, Bolts and Washers: Galvanize exterior bolts and similar threaded fasteners/ASTM A307, in accordance with reference Standard ASTM A153, Class C, and D, as applicable.
- I. Powder-Actuated Fasteners:
- 1. Tempered steel pins with special corrosion resistant finish. Provide guide washers to accurately control penetration. Accomplish fastening by low-velocity piston-driven powder-actuated tool. Pins and tool: Hilti Fastening Systems, Impex Tool Corporation.
 - 2. Penetration depth: Limit penetration of powder-actuated fasteners to not more than three-quarter (3/4) inch unless specifically noted otherwise on the Drawings.

2.03 COMPONENTS

- A. General: Provide weep holes at the bottom of all closed steel shapes and assemblies or at any location in an assembly that may collect moisture as follows:
 - 1. Vertical shapes (columns, supporting members, etc): Minimum of two (2) one-eighth (1/8) inch diameter weep holes to provide positive drainage at the lowest point.
 - 2. Horizontal shapes: Minimum of one (1) 1/8" weep hole per (24) inches of horizontal run, with not less than two (2) weep holes in any single assembly.
- B. Trellis Panels: Refer to Section 10245 - Trellis Panel Assemblies.
- C. Security Grilles.
 - 1. Mesh infill: 10.5 gauge wire, grid pattern 1/2" high x 3" wide welded wire steel mesh.
 - a. The mesh shall be "trimmed", 1/8" stubs maximum.
 - b. Hot dip galvanize and provide with PVC coating conforming to ASTM F668, Class 2B.
 - c. Mounted with welding or tamperproof bolts or screws.
 - 2. Acceptable Manufacturers:
 - a. Riverdale Mills Corp., "Wirewall" high security fencing mesh.
 - b. McNichols. (800) 237-3820 - "Weldmesh".
 - c. Darby Wire. (800) 875-6374 - "Welded Utility Fabric".
 - 3. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- D. HSS Security Grille Framing: Frames and Gates:
 - 1. Form from steel tubing, and plates.
 - 2. Finish: Section 09960 Performance Coatings.
 - 3. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- E. Decorative Screens:
 - 1. Mesh infill: 10.5 gauge wire, grid pattern 1/2" high x 3" wide welded wire steel mesh.
 - a. The mesh shall be "trimmed", 1/8" stubs maximum.
 - b. Hot dip galvanize and provide with PVC coating conforming to ASTM F668, Class 2B.
 - c. Mounted with welding or tamperproof bolts or screws.
 - 2. Acceptable Manufacturers:
 - a. Riverdale Mills Corp., "Wirewall" high security fencing mesh.
 - b. McNichols. (800) 237-3820 - "Weldmesh".
 - c. Darby Wire. (800) 875-6374 - "Welded Utility Fabric".
 - 3. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- F. Decorative Screen Supports:
 - 1. Finish: Section 09960 Performance Coatings.

2. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- G. Box-Rib Profile Steel Panels: Refer to Section 07410 - Metal Wall Panels.
- H. Headlight Screens:
1. Material: Fourteen (14) gage stainless steel.
 2. Corners: Provide round cut corners, with two (2) inch radius.
 3. Edges: Ease edges with a metal file for a smooth profile with no burrs.
 4. Finish: Section 09960 Performance Coatings on exterior surface; No. 4 - Satin on interior surface.
 5. Hardware:
 - a. Provide ASTM F 593 - 316; 5/16 x 18 stainless steel 'U' bolts with throat dimension in a range between 5/8 inch and 3/4 inch; spacers; and 5/16 inch nylon insert 'acorn' stainless steel locknuts for securing Headlight Screens to Cable Restraint System.
 - b. Quantity: Not fewer than ten (10) per Headlight Screen; and not greater than eighteen (18) inches on center spacing.
 - c. Refer to Section 05523 - Cable Restraint Systems.
- I. Equipment Enclosure:
1. Frames and Gates: Form from steel tubing, and plates. Finish: Section 09960 Performance Coatings.
 2. Un-insulated corrugated pattern architectural metal panels: Refer to Section 07410 - Manufactured Metal Panels.
 3. Edge channels and trim: Refer to Section 07600 - Custom Sheet Metal.
 4. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- J. Architectural Steel.
1. Form from structural steel shapes and plates.
 2. Finish: Section 09960 Performance Coatings.
 3. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- K. Steel Guardrails:
1. Guardrail frames:
 - a. Form from structural steel shapes and plates.
 - b. Finish: Section 09960 - Performance Coatings.
 2. Stainless Steel Mesh:
 - a. One (1) inch square 'intercrimp' stainless steel woven wire mesh, eleven (11) gage wire.
 - b. Weld each wire to frame.
 - c. Center welded wire in frame.
 - d. Provide products of one of the following manufacturers:

- i. McNichols Co. (800) 237-3820.
 - ii. Darby Wire. (800) 875-6374.
 - iii. Belleville Wire Cloth, Co. Inc., (800) 631-0490.
3. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- L. Stainless Steel Handrails:
 1. Stainless steel pipe: ASME/ANSI B36.19 - Schedule 40S; nominal one (1) inch pipe size with 1.315 inch outside diameter, and 0.113 inch wall thickness (STD).
 2. Mounting brackets and plates: Fabricate from stainless steel.
 3. Finish for handrails and mounting brackets and plates: No. 4 - Satin.
 - a. Fasteners: Stainless steel tamperproof fasteners in accordance with the provisions of this Section.
 4. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- M. Steel Doors: Refer to Section 08111 - Steel Doors and Frames.
- N. Overhead Coiling Grille Hood: Refer to Section 08334 - Overhead Coiling Grilles.
- O. Overhead Coiling Grille, Anodized Aluminum: Refer to Section 08334 - Overhead Coiling Grilles.
- P. Glazed Assemblies: Refer to Section 08410 - Glazed Assemblies.
- Q. Louvers and Vents: Refer to Section 10200 - Fixed Louvers and Vents.
- R. Bollards:
 1. Form from structural steel shapes and plates.
 2. Finish: Section 09960 Section 09968 - Powder Coating.
 3. Meet or exceed architecturally-exposed structural steel (AESS) quality of fabrication and installation.
- S. Standing Seam Metal Roof Panels: Refer to Section 07400 - Standing-Seam Metal Roof Panels.
- T. Elevator Tower roof framing:
 1. Form from structural steel shapes and plates.
 2. Finish: Section 09960 Performance Coatings.
- U. Canopy framing:
 1. Form from structural steel shapes and plates.
 2. Finish: Section 09910 - Painting.
- V. Concealed CMU wall top braces:
 1. Form from structural steel shapes and plates. Finish: Galvanized.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 FABRICATION

- A. Fabricate steel assemblies to meet the standards of 'AESS' quality as defined in these Specifications, unless otherwise noted.

END OF SECTION

SECTION 061600

SHEATHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wall protective covering.
 - 2. Roof sheathing.

1.02 SUBMITTALS

- A. Product Data.

1.03 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.02 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.03 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior type is suitable for both exterior and interior applications.
 - 3. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

2.04 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

2.05 WALL PROTECTIVE COVERING

- A. Medium Density Fiberboard: ASTM C 208, Type IV, Grade 2 (Structural) cellulosic fiberboard sheathing with square edges, 25/32 inch thick.

2.06 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.

2.07 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing and wall protective covering, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Standard in "Power-Driven Fasteners" Paragraph below covers power-driven staples, nails, P-nails, and allied fasteners.

- D. Power-Driven Fasteners: NES NER-272.
- E. Wood Screws: ASME B18.6.1.
- F. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- G. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 - 2. Retain subparagraph below for cold-formed metal framing, which is typically load-bearing.
 - 3. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
- D. NES NER-272 for power-driven fasteners.
- E. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- F. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- G. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

END OF SECTION

SECTION 071416

COLD FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Cold fluid applied waterproofing.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM C 836 – High Solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.

1.01 SYSTEM DESCRIPTION

- A. Provide cold-fluid applied, polyurethane liquid waterproofing applied to above grade walls retaining soil.

1.03 QUALITY ASSURANCE

- A. Concrete Mix Designs:
 - 1. Concrete mix designs for substrates to receive cold-fluid applied waterproofing shall be reviewed prior to pour, to ensure concrete does not contain additives that affect adhesion of primer and waterproofing.

1.04 PROJECT/SITE CONDITIONS

- A. Do not apply membrane if temperature is less than forty (40) degrees Fahrenheit; OR if precipitation is imminent; OR to a damp or frosty surface.

1.05 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Cold Fluid-Applied Waterproofing:
 - 1. Provide thixotropic, two-component liquid urethane formulated for application to vertical surfaces.
 - 2. Meet or exceed requirements of ASTM C 836.

3. Wet Film Thickness (WFT) of the applied system shall be not less than sixty (60) mils for vertical surfaces, and one-hundred (100) mils for horizontal surfaces.
4. Provide one of the following products:
 - a. Gaco Western (800) 456-4226 – 'LM-60V'.
 - b. Carlisle Coatings and Waterproofing (253) 946-2436 – 'CCW-703-V'.
 - c. Dayton Superior Weatherworker

2.02 ACCESSORIES

- A. Surface Primer: Provide as recommended by the waterproofing manufacturer for each type of substrate encountered.
- B. Sealants: Provide as recommended by the waterproofing manufacturer.
- C. Backer Rod: Closed cell polyethylene foam rod.
- D. Flexible Flashing: In accordance with manufacturer recommendations.
- E. Protection Course:
 1. Protection course is required between cold fluid-applied waterproofing and backfilled materials.
- F. Metal and Neoprene Reinforcements: Provide in accordance with manufacturer recommendations, and written installation instructions.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 071900

WATER REPELLENT COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes penetrating water-repellant treatments for the following vertical and horizontal surfaces:
 - 1. Cast-in-place concrete.
 - 2. Precast concrete.
 - 3. Concrete unit masonry.
 - 4. Clay brick masonry.
 - 5. Brick Veneers

1.02 SUBMITTALS

- A. Submit the following in accordance with the requirements of Section 013300 – Submittal Procedures.
 - 1. Product Data.

1.03 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Do no work of this Section when surface or air temperatures are below plus forty (40) degrees Fahrenheit or above ninety-five (95) degrees Fahrenheit.
 - 2. Weather:
 - a. Do no exterior work on unprotected surfaces if it is raining or moisture from any source is present or expected before finishes can dry, or attain proper cure.
 - b. Allow surfaces to dry and attain indicated temperatures and conditions before proceeding or continuing previously started work.

1.04 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Penetrating Water Repellents
 - 1. Siloxane, Penetrating Water Repellent: Clear, containing 10 percent or more solids of oligomeric alkylalkoxysiloxanes; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 600 g/L or less of VOCs.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 1. Dayton Superior Corporation; Weather Worker WB (J-26-WB), Weather Worker WB Heavy Duty (J-27-WB).
 2. H&C Concrete Care Products, Sherwin-Williams Company (The); H&C Super V or H&C SX-7.
 3. Conspec by Dayton Superior; Weather Seal WB.
- B. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 600 g/L or less of VOCs.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals, LLC; Enviroseal 7, Enviroseal Double 7 for Brick, Enviroseal Double 7 HD, Enviroseal PBT, White Roc 10 WB.
 4. PROSOCO, Inc.; Saltguard, Saltguard WB, Siloxane PD, Siloxane WB Concentrate or Weather Seal GP.
 5. Tnemec Inc.; Dur A Pell 10, Dur A Pell 20, Prime-A-Pell H2O, Prime-A-Pell Plus, Series 662 or Prime-A-Pell Plus, Series V662.

2.02 MATERIALS

- A. King County Transit prefers that all site-applied adhesives, sealants, and coatings shall comply with the VOC limits of Section 018113 Sustainable Building Requirements.
- B. Water Repellent:
 1. Material: Microemulsion concentrate of silanes and oligomeric alkyl alkoxysiloxanes.
 2. Solids: One hundred (100) percent concentrate.
 3. Form: Clear amber liquid.
 4. Specific Gravity: 1.000.
 5. Flash Point: Ninety (90) degrees Fahrenheit in concentrate.
 6. Volatile Organic Content (VOC): 318 grams/liter, ASTM D5059.
 7. Surface Appearance: No change.

2.03 COATING LOCATIONS

- A. Water repellent coating will be applied to all exposed surfaces above grade not receiving other coatings or paint. The underside of concrete slabs need not receive water repellent coating.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 072100

THERMAL INSULATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Thermal glass wool blankets.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM C 665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

1.03 SUBMITTALS

- A. Submit the following in accordance with the requirements of Section 013300 – Submittal Procedures:
 - 1. Product Data: Provide manufacturers' published technical data for each proposed product.
 - 2. Submit design data showing conformance with R values required by governing Energy Code as applicable to occupancy, unless higher values are indicated elsewhere.

1.04 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. King County prefers the use of materials which are sourced locally and include a high percentage of recycled content.
- B. Provide materials from one of the following manufacturers:
 - 1. Owens-Corning. 425-644-9707.
 - 2. U.S. Gypsum. 425-718-8300.
 - 3. Johns-Manville. 800-654-3103.
 - 4. Certainteed. 800-523-7844.

2.02 MATERIALS

A. Thermal Batt, and Sound Attenuation Insulation:

1. Batt insulation products shall contain no added formaldehyde. Slag-wool-fiber/rock-wool-fiber insulation shall be rated for resistance against erosion and mold growth per UL 181.
2. Non-Rated Thermal Glass Batt Insulation: Kraft faced glass fiber thermal insulation shall comply with referenced ASTM C665, Type II, Class C.
3. Required Thermal Values: In accordance with governing Energy Codes but no less than values indicated in the drawings.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

A. Install:

1. Thermal Insulation:
 - a. Fill all spaces indicated in the drawings. Install continuously.
 - b. Install in spaces between framing members at walls and ceilings.
 - c. Install vapor retarder on the warm side of all walls which separate interior, heated space from exterior space.

END OF SECTION

SECTION 072200

ROOF AND DECK INSULATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Rigid board insulation, for cavity wall construction, below grade, and floor slabs.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM C 1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 2. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. IBCO – Chapter 26 Foam Plastic.

1.03 SUBMITTALS

- A. General: Submit the following:
 - 1. Product Data.

1.04 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. King County prefers the use of materials which are rapidly renewable, sourced locally, and include the highest percentage of recycled content. Acceptable products shall be formaldehyde free.
- B. Acceptable Products: Subject to compliance with the requirements, furnish one of each the following types:
 - 1. Rigid Insulation for Perimeter Walls, and for Wall Cavities: Provide one of the following products:
 - a. Owens Corning - 'Foamular CW25'.
 - b. Dow - 'Styrofoam Square Edge'.
 - c. Insulfoam - 'Insulfoam II-40'.
 - 2. Rigid Insulation for Concrete Slabs on Grade:
 - a. Owens Corning - 'Foamular 600'.

- b. Dow - 'Highload 60'.
 - c. Insulfoam (206) 242-9424 - 'R-Tech'.
3. Rigid Insulation for Underside of Decks:
- a. Characteristics:
 - i. Nonstructural, insulative sheathing board meeting the requirements of IBCO – Chapter 26, Section 2603 Foam Plastic.
 - ii. Comply with ASTM C 1289; Type I; Class I.
 - iii. Rigid polyisocyanurate plastic foam core.
 - iv. Aluminum foil facing on exposed side: 1.5 mil thickness.
 - v. Provide with manufacturer's recommended aluminized tapes, and accessories.
 - vi. Provide the following product: RMAX – 'TSX-8500'.

2.02 ACCESSORIES

- A. Surface Conditioner for Concrete:
 - 1. Characteristics: water-based in accordance with manufacturer recommendations
- B. Adhesive for Rigid Insulation Board - Wall Cavities:
 - 1. Gun grade, mastic type.
 - 2. Compatible with rigid insulation board, and fiberglass mat faced gypsum sheathing substrate.
- C. Impale Fasteners:
 - 1. Approved Products:
 - a. Continental Stud Welding - (403) 531-0220: 'Insul-Anchors' with 'Tactoo General Purpose Adhesive'.
 - b. Midwest Fasteners, Inc. - (800) 852-8352: 'IHSP' with 'IHA 170 Insulation Hanger Adhesive'.
- D. Mastic Tape:
 - 1. Approved Products:
 - a. 3M - 'Scotch 2228 Rubber Mastic Tape'; two (2) inch width.
 - b. Plymouth Rubber Company - 'Water Stop Mastic', or 'Rubber Mastic'.
 - c. Bluefield Manufacturing - (800) 445-4461: '#527 Two-Ply Mastic Tape Splice'; one and one-half (1-1/2_ inch width.
- E. Protection Board: Cementitious, one-fourth (1/4) inch thickness.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 074113

METAL ROOF PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Standing seam metal roofing.
 - 2. Accessories, including but not limited to penetrations, flashings, vents, and associated trim.

1.02 REFERENCES

- A. ANSI – Light Gauge Cold-Formed Steel Design Manual. -
- B. ASTM A 653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot Dip Process.
- C. ASTM A 792 – General Requirements for Aluminum-Zinc Coated Sheet.
- D. ASTM A 2201 – Standard Practice for Preparation of Zinc-Coated and Zinc-Alloy Coated Steel Panels for Testing Paint and Related Coating Products.
- E. ASTM D 1056 – Flexible Cellular Materials.
- F. ASTM E 1592 – Structural Performance by Air Pressure Difference.
- G. NAAMM – TM-I.
- H. NRCA – The NRCA Construction Details.

1.03 SYSTEM DESCRIPTION

- A. Provide standing seam metal roof panel system, accessories, penetrations, flashings, vents, and associated trim for a complete installation.
- B. Structural Criteria:
 - 1. Uniform load capacity shall be determined by testing in accord with the principles of ASTM E 1592.
 - 2. Designed to safely resist the following positive and negative loads:
 - a. Roof covering: Negative (-) 21 Wind.
 - b. Roof ridges, eaves, and rakes: Positive (+) 25 Snow.
 - 3. Weathertightness: When tested in accord with the principles of NAAM TM-I, the roof system without sealant in the ribs shall show no leakage when exposed to dynamic rain and wind velocity to seventy (70) mph for five (5) minutes.

4. Deflection of the standing seam rib shall be limited to L/240, but in no case greater than three-quarter (3/4) inch.
5. Roof panels shall be able to support walking loads and design loads without excessive distortion or telegraphing of the structural supports.
6. Roof panel and flashing attachments shall be designed to accommodate the thermal expansion and contraction of the exterior material through ninety-five (95) degrees Fahrenheit of temperature change.
7. Factors of safety on design loads to ultimate strength of fasteners shall be as stated in the industry standard for the material into which the fastener is driven.
8. Roof panel system shall have a UL Class "A" rating as a deck.

1.04 SUBMITTALS

- A. General: Submit the following:
 1. Product Data: Submit manufacturer's product data sheets for each item.
 2. Shop Drawings.

1.05 RELATED SECTIONS

- A. The following related sections are applicable to this work
 1. Section 018113 Sustainable Building Requirements

1.06 WARRANTY

- A. Provide manufacturer's written warranty against defects in materials and workmanship, structural defects, corrosion, and leaks, and agreeing to repair or replace components that fail during the Warranty Period.
 1. The Warranty Period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. King County Transit prefers that the highest amount of recycled content materials, regional materials, rapidly renewable materials and FSC certified wood materials be used. Roofing and flashing shall be lead-free.
- B. Solar Reflectance Index: Not less than 78 for roof slopes less than 2:12; not less than 29 for roof slopes greater than 2:12; when calculated according to ASTM E 1980

2.02 ACCEPTABLE PRODUCTS

- A. Standing-Seam Metal Roofing Panel System: Shall have the following characteristics:
 1. Panel width: Sixteen (16) inches.
 2. Panel Profile:
 - a. Standing ribs; two-and-one-half (2-1/2) inches high with a continuous groove capillary break.

- b. Two intermediate stiffener ribs (minimum 5/16" deep) shall be located in the flat pan to minimize oil-canning and telegraphing of structural members.
 - 3. Panel Material: Twenty (20) gauge Galvalume; forty (40) ksi finished steel per ASTM A 653, A 792, and A 2201; and as recommended by the manufacturer.
 - 4. Provide concealed clips and anchors that resist wind uplift, yet permit expansion and contraction with temperature changes.
 - 5. Ribs shall be securely locked over anchor clips with an electric, field- operated roll-forming tool.
 - 6. Individual panels shall be removable for replacement of damaged material.
 - 7. Fluoropolymer Coating:
 - a. Provide seventy (70) percent minimum polyvinylidene fluoride (PVDF) acrylic resins.
 - b. System Thickness: 0.8 mil minimum dry thickness, applied over a 0.2 mil epoxy primer.
 - c. Comply with manufacturer's recommendations.
 - d. Provide color chosen by the Project Representative from the manufacturer's full range of colors.
 - 8. Provide one of the following products:
 - a. Metecno-Morin Corporation. (800) 640-9501 – 'SRR'.
 - b. Bemo USA. (800) 926-2366 – 'Bemo Roof'.
 - c. Centria. (800) 759-7474 – 'SRS 2'.
 - d. Fabral. (800) 477-2741 – 'Stand 'N Seam'.
- B. Vents:
- 1. Provide vents with the following characteristics:
 - 2. Provide with G90 galvanized coatings; then finish with same fluoropolymer coating as metal roof panels.
 - 3. Provide one of the following products:
 - a. Artis Metals Company. (800) 892-2277 – 'J-Vent'.
 - b. Famco. (800) 234-1903 – 'J-Vent'.
 - c. Construction Metal Inc., (800) 576-9810 – 'J-Vent'.
- C. Underlayment:
- 1. Provide one of the following products:
 - a. Grace Construction Products. – 'Ice and Water Shield'.
 - b. Johns Manville. (800) 654-3103 – 'Johns Manville Ice and Water Guard'.

2.03 COMPONENTS

- A. Flashing: Flashing shall be same material type, and finish as the roof panel, but the temper may be reduced to facilitate forming.
- B. Panels and Sheets:
 - 1. Panels shall be fabricated in full lengths from ridge to eave without end.
 - 2. Minimum thickness shall be the same as the roof panel.

2.04 ACCESSORIES

A. Clips and Anchors:

1. Anchor clips (one piece or two-piece units) designed to be determined by design wind uplift resistance.
2. Clips shall be designed to allow for expansion and contraction of the roof relative to the structure throughout the specific temperature range.

B. Fasteners:

1. Fasteners in supports and screws installed in lips shall be fully recessed so that no sharp edges come into contact with the roof material.
2. Screws holding anchor clips to the structure shall be:
 - a. Into wood: stainless steel (or plated steel).
 - b. Into steel: stainless steel, cadmium plated self-tapping screws into predrilled holes (or plated hardened steel self-drilling screws).
3. Exposed fasteners shall be stainless steel.
4. For weather tightness, screws shall have separate washers with hot bonded neoprene faces, and pop rivets shall be set in wet sealant.
5. Exposed fasteners shall be a minimum #14 size screw or three-eighth (3/8) inch diameter rivet.

C. Foam Closures:

1. Provide materials conforming to ASTM D 1056, and as recommended by the manufacturer.
2. Precut foam profile closures shall be closed cell foam meeting specification.
3. Field fabricated hip closures shall be closed cell foam block supported and protected from weathering by a metal channel matching the roof flashing.

D. Sealants:

1. Provide in accordance with requirements of Section 07 90 00 – Joint Protection.
2. Match colors of the metal roof panels.
3. Sealant used with the roofing shall be applied between surfaces during assembly with a minimum amount exposed on the completed installation.
 - a. Concealed sealant may be a non-curing, non-skinning butyl, polyisobutylene, or polybutane tape of sufficient thickness to make full contact with both surfaces.
 - b. Exposed sealant shall be a curing type with excellent weather and sunlight resistance.
 - c. Apply in accordance with the sealant manufacturers recommendations.

- E. Underlayment: Install in accordance with the product manufacturer's instructions; metal roof panel manufacturer's standard details; the Drawings; and this Section.

2.05 FABRICATION

A. Flashings:

1. Minimum inside bend radius on flashing shall be three (3) times material thickness.

2. Edges shall have an open hem for stiffness.

2.06 SOURCE QUALITY CONTROL

- A. Panel designs are to be in compliance with SMACNA dimensions, profile limitations, gages, and fabrication details.
- B. Electrolytic Protection:
 1. Provide industry-approved separation of materials of different galvanic range.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install in accordance with Specifications of this Section and Manufacturer's directions.
- B. Flashing shall be installed in strict accordance with the recommended practice in the MCA, AA, without fasteners in end laps, and isolated from dissimilar materials.
- C. Excess sealant shall be removed and touch-up paint applied to any areas where paint scrapes occur.
- D. As much as possible, attachment screws shall be eliminated in favor of concealed cleats or clips.
- E. Close all ends, and edges of panels with the required foam closures and metal accessories for a clean, trim appearance.

3.02 CLEANING

- A. Vacuum all metal shavings from the roof panels.

END OF SECTION

SECTION 074213

METAL WALL PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Box-rib pattern metal wall panels.
 - 2. Corrugated pattern metal wall panels.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - 2. ASTM A 792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 3. ASTM D 1056 – Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
 - 4. Metal Construction Association - Preformed Metal Wall Panel Guidelines.
 - 5. SMACNA – Sheet Metal Manual.

1.03 SYSTEM DESCRIPTION

- A. Provide one piece, single length, un-insulated metal wall panels, with accessories and finishes as indicated in this Section.
 - 1. Provide box-rib pattern panels at vehicle barriers, and walls.
 - 2. Provide corrugated pattern panels at equipment screens.
- B. Provide accessories as required by the panel manufacturer for a complete watertight installation.

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Product Data.
 - 2. Shop Drawings.

1.05 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 PERFORMANCE CRITERIA

- A. King County Transit prefers that the highest amount of recycled content materials, regional materials, rapidly renewable materials and FSC certified wood materials be used.

2.02 ACCEPTABLE PRODUCTS

- A. Provide products of this Section from one of the following manufacturers:
 - 1. Metecno Morin, Inc. (800) 700-6140.
 - 2. Centria. (800) 759-7474.
- B. Box-rib Pattern Metal Wall Panels:
 - 1. Characteristics:
 - a. Un-insulated, concealed-fastener architectural metal wall panels.
 - b. Box-rib pattern: One and one-half (1-1/2) inch x One and one-half (1-1/2) inch rectangular ribs.
 - c. Twelve (12) inch panel coverage.
 - d. Factory-applied vinyl gasket at mating edges of panels.
 - e. Base metal: 20-gauge Galvalume 40 ksi prefinished steel per ASTM A 792 or equal.
 - f. Fasteners: Manufacturer's standard concealed fastener.
 - g. Trim pieces: As required by conditions of construction from manufacturer's standard accessories.
 - 2. Corrugated Pattern Metal Wall Panels:
 - a. Un-insulated, exposed fastener architectural metal wall panels.
 - b. Corrugated Pattern: Three (3) inch deep corrugations front-to-back.
 - c. Thirty-six (36) inch panel coverage.
 - d. Factory-applied vinyl gasket at mating edges of panels.
 - e. Base metal: 20-gauge Galvalume 40 ksi prefinished steel per ASTM A 792 or equal.
 - f. Fasteners: Manufacturer's standard hex-head exposed fastener with Neoprene washer gasket.
 - g. Trim pieces: As required by conditions of construction from manufacturer's standard accessories.

2.03 ACCESSORIES

- A. Fasteners:
 - 1. Fasteners shall be color matched to the wall panels; snap-on color caps are not acceptable.
 - 2. For metal-to-metal attachments:
 - a. Stainless steel cadmium plated, #14 self-tapping sheet metal screws into pre-drilled holes; OR

- b. Plated, hardened steel #14 self-drilling screws.
- 3. For weathertightness, screws shall have washers with hot bonded neoprene faces.
- 4. Exposed Pop-riquet Fasteners: Where approved for use by the Project Representative, pop-riquets shall be set in wet sealant.
- B. Precut Profile Closures:
 - 1. Closed cell rubber RE-42 meeting ASTM D 1056 EPT.
 - 2. Metal profile closures of the same material and color as the wall panel, shall be placed in front of rubber closures that have UV exposure.
- C. Sealants:
 - 1. Sealant used with the wall system shall be applied between surfaces with a minimum amount of UV exposure on the complete installation.
 - 2. Concealed sealant may be a non-curing, non-skinning butyl polyisobutylene; OR butyl tape of sufficient thickness to make full contact with both surfaces.
 - a. Caulk shall meet Federal Specification TT-C-1796A, Type I, Class A.
 - b. Tape shall meet Federal Specification TT-C-1796A, Type II, Class B.

2.04 FABRICATION

- A. Fabrication shall be in accordance with Metal Construction Association - Preformed Metal Wall Panel Guidelines.
- B. Comply with dimensions, profile limitations, gauges, and fabrication details show on drawings; and if not shown, provide manufacturer's standard product fabrication and details.

2.05 FINISHES

- A. Finishes for Metal Wall Panels, and Accessories:
 - 1. Characteristics:
 - a. Provide coil coating formulations for applications to sheet materials.
 - b. Provide spray-applied, touch-up formulations for applications to accessories, and products of other Sections required to match coil-coated products.
 - c. Conform with the following general requirements of AAMA 2605.
 - d. Primer Dry Film Thickness: 0.45 mil.
 - e. Coating Dry Film Thickness: 0.70 to 0.90 mil.
 - f. Provide factory-finished products that meet the following:
 - i. 3-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install in accordance with Specifications of this Section and Manufacturer's directions.
- B. Flashing and trim shall be installed in strict accordance with the recommended practice of SMACNA - Sheet Metal Manual; and MCA - Preformed Metal Wall Panel Guidelines.

3.02 CLEANING

- A. Wipe down each area after erection is complete for final acceptance.

END OF SECTION

SECTION 076000

FLASHING AND CUSTOM SHEET METAL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Custom sheet metal fabrications.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM A167 – Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 2. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM A792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM B32 - Standard Specification for Solder Metal.
 - 5. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 6. NRCA – National Roofing Contractors Association.
 - 7. SMACNA – "Architectural Sheet Metal Manual" - 1993, Available Western Washington Sheet Metal Employers Association, Seattle, Washington. (206) 285-4144.

1.03 SYSTEM DESCRIPTION

- A. Provide flashings, counterflashings, metal drips, louver sill flashing, condensation drip pans, reglets, pipe penetrations, gutters and downspouts, and the like for a complete and watertight installation.

1.04 SUBMITTALS

- A. Submit the following.
 - 1. Shop Drawings.
 - 2. Product Data.

1.05 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MATERIALS

- A. King County Transit prefers that the highest amount of recycled content materials, regional materials, rapidly renewable materials and FSC certified wood materials be used. Roofing and flashing shall not contain lead.
- B. Galvanized Steel Sheet Metal Material:
 - 1. Pre-coated Galvanized Steel:
 - a. Prime Commercial Quality Sheet, ASTM A653 (coating G90-1.25 oz. per square foot), low carbon, open hearth steel, ductile, flat, accurately sheared, and evenly covered with tight coat of prime zinc speller.
- C. Stainless Steel Sheet Metal Material:
 - 1. Sheet metal material shall conform to ASTM A167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch (26 ga) thick, unless otherwise indicated.
- D. Fastenings:
 - 1. Nails:
 - a. Same metal as sheet metal flashing or other non-corrosive metal as recommended by sheet metal manufacturer.
 - b. Match finish of exposed heads with material being fastened.
 - 2. Screws:
 - a. High-dome, neoprene gasketed, hex head type, or incorporate a washer with a laminated neoprene gasket.
 - b. Exposed screws to have prefinished heads of color matching the coping metal.
- E. Solder:
 - 1. Galvanized Steel: Conform to referenced ASTM B 32, Alloy Grade Sn50, used with rosin flux.
 - 2. Stainless Steel: Conform to referenced ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- F. Plastic Cement: In accordance with referenced FS SS-C-153, Type I-asphaltic.
- G. Underlayment (as applicable): ASTM D 226, No. 15 asphalt saturated roofing felt.
- H. Reglets:
 - 1. Characteristics:
 - a. Provide in 24 gage Galvalume sheet metal, shop primed, and shop finished as indicated in this Section.
 - b. Surface-mounted profiles for flashing and counterflashing.
 - c. Masonry profiles for installation in brick veneer masonry.
 - d. Concrete reglets for installation in concrete.
 - 2. Provide products of one of the following manufacturers:
 - a. Fry Reglet Corp.

- I. Electrolytic Protection – Bituminous Paint:
 - 1. Provide one of the following products:
 - a. American Tar Company – ‘No. 2221’.
 - b. Farwest – ‘Vitamic’.

2.02 FABRICATION

- A. Conform to referenced SMACNA manual.
- B. Flashing:
 - 1. Use shop finished twenty-two (22) gauge Galvalume sheet metal.
 - 2. Self supporting flashing shall be twenty (20) gage minimum.
 - 3. Use twenty (20) gauge minimum for clips.
- C. Single Pipe Vents:
 - 1. Conform to SMACNA Figure 4-14B with lead flashing system.
- D. External Gutters:
 - 1. Conform to SMACNA Figure 1-2, gutter design.
- E. Stainless Steel Gutters:
 - 1. Fourteen (14) gauge stainless steel, seam molded.

2.03 FINISHES

- A. Finish Characteristics:
 - 1. Provide coil coating formulations for applications to sheet materials.
 - 2. Provide spray-applied, touch-up formulations for applications to accessories, and products of other Sections required to match coil-coated products.
 - 3. Conform with the following general requirements of AAMA 2605.
 - 4. Primer Dry Film Thickness: 0.45 mil.
 - 5. Coating Dry Film Thickness: 0.70 to 0.90 mil.
 - 6. Provide one of the following products:
 - a. Arkema - Kynar 500 Polyvinylidene Fluoride (PVDF); formulations of seventy (70) percent resin.
 - b. Solvay Solexis - Hylar 5000 Polyvinylidene Fluoride (PVDF) formulations of seventy (70) percent resin.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Follow Manufacturer's directions and referenced "SMACNA Manual".

3.02 CLEANING

A. Perform in accordance with the following:

1. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
2. Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

3.03 PROTECT ADJACENT ROOFING MEMBRANES FROM WORK IN THIS SECTION.

1. Remove screws, nails, and sharp objects daily.

END OF SECTION

SECTION 079000

JOINT PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Joint protection.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants.
 - 2. ASTM C 1193 – Standard Guide of Use for Joint Sealants.
 - 3. ASTM C 1330 – Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.03 SYSTEM DESCRIPTION

- A. Provide joint protection of appropriate types to close gaps between materials and products.
- B. High quality products formulated from virgin materials are required.
- C. Compatibility:
 - 1. Use products determined to be fully compatible by the manufacturers.
 - 2. Use surface conditioners where recommended by the manufacturers.
 - a. Surface conditioners shall be non-staining.

1.04 SUBMITTALS

- A. Provide manufacturer's data for each type of sealant and all associated accessories proposed for incorporation in the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: refer to the Joint Sealant Schedule provided in this Section.
 - 1. Types, uses and grades referred to in this Section refer to the applicable types, uses and grades identified in ASTM C 920.
- B. Locations: Metal lap joints, and glazing units
 - 1. Glazing tape.

2. Non-drying, non-curing butyl, OR polyisobutylene.
- C. Locations: Horizontal joints in concrete; traffic joints
1. Two-component, premium grade, polyurethane-based, elastomeric sealant.
 2. Type M; Grade P; Class 25; Use T, NT, M, G, A, O, and I.
 3. Federal Specification TT-S-00227E, Type I, Class A.
 4. Joint Widths: Between three-quarter (3/4) inch and one and one-half (1-1/2 inches).
 5. Provide one of the following products:
 - a. Sika – 'Sikaflex-2c SL'.
 - b. Sonneborn – 'SL2 Sealant'.
 - c. Tremco – 'THC 900'.
 - d. Vulkem – '245'.
- D. Locations: Vertical joints in concrete and masonry.
1. Two-component, premium grade, polyurethane-based elastomeric sealant.
 2. Type M; Grade NS; Class 25; Use T, NT, M, G, A, O, and I.
 3. Federal Specification TT-S-00227E, Type II, Class A.
 4. Joint Widths: Between three-eighths (3/8) inch and three-quarter (3/4) inch.
 5. All sealed joints in concrete unit masonry and brick assemblies shall be surface sanded to match as closely as possible the appearance of the adjacent mortar joints.
 6. Provide one of the following products:
 - a. Sika – 'Sikaflex-2c NS'.
 - b. Sonneborn – 'NP II'.
 - c. Vulkem – '922'.
- E. Locations: Standing-seam metal roof panels; metal wall panels; composite panels; custom sheet metal.
1. Single component, premium grade, moisture-cured, polyurethane-based, non-sag elastomeric sealant.
 2. Type S; Grade NS; Class 25; Use T, NT, O, M, G, I.
 3. Federal Specification TT-S-00230C, Type II, Class A.
 4. Joint Widths: Nominal; bead characteristics shall be per manufacturer instructions.
 5. Provide one of the following products:
 - a. Sika – 'Sikaflex-1a'.
 - b. Sonneborn – 'Omniplus'.
 - c. Dow – 'No. 795'.
 - d. GE – 'Silglaze'.
- F. Locations: Interior joints – other than wet condition.
1. Characteristics: Type S – Single Component Butyl or Acrylic.
- G. Locations: Interior joints – wet condition; and around plumbing fixtures.
1. Characteristics: Type S – Single Component Mildew-resistant Silicone.

- H. Locations: Thresholds.
 - 1. Characteristics: Type S – Moisture Cure Silicone.
- I. Locations: Storefront system glazing sealant.
 - 1. Characteristics: Use G – Single Component Polyurethane.

2.02 ACCESSORIES

- A. Bond Breaker:
 - 1. Polyethylene tape recommended by the manufacturer in its written instructions.
 - a. Provide self-adhesive tape where appropriate.
- B. Joint Fillers: In accordance with ASTM C 1330.
- C. Joint Primers and Conditioners: On-corrosive, non-staining types recommended by the sealant manufacturers' written instructions, and compatible with substrates.
- D. Cleaners: Provide as recommended by the sealant manufacturers written instructions.
- E. Masking Tape: Non-staining, non-absorbent type compatible with materials and substrates.

2.03 SOURCE QUALITY CONTROL

- A. Sealants and Fillers: Meet VOC limits Bay Area Resources Board Regulation 8, Rule 51.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PREPARATION

- A. Substrate Cleaning:
 - 1. Clean out joints immediately before installing joint sealants.
 - 2. Remove laitance and form-release agents from concrete surfaces.
 - 3. Clean non-porous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - 4. Comply with requirements of ASTM C 1193 for preparation of materials to receive latex and solvent-release type materials.
- B. Joint Primers and Surface Conditioners:
 - 1. Prime surfaces when indicated by the manufacturer's written instructions.
 - 2. Apply primer in close conformance to manufacturer recommendations.

C. Masking Tape:

1. Use masking tape where necessary to prevent sealant contact with adjacent surfaces.

3.02 INSTALLATION

- A. Install system in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.

3.03 APPLICATION

- A. General: Comply with requirements and procedures identified in ASTM C 1193.

B. Joint Fillers:

1. Joints Less Than one-half (1/2) inch Depth:
 - a. Apply bond breaker tape to bottom of joints to prevent adhesion of sealant to the bottom of the joint.
2. Joints Less Than three-quarter (3/4) inch but Greater Than one-half (1/2) inch Wide:
 - a. Pack joint with cylindrical joint filler tape to within one-fourth (1/4) inch of finish surface.
3. Joints three-quarter (3/4) inch and Wider:
 - a. Pack joint with cylindrical joint filler tape to within one-half (1/2) inch of the finish surface.

C. Sealants:

1. Conform to the profiles indicated in manufacturer installation instructions.

3.04 FIELD QUALITY CONTROL

A. Curing:

1. Cure sealants in close conformance with manufacturers written instructions and recommendations.

3.05 CLEANING

- A. Remove foreign materials including dust and dirt, and excess adhesive using materials and methods in accordance with manufacturer's written instructions.

3.06 SCHEDULE

A. Joint Sealant Schedule:

MARK	TYPE	JOINT WIDTH	APPLICATION	SECTION(S)
Type S	Single component polyurethane	nominal	Roof panel (except lap joints)	074000 086253
Type S	Single component polyurethane	nominal	Siding panel (except lap joints)	074000
Glazing Tape	Non-drying, non-skinning, non-curing butyl or polyisobutylene	nominal	Metal lap joints	074000

MARK	TYPE	JOINT WIDTH	APPLICATION	SECTION(S)
Use G	Single component polyurethane	3/4 inch	Storefront system (glazing sealant)	084315
Type S	Single component polyurethane	3/4 inch	Storefront system (perimeter)	084315
Type S	Single component butyl, or acrylic sealant	3/16 inch	Miscellaneous interior joints (other than wet condition)	092000
Type S	Single component mildew-resistant silicone	3/16 inch	Miscellaneous interior joints (wet condition)	various
Type M, Grade NS	Multi-component solvent release curing acrylic	3/4 inch	Masonry joint	042200
Type S	Single component polyurethane	nominal	Gutter and downspout	076213
Use T	Self leveling polyurethane	1-1/2 inches	Traffic joint	various
Type S	Single component mildew-resistant silicone	3/16 inch	Plumbing fixtures	various
Type M, Grade NS	Multi-component solvent release curing acrylic	1-1/2 inches	Concrete (vertical)	various
Type S, Grade NS	Single component moisture cure silicone	nominal	Threshold	various

END OF SECTION

SECTION 081100

METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes hollow metal doors and frames, preparation to receive hardware and grouting of frames.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 1. ANSI A250.8 – SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
 2. ASTM A 153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 3. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 4. DHI A115 Series – Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute.
 5. NAAMM HMMA 840 – Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames.
 6. NFPA – 80 – Fire Doors and Windows.
 7. SDI - 100/ANSI 250.8 – Recommended Specifications for Standard Steel Doors and Frames.
 8. SDI 112 – Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.
 9. SDI 117 – Manufacturing Tolerances for Standard Steel Doors and Frames.
 10. UL 10B – Fire Tests of Door Assemblies.

1.03 SUBMITTALS

- A. General: Submit the following:
 1. Shop Drawings.
 2. Product Data.
 3. Certificates.
 - a. Furnish letter from Manufacturer stating that hollow metal doors and frames delivered to the Project conform to these Specifications.
 - b. Submit certification letter attesting that specified priming procedures, methods, and products have been followed.
 4. Maintenance Data.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Accessibility: Comply with provisions of ANSI A117.1.
2. Fabrication and installation of steel door and frame assemblies shall comply with SDI-100 /ANSI A250.8.

B. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved.

1. Fire / Smoke Control Door Construction: Conform to ASTM E 152, and UL 10B.
2. Fire / Smoke Control Door Installation: Conform to NFPA 80.

C. Rated Openings:

1. Provide doors, frames, and other Work of this Section that are in compliance with requirements of Underwriters Laboratories (UL), Factory Mutual, or other approved testing agency.
2. Coordinate with 087000 Hardware.

1.05 DELIVERY, STORAGE AND HANDLING

A. Inspect doors and frames on delivery for damage.

B. Minor damage may be repaired provided refinished items match new work, otherwise, remove and replace damaged items as directed.

C. Protection prior to installation:

1. Protect at all times to prevent damage to doors, frames, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide products of one of the following:

1. Ceco. 206-281-3745.
2. Curries. 425-392-2358.
3. Steelcraft. 513-745-6400.

2.02 COMPONENTS

A. Steel Doors:

1. Exterior Doors:

- a. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
- b. Core: Polyurethane.
- c. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653 with manufacturer's standard coating thickness.

- B. Steel Frames:
 - 1. Comply with the requirements of grade specified for corresponding door.
 - a. ANSI A250.8 Level 3 Doors: 14 gage frames.
 - b. Finish: Same as for door.
 - 2. Exterior Door Frames: Face welded, seamless with joints filled.
 - a. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653, with manufacturer's standard coating thickness.

2.03 ACCESSORIES

- A. Support and Anchors:
 - 1. Fabricate from minimum eighteen (18) gauge galvanized sheet steel.
 - 2. Galvanized units after fabrication, and in conformance with ASTM A 153, Class B.
- B. Astragals for Double Doors:
 - 1. Steel, Z-shaped.
- C. Inserts, Bolts, and Fasteners:
 - 1. Provide manufacturer's standard units, EXCEPT hot-dip galvanize items to be built into exterior walls, and conform to ASTM A 153, Class C or D as applicable.
- D. Bituminous Coating: Fibered asphalt emulsion.

2.04 FABRICATION

- A. General:
 - 1. Fabricate exposed faces of doors and panels from only cold rolled steel.
 - 2. Fabricate frames, concealed stiffeners, reinforcement, edge channels and moldings from either cold-rolled OR hot-rolled steel at manufacturer's option.
 - 3. Provide steel top cap to seal all doors.
 - 4. Tolerances: Comply with SDI 117.
- B. Doors:
 - 1. Comply with ANSI A250.8, Level 3 – Extra Heavy Duty, Model 2; Seamless – Hollow Metal.
 - a. Face Sheets: 16 gage thickness.
 - b. Core: Polystyrene foam.
 - 2. Glazing Stops:
 - a. Thickness: 0.0359 inch thickness.
 - b. Provide non-removable stops; locations:
 - i. Outside of exterior doors.
 - ii. Secure side of interior doors.
 - iii. Glazing Beads: Screw-applied, removable.

C. Frames:

1. Provide metal door frames of the types and styles complying with Manufacturer's specifications, and ANSI A250.8 for minimum materials and construction requirements.
2. Profile: Pressed steel single rabbet; flush; with two (2) inch face; and five-eighth (5/8) inch returns, unless noted otherwise.
3. ANSI A250.8, Level 3.
 - a. Material shall be in accordance with ASTM A 653, Grade A60.
 - b. Metal Thickness: 16 gage; except use 14 gage for units over thirty-six (36) inches in width.
 - c. Finish: Hot dip galvanized.
 - d. Fabricate per SDI 112.
4. Conceal fastenings, unless otherwise indicated.
 - a. Body putty frames flush over fastenings making fasteners invisible.
5. Welded Frames: Fabricate frames of welded construction as required for rated and non-rated assemblies, all corners mitered.
 - a. Knockdown frames not permitted.
6. Plaster Guards: Provide 26 gauge steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where finish materials might obstruct hardware operation.
7. Protective Frame Coating:
 - a. Factory coat inside of frames indicated to be grouted, and frames indicated to be built into concrete construction.
 - b. Apply bituminous coating to a thickness of one-sixteenth (1/16) inch.

2.05 FINISHES

A. Preparation:

1. Weather Exposed: SSPC-SP6 Commercial Blast Cleaning.

B. Primer and Adhesion Promoter:

1. Per Section 099100 – Painting.
2. Do not shop-prime steel scheduled to receive Section 099623 Graffiti-Resistant Coatings.

C. Finish:

1. Per Section 099100 – Painting.
2. Special Requirement: Do not paint over labels for rated doors and frames.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PREPARATION

- A. Bituminous Coating: Back paint metal frames indicated to be installed in concrete, and masonry wall assemblies, with bituminous coating.

3.02 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. Frames:
 - 1. Place frames per ANSI A250.8 and SDI-105 "Recommended Erection Instructions for Steel Frames."
 - 2. Set frames accurately in place/plumb/aligned and securely braced.
 - 3. Jamb Anchors:
 - a. Install a minimum of three (3) wall anchors per jamb at hinge and strike levels.
 - b. Install sealant between door and window frames and wall.
- C. Grouting:
 - 1. Grout frames located in concrete, and masonry wall assemblies.
 - a. Do not grout metal frames located in metal stud wall assemblies.
 - 2. Assure frames are back painted with bituminous coating before beginning.
- D. Install doors, frames, and gasket assemblies plumb and square to provide continuous seal.
 - 1. Install fire-rated doors in fire-rated assemblies, and in conformance with standards for fire-rated doors and assemblies.
 - 2. Fit hollow metal doors accurately in their respective frames, within range of clearances specified in ANSI 250.8 and SDI-122.
- E. Coordinate gasketing with other hardware to maintain a continuous perimeter seal.
- F. Shim door closers as necessary to accommodate minor deviations in plane, and to maintain a continuous seal at the gasketing.

3.03 TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: One-sixteenth (1/16) inches measured with straight edge, corner to corner.

3.04 CLEANING

- A. Remove foreign materials including dust and dirt, and excess adhesive using materials and methods in accordance with manufacturer's written instructions.
- B. Remove temporary labels and protective coverings.

END OF SECTION

SECTION 083100

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Access doors in finished walls where indicated or required.
 - 2. For access doors to Mechanical or Electrical work, see those Divisions.

1.02 SYSTEM DESCRIPTION

- A. Provide manufactured, outward opening, metal panel access doors with metal frame construction, of types required to accommodate adjacent construction as indicated.

1.03 SUBMITTALS

- A. Submit the following:
 - 1. Design Data: Indicate each installation in accordance with governing code reference.
 - 2. Shop Drawings.
 - 3. Product Data.

1.04 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors from one source, and by a single manufacturer.

1.05 PERFORMANCE REQUIREMENTS

- A. Fire-rated access doors and frames: units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL and acceptable to authorities having jurisdiction.
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products of one of the following:
 - 1. Larsen's Manufacturing Co. 800-LARSENS.
 - 2. Milcor, Inc. 419-228-1411.

3. Williams Brothers Inc. 800-255-5515.
4. Nystrom, Inc., 800-781-3491.
5. Precision Ladders, LLC, 800-225-7814.

B. Nystrom flush panel access doors are the basis of design for Work of this Section.

1. Provide model 'NT' as required for concrete unit masonry wall type.
2. Material: 16-gauge steel frame with 14-gauge door panel.
3. Phosphate dipped with baked on rust inhibitive gray prime finish.
4. Sizes: Three (3) inch x three (3) inch unless indicated otherwise on drawings.
5. Quantity: As required.
6. Hinge: Concealed spring pin hinges open to 175 degrees.
7. Provide number of hinges required in accordance with panel size.
8. Lock: Key operated cylinder lock with two keys per lock, keyed alike.

2.02 FABRICATION

- A. Construction: Fabricate units on continuous welded steel construction.
- B. Grind welds smooth and flush with adjacent surfaces.
- C. Furnish attachment devices and fasteners of the type required to secure access panels to the types of support shown.

2.03 FINISHES

- A. Paint access doors and frames in accordance with Section 099100 Painting.
- B. Paint color shall match adjacent surfaces unless noted otherwise.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install system in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.
 1. Install frames plumb and level in openings. Secure rigidly in place.
 2. Position units to provide convenient access to concealed work requiring access.

3.02 CLEANING

- A. Leave installations clean; premises free of any residue of work of this Section.

END OF SECTION

SECTION 083300

COILING DOORS AND GRILLES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Motor operated overhead coiling grilles.
- B. Related Sections:
 - 1. 087000 Hardware.

1.02 SYSTEM DESCRIPTION

- A. Provide motor-operated overhead coiling grilles in locations indicated on the Drawings.
- B. Provide complete installations, with safety features fully incorporated, and ready for operation by the Owner.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with the Conditions of Contract and Section 013300 Submittal Procedures:
 - 1. Product Data: Submit manufacturer's project data sheets for each item.
 - 2. Shop Drawings:
 - a. Provide installation and layout Shop Drawings for the specific conditions of this Project.
 - i. Manufacturer's standard published drawings are not sufficient for this purpose and are not acceptable to meet the requirements.
 - ii. Include an elevation view and a section view for each respective door, at a minimum.
 - iii. Indicate the end on which motor operators are proposed fitted.
 - iv. Show control locations, and location for electrical disconnects.
 - b. Include detailed erection and installation instructions.
 - c. Show attachments.
 - d. Show critical dimensions and clearances to obstructions.
 - i. Show doors in relationship to clear openings, and provide dimensions for coordination of jamb and head positions.
 - ii. Indicate tolerances for field location of attachments.
 - iii. Show correct as-built dimensions of concrete structure, and other permanent surfaces surrounding each respective door.
 - iv. Indicate observed slopes and surface irregularities in the installed concrete work on the Shop Drawings.

- e. Show relationships to adjacent surfaces, curbs, and obstacles.
 - f. Show details of fabrication and dimensions.
 - g. Indicate door numbers on each respective drawing.
3. Samples:
- a. Provide one (1) sample of door grille proposed for the Project.
 - b. Size: Twelve (12) inches by twelve (12) inches, and assembled so as to stay together in one unit to accommodate handling in the review process.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. Comply with requirements of the authority having jurisdiction, and referenced Safety and Health requirements.
- 2. Electric motor operators shall be UL Listed and approved.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

- 1. Maintenance Proximity: Not more than two hours normal travel time from Installer's place of business to Project site.
- 2. All electrical controls to be completed by door installer by fully licensed and trained electrician.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Provide palletized cartons to protect doors from damage during shipping, storage, and handling.
- B. Store in original protective packaging until time of installation.
- C. Handle doors in strict accordance with manufacturer's instructions.

1.06 WARRANTY

- A. Provide manufacturer's written warranty against defects in materials and workmanship, and agreeing to repair or replace components that fail during the Warranty Period.
 - 1. The Warranty Period for Work of this Section is two (2) years commencing on the date of Substantial Completion.

1.07 OWNERS INSTRUCTIONS

- A. Separate cardboard and paper packaging, pallet materials, and metals used in shipping overhead coiling grilles for later disposal and recycling at firms listed in the King County 'Construction Recycling Directory,' latest edition.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Products specified for Work of this Section are:
 - 1. Cookson Co. 206-547-1900.

2. Cornell. 800-233-8366.
3. Overhead Door Corporation. 888-451-0060.
4. Or Approved Equal.

2.02 ACCEPTABLE PRODUCTS

A. Overhead Coiling Grilles:

1. Doors indicated on the Drawings: Basis of design unit is Cookson Type 'FMG' face-mounted rolling grille, operated by a vertically mounted gearhead motor.
2. Mount coiling grilles to HSS columns as detailed on the Drawings

B. Grille Curtains:

1. Pattern: Cookson No. 5015-9 heavy duty grille pattern constructed of solid 5/16-inch-diameter horizontal aluminum rods with 1/2-inch tube spaces on 1-1/2 inches on-center spacing; with 3/16 inch thick aluminum hinged vertical connecting links (5/8 inch deep by 2-1/4 inches high); with 9 inches on-center spacing.
2. Finish: The finish on the rod, tube spacers, and links shall be 204-R1 clear anodized.

C. Bottom Bars:

1. Bottom bars shall consist of an extruded aluminum tube measuring 4 inches high by 1 3/4 inches deep, and shall include the Cookson 'Featheredge' safety edge system.
2. Provide sloped bottom bar assembly as required to fully close openings at irregular (non-horizontal) entrances.
3. Field verify slope angle after placement and finishing of adjacent concrete surfaces.
4. Finish: Bottom bar finish shall be 204-R1 clear anodized.

D. Door Guides:

1. Door guides shall be constructed of a 1/4-inch-thick continuous aluminum angle connected to 1 1/2 inch by 2 1/2 inch by 1/8 inch thick continuous extruded aluminum guide section. Continuous nylon wearstrips shall be inserted on both sides of the guide to eliminate metal-to-metal contact. The aluminum wall angle and the aluminum guide shall be 204-R1 clear anodized finish.

E. Brackets:

1. The brackets shall be constructed of steel not less than 1/4-inch thick.
2. Finish: Brackets shall have one coat of aluminum prime paint.

F. Barrel:

1. The barrel shall be steel tubing of not less than 6 inches in diameter. Oil tempered torsion springs shall be capable of correctly counter balancing the weight of the curtain. The barrel shall be designed to limit the maximum deflection to 0.03 inches per foot of opening width. The springs shall be adjusted by means of an exterior wheel.
2. Finish: The finish on the barrel shall be one coat of bronze rust-inhibiting paint.

G. Hood:

1. The hood shall be fabricated from 0.040 inch aluminum sheet, and shall be formed to fit the profile of the brackets.
2. Finish: The finish on the hood shall be 204-R1 clear anodized.

H. Operator:

1. The grille shall be operated at a speed of 2/3 foot per second by an open drip-proof electric motor with gear reducer in oil bath.
2. The motor operator shall include a geared limit switch and an electrically interlocked emergency chain operator.
3. The motor starter shall be housed in a NEMA 1 housing and include a magnetic reversing starter size 0, a 14-volt control transformer, and complete terminal strip to facilitate field wiring.
4. The motor operator shall be activated by a three-button push-button station in a NEMA 1 enclosure.
5. The motor shall be sized as required by the grille, 230 volts, three phase.
6. The motor operator shall be mounted to the grille bracket as shown on drawings.
7. The motor operator shall be UL listed.
8. Coordinate location with King County Metro Transit requirements, for approval by King County Project Representative.

I. Accessories:

1. Grilles shall be provided with 110VA transformers, timer to close, photo eyes, auxiliary limit switches (terminal block connections) for open and close limits to advise of door position (open or closed), delay on reverse function, non-resettable cycle counters, wall-mounted starter with hinged cover.

J. Control Stations:

1. Coordinate with the Security System requirements.
2. Grilles shall be provided with surface-mounted three-button control stations on interior, and NEMA 4 compliant key stations on the exterior, and masterkeyed to Corbin Russwin high security cores in accordance with Section 087000 Finish Hardware.
3. Coordinate location with King County Metro Transit requirements, for approval by King County Project Representative.

K. Safety Edge:

1. The grille shall be fitted with the Cookson 'Featheredge Rolling Grille Safety Edge System,' and shall include the following features:
 - a. The safety edge shall be installed on the bottom bar of the grille and shall automatically reverse the grille if the device detects an obstruction in the downward travel of the grille.
 - b. The grille shall be provided with cord reel to connect safety edge to operator.
 - c. The safety edge shall consist of a rubber boot attached below the bottom bar with an electrical switch secured to the back of the bottom bar.
 - d. The safety edge shall not rely on pneumatic pressure of electrical strip contacts to operate properly.
 - e. The operation of the safety edge shall not be subject to interference by temperature, barometric pressure, water infiltration, or cuts in the rubber boot.

L. Loop Detectors:

1. Provide one loop detector at coiling door (one set of three loops). Provide wiring, conduit and auxiliary components as required for a fully functioning system. Cut loops into base slab maximum of 1/2 depth and cover with loop filler. The purpose of the loop detectors is, in the nighttime condition, when the coiling doors are closed, to detect the presence of a car and send a signal to the operator to open the doors to allow the car to exit.

M. Control Interface:

1. Provide control interface for doors as required for a fully functioning system to allow King County the ability to remotely operate (open and close) the coiling doors. In order to accomplish this, provide the following control interface at the controller for each door:
 - a. One normally open dry contact wired between the common terminal and open terminal in motor control panel for open function.
 - b. One normally open dry contact wired between the common terminal and the close terminal in motor control panel for close function.
 - c. One normally closed dry contact wired in series with stop buttons on local control station.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Upon completion of installation, including work by other trades, lubricate, test, and adjust grilles to operate easily, free from warp, twist, or distortion.
- B. Upon completion of installation, provide training to King County personnel on the full operation of the doors. Provide operation and maintenance manual to King County.
- C. Install system in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.

3.02 ADJUSTING

- A. Make any adjustments required to ensure proper and reliable operation.
 1. Include adjustments to motor and hardware as necessary to achieve proper operation.
- B. Put overhead coiling grilles into service as soon as installed and without delay.

END OF SECTION

SECTION 084113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Aluminum storefront assemblies.
 - 2. Aluminum curtain wall assemblies.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specifications apply to the work of this Section.
- B. Related Section: Division 08 Section "Glazing".

1.03 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. AAMA 501.2-03 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 2. ASTM E 283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 3. ASTM E 330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - 4. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.04 PERFORMANCE

- A. Acceptable assemblies for work of this Section shall meet or exceed the following performance criteria:
 - 1. Wind Loads: Comply with provisions of the IBC Code.
 - 2. Air Infiltration:
 - a. Tested in accordance with ASTM E 283.
 - b. Air infiltration rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 6.24 psf.
 - 3. Static Water Resistance:
 - a. Tested in accordance with ASTM E 331.
 - b. There shall be no leakage at a static air pressure differential of twelve (12) psf; refer to AAMA 501.
 - 4. Dynamic Water Resistance:
 - a. There shall be no leakage at a static air pressure differential of twelve (12) psf; refer to AAMA 501.1.

5. Uniform Loading:
 - a. In accordance with ASTM E 330, deflection shall be limited to L/175 of the span of any framing member at design load when a static air design load of forty (40) PSF is applied alternately in the positive and negative directions.
 - b. No glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur at structural test load equal to 1.5 times the specified design load.
6. Seismic Loading: When tested in accordance with AAMA 501.4:
 - a. Meet design displacement of 0.010 times the story height; AND
 - b. Meet ultimate displacement of 1.5 times the design displacement.
7. Expansion and Contraction: Accommodate surface temperature differential of one-hundred-ninety (190) degrees Fahrenheit.
8. Condensation Resistance: When tested in accordance with AAMA Specification 1530, the Condensation Resistance Factor (CRF) shall be sixty-six (66) or greater at the frame.

1.05 SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Test Reports.
- C. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
- D. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.”.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aluminum Extrusions:
 1. Extruded 6063-T5 alloy and temper; OR
 2. As required to be compatible with the indicated finish.
- B. Fasteners:
 1. Aluminum; OR
 2. Stainless steel.
 3. Zinc plated fasteners are not permitted.
- C. Perimeter Anchors:
 1. Aluminum or stainless steel.
 2. Designs and configurations shall be isolated to prevent galvanic corrosion.

2.02 MANUFACTURED UNITS

A. Storefront Assemblies:

1. Face-set, non-thermal break configuration.
2. Locations as indicated on the Drawings.
3. Dimensions: Four (4) inch width; six (6) inch depth.
4. Glazing unit configuration: Prepare framing to accept one (1) inch nominal thickness insulated glazing units.
5. Provide one of the following assemblies:
 - a. Arcadia, Inc.
 - b. Commercial Arch. Prod. Inc.
 - c. LEED Himmel Industries, Inc.
 - d. United States Aluminum
 - e. Vistawall Arch. Products
 - f. Kawneer - '1600 System 1'.

B. Curtain Wall Assemblies:

1. Face-set, non-thermal break configuration.
2. Shear block construction.
3. Locations as indicated on the Drawings.
4. Dimensions: Four (4) inch width; six (6) inch depth.
5. Glazing unit configuration: Prepare framing to accept one (1) inch nominal thickness insulated glazing units.
6. Provide one of the following assemblies:
 - a. Arcadia, Inc.
 - b. Commercial Arch. Prod. Inc.
 - c. LEED Himmel Industries, Inc.
 - d. United States Aluminum
 - e. Vistawall Arch. Products
 - f. Kawneer - '1600 System 1'.

2.03 FABRICATION

A. Utilize manufacturer's standard methods.

1. Workmanship:

2.04 FINISHES

A. Aluminum Framing:

1. Class I anodized coating in accordance with AAMA AA-M12-C22-A31.
2. Color: No. 14 Clear.
3. Seven-tenths (0.7) mils minimum thickness.
4. Provide the same finish for all aluminum framing and items of this Section.

2.05 SOURCE QUALITY CONTROL

- A. Provide assemblies of this Section from a single manufacturer, and installer.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install system in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.

END OF SECTION

SECTION 087000

HARDWARE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Finish hardware.

1.02 RELATED SECTION

- A. Comply with the requirements of
 - 1. Division 28 Section 'Electronic Access control System'.

1.03 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ADA – ADAAG.
 - 2. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
 - 3. ANSI/BHMA – Reference Standards 156 series.
 - 4. ANSI 156.1 - Butts and Hinges.
 - 5. ANSI 156.2 – Bored Locks and Latches.
 - 6. ANSI 156.3 – Exit Devices.
 - 7. ANSI 156.4 – Door Controls/Closers.
 - 8. ANSI 156.5 – Auxiliary Locks and Associated Products.
 - 9. ANSI 156.6 – Architectural Door Trim.
 - 10. ANSI 156.7 – Template Hinge Dimensions.
 - 11. ANSI 156.8 – Door Controls – Overhead Holders.
 - 12. ANSI 156.13 – Mortise Locks and Latches.
 - 13. ANSI 156.14 – Sliding and Folding Door Hardware.
 - 14. ANSI 156.15 – Closer Holder Release Devices.
 - 15. ANSI 156.16 – Auxiliary Hardware.
 - 16. ANSI 156.17 – Self-Closing Hinges and Pivots.
 - 17. ANSI 156.18 – Materials and Finishes.
 - 18. NFPA 80 – Fire Doors and Windows.
 - 19. NFPA 101 – Life Safety Code.

1.04 SUBMITTALS

- A. General: Submit the following:
 - 1. Product Data.
 - 2. Finish Hardware Schedule:
 - 1. List hardware schedule for each door opening separately, using a vertical format per the sample hardware set below.

SAMPLE HARDWARE SCHEDULE FORMAT:

Door 101

HW1 - One single door: 3'-0" x 7'-0" x 1-3/4" W x HM

	Butts	CB1900 US26D 4-1/2 x 4-1/2
1 ea	Lockset	ML2051 LWA 630 SA114 M17
1 ea	Closer	DC2200 689 M54 M72 M74
1 ea	Kickplate	K0050 10 x 34 630
1 ea	Wall stop	WC9X 626
3 ea	Silencers	64

2. Provide copies of catalog cuts for each item.
3. Promptly incorporate any corrections and changes in the reviewed submittal and return copies, quantity as required, of the revised Finish Hardware Schedule to the Developer for distribution.

B. Special Tools:

1. The Developer shall provide to the County two (2) sets of any special tools shipped with the finish hardware products required for maintenance and installation.

C. Operations and Maintenance Data:

1. Submit required sets of O&M manuals.
2. Include an as-built Finish Hardware Schedule, catalog cuts, template lists with templates and warranty information.
3. One (1) additional copy shall either be delivered with the permanent keys at the completion of the construction period.
4. This copy shall contain parts data for exit devices, locksets & closers, and catalog cuts of all electrical products, including manufacturer's name.

1.05 QUALITY ASSURANCE

A. Supplier Qualifications:

1. The hardware supplier shall be a factory direct authorized distributor of the material provided and shall maintain a stock and parts inventory of standard items supplied on the Project.

B. Regulatory Requirements:

1. Provide listed door hardware at fire rated openings in compliance with NFPA 80 and the requirements of the authority having jurisdiction.
2. Hardware provided for the Project is to be ADA compliant.

C. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved.

D. Completeness:

1. Provide a complete and functional hardware installation including all products, materials and accessories necessary for the Project.

1.06 WARRANTY

- A. **Special Warranty:** Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. The Warranty Period for Work of this Section is one (1) year commencing on the date of Substantial Completion, unless otherwise indicated:
 - a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion. Comply with the requirements of Division 28 Section 'Electronic Access Control System'.
 - b. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide hardware items from the following manufacturers:
 - 1. The following manufacturers' products are the basis of design for Work of this Section:
 - 2. Butts and Hinges: Stanley.
 - 3. Manual Flush Bolts: Ives.
 - 4. Mortise Locks: Corbin Russwin.
 - 5. Cylinders: Corbin Russwin high security cores.
 - 6. Exit Devices: Corbin Russwin.
 - 7. Surface-mounted Closers: Norton.
 - 8. Flat Goods and Trims: Trimco.
- B. Items indicated in the Finish Hardware Schedule in Part 3 of this Section, but not specifically listed in Part 2 shall be provided as indicated in the Finish Hardware Schedule.

2.02 PRODUCTS

- A. **General:** The facility standard for door hardware applies to the lock cylinders. Master lock sets shall follow King county Metro Transit Power & Facility's transit-wide facility cut-key system.
- B. **Butts:**
 - 1. **Type:** As indicated in the Finish Hardware Schedule.

2. Sizes:
 - a. For Doors 3'-0" and Under: 4-1/2 inch x 4-1/2 inch, except as required for 180 degree swing.
 - b. For Doors 3'-1" and over: 5 inch x 4-1/2 inch, except as required for 180 degree swing.
 - c. Quantities:
 - i. For Doors up to ninety (90) inches height: Three (3) each.
 - ii. For Doors over ninety (90) inches height: Four (4) each.
3. Special Requirements: Exterior outswinging doors are to have non-removable pins with NRP screw set into the barrel of the hinge.

C. Locksets:

1. Type:
 - a. Mortise: Grade 1; extra heavy duty; and UL Listed for use on fire doors.
 - b. Deadbolt function; deadbolt shall have one (1) inch projection.
 - c. Functions shall be as listed in the Finish Hardware Schedule in this Section; and in accordance with the approved Submittals.
 - d. Wrought strike boxes.
 - e. Provide escutcheons in accordance with manufacturer's instructions.
2. Design: Lever; NSV.
3. Backset: 2-3/4 inches.
4. Furnish with strikes having curved lip, and with sufficient lip to protect trim.
 - a. Three-quarter (3/4) inch latch bolts require minimum three-quarter (3/4) inch clearance for trim.
 - b. Furnish strikes with extended lip for other configurations.

D. Keying:

1. Furnish keys in configurations and quantities as follows:
 - a. Master Keys: Furnish six (6).
 - b. Control Keys: Furnish two (2).
 - c. Construction Keys: Furnish ten (10).
 - d. Change Keys: Furnish three (3) per keyed-alike group.

E. Exit Devices: Provide as indicated in this Section.

F. Pushes and Pulls: Provide as indicated in this Section.

G. Manual Flush Bolts: Provide as indicated in this Section.

H. Surface-mounted Door Closers:

1. Furnish drop plates or other mounting plates where required.
2. Provide closers of sufficient size and mounting style for each respective opening.

- I. Overhead Stops:
 1. Provide proper size and configuration of overhead stop for respective door width.
 2. Through-bolt with sex nuts and bolts.

2.03 FINISHES

- A. Designations for the hardware finishes are those listed in ANSI/BHMA A156.18 – Materials and Finishes.
- B. Finishes for products of this Section shall be as follows.
 1. Butts: 630/626.
 2. Locksets: 630.
 3. Exit Devices: 630.
 - a. Closers: 689.
 4. Pushes and Pulls: 630.
 5. Other Items: 626.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install finish hardware in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.
- B. Manufacturer's standard locations shall apply as required to meet applicable code requirements.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.
- F. Weather-stripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.02 FIELD QUALITY CONTROL

- A. Allowable Tolerances: Level main runners and cross tees to within one-eighth (1/8) inch in twelve (12) feet.

3.03 ADJUSTING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit.
- B. Adjust door control devices to compensate for the final operation of mechanical air-handling systems.
- C. Approximately six months after acceptance of hardware in each area, the installer shall return to the project and make any necessary adjustments to the hardware to restore proper operational function of door and hardware.
- D. Consult with and instruct County's personnel in any recommended additions or maintenance procedures.

3.04 SCHEDULES

- A. Finish Hardware Groups: Electrical items are marked accordingly and shall be coordinated with the electrical subcontractor, for required provision of circuiting, conduit, cabling, terminations and boxes associated with the finish hardware requiring power and or data.

- 1. Finish Hardware Group For Doors To Electrical Room, Elevator Machine Room, Generator Room, Communications Room, And Custodial Room:

Varies		Hinges BB179
1	ea	ML2065 NSA LC
1	ea	Cylinder 1090 626
1	ea	Closer 7500SS SNB
1	ea	Overhead stop 9-X36
1	ea	Threshold 171A MS & ES
1	ea	Door bottom 18061CP
1	set	Gasket S88D

- 2. Finish Hardware Interior Door To Sprinkler Room:

Varies		Hinges BB191 NRP
1	ea	Lockset ML2057VR LC
1	ea	Cylinder 1090
2	ea	Flush bolts 458B
1	ea	Dustproof strike 487B x 489B
1	ea	Closer P7500SS SNB (active leaf)
2	ea	Overhead stop 6-X36
1	ea	Threshold 171A MS & ES
2	ea	Door bottom 18061CP
1	set	Gasket S88D
1	set	Meeting stile gasket S77C

- 3. Finish Hardware Exterior Door To Sprinkler Room:

Varies		Hinges BB179
1	ea	Cylinder 1090 626
1	ea	Closer 7500SS SNB
1	ea	Overhead stop 9-X36
1	ea	Threshold 171A MS & ES

1 ea Door bottom 18061CP
1 set Gasket S88D

4. Finish Hardware Overhead Ceiling Grille / Door:

a. All hardware by door manufacturer except:

1 ea Cylinder 1090

5. Finish Hardware Doors To Stairways

Varies Hinges BB199
1 ea Exit device ED4200 K157 LC
1 ea Strike 655F71-8
1 ea Cylinder 3090
1 ea Anti-vandal trim 1090
1 ea Closer P7500SS SNB
1 ea Drop plate 7788
1 ea Wall stop 1270CVCP
Silencers

6. Comfort Station Door hardware shall conform to the requirements of Appendix C to the Design Criteria, "Metro Transit Standard Single-Unit Comfort Station". This hardware group shall also include the following:

1 ea Privacy ML2065 NSA LC

1 ea Privacy Indicator 5004-1

END OF SECTION

SECTION 088000

GLAZING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Un-insulated glazing units.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. IBC – Chapter 24 – Glass and Glazing.
 - 2. IBC – Section 2406 – Safety Glazing.

1.03 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Provide exterior, single sheet, un-insulated glazing units.
 - 1. Provide glazing units coordinated with the requirements of the referenced standards, the Design Criteria, these Performance Specifications and in compliance with federal, state and jurisdictional requirements for safety glass.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Product Certificates: For glass and glazing products, from manufacturer.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for glazing sealants and glazing gaskets.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
 - 2. Preconstruction adhesion and compatibility test report.
- D. Maintenance Data.

1.06 QUALITY ASSURANCE

- A. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved.
 - 1. Mark and label glazing items in accordance with requirements of IBC - Chapter 24 – Glass and Glazing.
 - a. Include required labels for safety glass: Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

PART 2 PRODUCTS

2.01 GLASS PRODUCTS, GENERAL:

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- B. Strength: Where required to comply with Structural Performance and Regulatory Requirements, provide the following.
 - 1. Float glass shall be annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass.
 - 2. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass.
 - 3. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for the Project Wind Zone when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
 - 1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
 - 2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.

- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick or thickness indicated by the Developer's design in response to Performance Criteria.
 2. For laminated-glass lites, properties are based on products of construction indicated by the Developer's design in response to Performance Criteria.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.02 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I transparent flat, Quality-Q3, Class I (clear) unless otherwise indicated by design location and Performance Requirements.
- B. Heat-Treated (Tempered) Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated by design location and Performance Requirements.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. For uncoated glass, comply with requirements for Condition A.
 3. For coated vision glass, comply with requirements for Condition C (other coated glass).
- C. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.
1. Visible Light Transmittance: 91 percent minimum.
- D. Laminated Glass and Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172 and ANSI Z97.1, B, complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified.
1. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 2. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
 3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 4. Interlayer Color: Clear unless otherwise indicated.

2.03 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

- B. Fire-Protection-Rated Tempered Glass: Fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials, thickness ¼", 3/8" or ½" as indicated by design condition and Performance Requirements.

2.04 MANUFACTURED UNITS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - 1. Sealing System: Dual seal
 - 2. Spacer: Compatible with manufactured system. Avoid the use of galvanized metals.
 - 3. Desiccant: Molecular sieve, silica gel, or blend of both.
- B. Verify and coordinate glass and related glass and glazing materials with the requirements of the Design Criteria, applicable Standards, Codes and Performance Requirements, and these Performance Specifications.
 - 1. 'Category I Safety Glass': Comply with requirements of IBC Section 2406 – Safety Glazing.
 - 2. 'Category II Safety Glass': Comply with requirements of IBC Section 2406 – Safety Glazing.
- C. Glazing Types for Manufactured Units:
 - 1. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.
 - a. Visible Light Transmittance: 91 percent minimum.
 - 2. Clear Float Glass: ASTM C 1036, Type I transparent flat, Quality-Q3, Class I (clear) unless otherwise indicated by design location and Performance Requirements.
 - 3. Heat-Treated (Tempered) Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated by design location and Performance Requirements.
 - a. Clear tempered with horizontal tempering; conforming to ASTM C1172 and ANSI Z97.1; 1/4 inch thick. Provide safety labeling etched on safety glass.
 - b. Where required at all hazardous conditions and where indicated as "tempered safety glass" or "safety glass" by these Performance Specifications.
 - 4. Laminated Glass: Provide safety labeling etched on safety glass. Clear laminated glass with 0.030 inch plastic interlayer providing 90% UV radiation screening (wavelength > 380 nanometer); conforming to ANSI Z97.1; 1/4 inch thickness.
- D. Low emissivity reflective coating: Metallic deposition coating, ASTM C 1376.
- E. Acceptable Products: Provide glazing units manufactured by one of the following:
 - a. Libbey Owens Ford.
 - b. PPG Industries.
 - c. Visteon.
 - d. Nippon Electric Glass America, Inc.

2.05 ACCESSORIES

A. Lamination Film:

1. Characteristics: 0.030 inch clear plastic interlayer film for security and impact protection.
2. Provide products of one of the following:
 - a. Stevens Urethane.
 - b. 3M.
 - c. Solutia.

B. Setting Blocks:

1. Neoprene blocks with 80 to 90 Shore A durometer hardness.
2. Minimum length four (4) inches.

C. Spacer Shims:

1. Neoprene, with 50 to 60 Shore A durometer hardness.
2. Minimum length three (3) inches.
3. Self-adhesive on one face.

D. Glazing Tapes:

1. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - a. AAMA 804.3 tape, where indicated.
 - b. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - c. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
2. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

E. Glazing Splines: Resilient PVC extruded shape, black color.

F. Glazing Clips: Manufacturers standard type.

G. Glazing Sealants:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Type: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 4. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.
 5. Colors of Exposed Glazing Sealants: Dark colors only.
- H. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

2.06 FABRICATION

- A. Fabricate insulated glazing units in accordance with the following assemblies.
- B. Glazing Units containing 'Category I Safety Glass':
1. Fabricate as scheduled, EXCEPT substitute the Category I safety glass in the position within the glazing assembly as prescribed by IBC Section 2406 – Safety Glazing.
 2. Color: Provide clear transparent safety glass EXCEPT provide tinted, reflective and etched safety glass where required to comply with the regulations.
- C. Glazing Units containing 'Category II Safety Glass':
1. Fabricate as scheduled EXCEPT substitute the Category II safety glass in the position within the glazing assembly as prescribed by IBC Section 2406 – Safety Glazing.
 2. Color: Provide clear transparent safety glass EXCEPT provide tinted, reflective and etched safety glass where required to comply with the regulations or Performance Criteria.
- D. Tinted Laminated Glass Type for Exterior Applications:
1. Two (2) layers of 3/16 inch thickness glass laminated together to form a single pane.
 1. The exterior material is to be clear transparent glass.
 2. The inside material is to be tinted glass.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

A. Manufacturer's Instructions:

1. Comply with manufacturer's instructions, including technical bulletins and product catalog data.

3.02 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer. Remove foreign materials including dust and dirt, and excess adhesive using materials and methods in accordance with manufacturer's written instructions.
- E. Remove temporary labels and protective coverings.
- F. Clean and polish exposed surfaces according to the manufacturer's written recommendations.

END OF SECTION

SECTION 089000

LOUVERS AND VENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Exterior, fixed blade aluminum louvers.
 - 2. Fixed vents.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM B 209 – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
 - 2. ASTM B 211 – Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
 - 3. AWS – Structural Welding Code.
 - 4. NAAMM – Metal Finishes Manual.
 - 5. SMACNA – Architectural Sheet Metal Manual.

1.03 SYSTEM DESCRIPTION

- A. Provide fixed louvers and vents in locations shown on the Drawings, and in accordance with this Section.

1.04 QUALITY ASSURANCE

- A. Comply with SMACNA Architectural Sheet Metal Manual recommendations for fabrication, construction details, and installation procedures.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aluminum Extrusions: ASTM B 211; Alloy 6063- T5; 6063-T6; or 6061-T6.
- B. Aluminum Sheet: ASTM B 209; Alloy 1100, 3003, or 5005.

2.02 ACCEPTABLE PRODUCTS

- A. Fixed Extruded Aluminum Drainable Louvers:
 - 1. Frame: Four (4) inch depth minimum.
 - 2. Head, sill, and jambs to be fabricated from one piece 0.081 inch thickness extruded structural aluminum sections, with integral sealant slot and retaining beads.

3. Products shall include closed-cell PVC compression gaskets between bottom of mullion or jamb and top of sill to ensure leak tight connections.
 4. When tested in accordance with AMCA Standard 500L in a four (4) foot by four (4) foot sample, products shall have the following performance or better:
 5. Free area shall be fifty (50) percent or greater.
 6. Free area velocity at beginning point of water penetration: Not less than 1,000 FPM.
 7. Air volume flow rate at beginning point of water penetration: Not less than 10,000 CFM.
 8. Pressure drop at beginning point of water penetration: Not more than 0.20 inches (water).
 9. Blades/Mullions:
 - a. Stationary; horizontal; and inclined at an angle between 35 and 40 degrees from the horizontal; and spaced at approximately 3-1/2 inch on center spacings.
 - b. Fabricated from one piece 0.081 inch thickness extruded structural aluminum sections, with gutters designed to catch and direct water to jamb and mullion drains.
 - c. Where located adjacent to metal wall panels, align horizontal louver mullions with panel corrugations.
 10. Finish: Manufacturer's three (3) coat fluoropolymer coating.
 - a. Comply with NAAMM Metal Finishes Manual; manufacturer's factory-applied finishes data.
 11. Provide end-dammed sill flashings.
 12. Bird screen:
 - a. One-half (1/2) inch by one-half (1/2) inch mesh from nineteen (19) gage galvanized steel wire.
 - b. Bird screen shall be mounted in continuous perimeter frames, and mounted on the inside of each louver using sheet metal screws.
 13. Provide one of the following products:
 - a. AiroLite – (740) 373-7676 - 'K6744 Drainable Louver'.
 - b. Greenheck (715) 359-6171 - 'ESD 435 Stationary Louver with Drainable Blade'.
 - c. C/S Group – (800) 233-8493 - 'A4097 – High Performance Drainable Fixed Mullion Louver'.
- B. Fixed Vents:
1. Depth: Four (4) inches minimum.
 2. Material: Extruded aluminum, 6063-T5 alloy, minimum 0.125" thick with 1/4" structural ribs, and die-formed 7 x 7 mesh.
 3. Finish: As selected from the manufacturer's line of premium finishes.
 4. Non-drainable.
 5. Bird Screen: 0.028" diameter wire aluminum screen mechanically secured to interior face of vent.
 6. Provide one of the following products:
 - a. Ruskin. (816) 761-7476 - 'BV100 Brick Vent'.
 - b. Sunvent Industries. (800) 325-4115 – 'Cast Aluminum Brick and Block Vents'.

2.03 ACCESSORIES

A. Fasteners:

1. Provide fasteners to meet manufacturer's requirements for installation.
2. Use stainless steel, or fluoropolymer-coated fasteners for improved corrosion resistance.

B. Anchors:

1. Use drilled epoxy anchors into brick, and concrete unit masonry installations.
 - a. Structural epoxy: Provide one of the following products:
 - a. Hilti – 'HIT HY-150'.
 - b. Dayton-Superior – 'Sure-Anchor Epoxy J-50 FS'.
2. Use drilled wedge anchors in concrete installations.
 - a. Wedge Anchors: Provide one of the following products:
 - b. Hilti – 'Kwik Bolt 3'.
 - c. Red Head – 'Trubolt'.

2.04 SOURCE QUALITY CONTROL

- A. Design units to withstand wind and snow loads as required by the applicable codes, and in accordance with requirements of authorities having jurisdiction.
- B. Design materials and products for maximum allowable deflection of the louver structural members to be 1/180, OR three-quarter (3/4) inch; whichever is less.
- C. Design materials and products for maximum allowable deflection of the louver blades to be 1/120, OR one-half (1/2) inch when measured across the weak axis; whichever is less.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install fixed louvers in accordance with applicable codes and regulations, manufacturer's written instructions.

3.02 PROTECTION

- A. Clean and touch-up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 092116

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Metal stud framing.
 - 2. Gypsum board.
 - 3. Exterior gypsum board.
 - 4. Joint treatment and accessories.

1.02 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM C 475 – Standard Specification for Joint Compound and Joint Tape for Finishing Interior Gypsum Board.
 - 2. ASTM C 645 – Standard Specification for Nonstructural Steel Framing Members.
 - 3. ASTM C 754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Exterior Gypsum Panel Products for ceilings and soffits.
 - 4. ASTM C 840 – Standard Specification for Application and Finishing of Gypsum Board.
 - 5. ASTM C 954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. in Thickness.
 - 6. ASTM C 1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 7. ASTM C 1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 8. ASTM C 1280 – Standard Specification for Application of Gypsum Sheathing.
 - 9. ASTM C 1396 – Standard Specification for Gypsum Board.
 - 10. GA-216 – Application and Finishing of Gypsum Board.
 - 11. GA-253 – Application of Gypsum Sheathing.

1.04 SYSTEM DESCRIPTION

- A. Provide:
 - 1. Completed gypsum board assemblies conforming to ASTM C 840, and GA-216.

2. Completed exterior gypsum board assemblies conforming to ASTM C 1177; and GA-253.
3. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - i. Fire Rated Partitions: UL listed assemblies for one (1) hour ratings.
 - ii. Design Requirements/Fire Resistive Ratings: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.05 SUBMITTALS

- A. Submit the following:
 1. Product Data.
 2. Submit fire resistance design data.

1.06 PERFORMANCE REQUIREMENTS

- A. Interior spaces shall be completely enclosed and weathertight prior to start of gypsum board finishing.
- B. Room Temperatures:
 1. For non-adhesive attachment of gypsum board to framing, maintain not less than forty (40) degrees Fahrenheit.
 2. For adhesive attachment and finishing of gypsum board, maintain not less than fifty (50) degrees Fahrenheit for 48 hours before application and continuously after until dry.
 3. Do not exceed ninety-five (95) degrees Fahrenheit when using temporary heat sources.

PART 2 PRODUCTS

2.01 SUSTAINABLE PRODUCTS

- A. Finish products and systems shall have recycled content and shall be extracted, processed, and manufactured within 500 miles of the project site.
- B. Heavy materials should be sourced within 50 miles of the project site.
- C. Any interior or exterior adhesives or sealants, including aerosol applied within the weather barrier shall comply with the VOC limits and shall not contain carcinogens or reproductive toxicants per Section 018113 Sustainable Building Requirements.
- D. Architectural paints, coatings, and primers applied to interior walls and ceilings shall comply with the VOC limits per Section 018113 and shall be lead and cadmium free.

2.02 ACCEPTABLE PRODUCTS

- A. Light gage Metal Framing: Provide products of one of the following manufacturers:
 - 1. Dietrich. (412) 281-2805.
 - 2. Steeler. (206) 725-2500.
 - 3. LGS Systems. (360) 424-7434
- B. Gypsum Board: Provide one of the following products:
 - 1. La Farge—Over 90% recycled content.
 - 2. Certaineed ProRoc Type C—96% recycled content.
 - 3. USG. (800) 874-4968 – 'Sheetrock Firecode C Gypsum Panels'.
 - 4. GP. (800) 225-6119 – 'ToughRock Fireguard C Gypsum Board'.
 - 5. BPB. (800) 233-8990 – 'ProRoc Type C'.
- C. Exterior Gypsum Board: Provide one of the following products:
 - 1. USG. (800) 874-4968 – 'Fiberock Aqua-Tough Sheathing Panels'.
 - 2. GP. (800) 225-6119 - 'DensGlas Gold'.
 - 3. BPB. (800) 233-8990 – 'ProRoc Sheathing Treated Core Type X'.

2.03 MATERIALS

- A. Light Gage Metal Framing/Non-Loadbearing Framing:
 - 1. Comply with ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacings indicated, with maximum deflection of wall framing of L/240 at five (5) PSF.
 - 2. Studs: "C" shaped; with flat or formed webs with knurled faces.
 - 3. Runners: U shaped, sized to match studs.
 - 4. Partition Head To Structure Connections:
 - a. Comply with requirements of the authority having jurisdiction.
- B. Gypsum Board:
 - 1. Comply with ASTM C 1396.
 - 2. IBCO approved for one-hour fire resistive system detailed.
 - 3. Provide sizes to minimize joints in place.
 - 4. Fire Resistant Type X: Use throughout this Project.
 - a. Complying with Type X requirements; UL rated.
 - b. Thickness: 5/8 inch.
 - c. Edges: Tapered.
 - d. Ends: Square cut.
- C. Exterior Gypsum Board:
 - 1. Provide exterior gypsum sheathing panels with EITHER:
 - a. Moisture-resistant core, and coated inorganic fiberglass mat back surface designed to resist growth of mold and mildew, per ASTM D 3273; OR

1. Fiber-reinforced, moisture-resistant core, and designed to resist growth of mold and mildew, per ASTM C79; ASTM C 1396; and C 1278.
2. Comply with performance requirements of ASTM C 1177 for sheathing.
3. IBCO approved for one-hour fire resistive system detailed.
4. Provide with tapered long edges.
5. Provide fire-resistant Type X core; thickness 5/8 inch.

2.04 ACCESSORIES

A. Finishing Accessories:

1. Provide steel beaded units conforming to ASTM C 1047; and hot dipped in accordance with ASTM A 653; minimum G30 coating.
 - a. Provide with flanges for concealment beneath joint compound.
 - b. Provide shapes in accordance with ASTM C 1047.
2. Joint tape shall not be used for inside and outside corners on this Project; use rolled zinc profiles.

B. Joint Materials for Gypsum Board:

1. Conforming to ASTM C 475, and as recommended by gypsum board manufacturer for project conditions.
2. Tape: Two (2) inch width, coated glass fiber tape for panel butt joints, and edges.
3. Joint Compound for Gypsum Board:
 - a. Provide powder-type, vinyl-based joint compound, or as indicated by gypsum board manufacturer.

C. Joint Materials for Exterior Gypsum Board:

1. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film.
2. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

D. Screws for Applications to Light Gage Metal Framing:

1. Comply with manufacturer instructions; utilize recommended fasteners for optimum holding power and corrosion-resistance for the project conditions.
2. Provide fasteners conforming to ASTM C 1002 for fastening to steel framing less than 0.0329 inch thickness.
3. Employ self-piercing, self-tapping type screws; cadmium-plated.

E. Screws for Applications to Cold-Formed Metal Framing:

1. Comply with manufacturer instructions; utilize recommended fasteners for optimum holding power and corrosion-resistance for the project conditions.
2. Provide fasteners conforming to ASTM C 954 for fastening to steel framing between 0.033 to 0.112 inch thickness.

PART 3 EXECUTION

3.01 INTERIOR FINISHING

- A. Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.02 INSTALLATION

- A. Metal Framing:
 - 1. Install in accordance with ASTM C 754; and light gage metal framing manufacturer's instructions.
- B. Fire-Rated Construction:
 - 1. Furring for Fire Ratings: Install as required for fire resistance to GA-600 requirements.
- C. Gypsum Board:
 - 1. Comply with ASTM C 840, GA-216, and manufacturer's instructions.
 - 2. Finish gypsum board in accordance with ASTM C 840, Level 4.
 - a. Level 4: All joints and angles shall have tape bedded in joint compound and have three (3) separate coats of compound.
- D. Exterior Gypsum Board:
 - 1. Install in strict accordance with manufacturer's written installation instructions.
 - a. Comply with ASTM C 1280; and GA-253.
 - 2. Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
 - 3. Control Joints.

3.03 FIELD QUALITY CONTROL

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: One-eighth (1/8) inch in ten (10) feet in any direction.

END OF SECTION

SECTION 096513

RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Roll-type resilient wall base, and accessories.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. ASTM F 1861 – Standard Specification for Resilient Wall Base.

1.03 RELATED SECTIONS

- A. Section 018113 Sustainable Building Requirements

1.04 SUBMITTALS

- A. General: Submit the following:
 - 1. Product Data.
 - 2. Maintenance Data.

PART 2 PRODUCTS

2.01 SUSTAINABLE PRODUCTS

- A. Finish products and systems shall have recycled content and shall be extracted, processed, and manufactured within 500 miles of the project site.
- B. Heavy materials should be sourced within 50 miles of the project site.
- C. Any interior or exterior adhesives or sealants, including aerosol applied within the weather barrier shall comply with the VOC limits and shall not contain carcinogens or reproductive toxicants per Section 018113 Sustainable Building Requirements.
- D. Architectural paints, coatings, and primers applied to interior walls and ceilings shall comply with the VOC limits per Section 018113 and shall be lead and cadmium free.

2.02 MANUFACTURED UNITS

- A. Resilient Base:
 - 1. Provide product complying with ASTM F 1861.
 - a. Group I, Type TS Rubber, Thermoset Vulcanized Extruded Rubber Cove Base.
 - b. Style: Cove profile; Style B.

- c. Finish: Satin; color: Black.
 - d. Length: Provide rolls; precut stock is not acceptable.
 - e. Dimensions: Height four (4) inches; with thickness 0.125 inch (1/8 inch).
 - 2. Accessories: Provide pre-molded inside and outside corners, and end stops in color and finish combinations to match resilient base material.
 - 3. Provide products of one of the following:
 - a. Forbo Wall Base 51% recycled content
 - b. BurkeMercer Flooring Products.
 - c. Johnsonite.
 - d. Roppe.
- B. Adhesives:
- 1. Provide in accordance with manufacturer recommendations.
- C. Sealer, Filler and Primer:
- 1. Characteristics: Provide products with formulations that are water-resistant, and in accordance with manufacturer's recommendations.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INTERIOR FINISHING

- A. Finishing that will occur inside the building shall be performed per Section 018113.

3.02 INSTALLATION

- A. Manufacturer's Instructions:
 - 1. Comply with manufacturer's instructions, including technical bulletins and product catalog data.

END OF SECTION

SECTION 099100

PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Interior painting.
 - 2. Exterior painting.
 - 3. Surface preparation for substrates requiring painting.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. PDCA – Architectural Specifications Manual.
 - 2. MPI – Architectural Painting Specification Manual.
 - 3. MPI – Approved Products List.
 - 4. SSPC – Volume 1, Good Painting Practice.
 - 5. SSPC – Volume 2, Systems and Specifications.
 - 6. IBC – Chapter 8, Interior Finishes.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SYSTEM DESCRIPTION

- A. Work of this Section is organized in accordance with the painting systems developed by the Master Painters Institute (MPI).
- B. Surfaces Not Requiring Finish:
 - 1. Metals: Brass; copper; plated metals other than galvanized; stainless steel; pre-finished metals.
 - 2. Factory finished items; except where factory finish is incomplete; or where specifically required.
 - 3. Plastic laminate.
 - 4. Glass.
 - 5. Coil-coated sheet metal.
 - 6. Fabrics; plastics; and materials normally left unfinished.
 - 7. Inaccessible materials and products permanently enclosed behind building construction.

8. Concrete surfaces indicated to receive sealer.
9. Concrete masonry except as indicated.

1.05 SUBMITTALS

- A. General: Submit the following:
 1. Material and Product List.
 2. Product Data.
 3. Maintenance Data: Provide in 'Project Operation and Maintenance Manual'.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 1. Do not perform work of this Section when the relative humidity exceeds 85 percent.
 2. Do not perform Work of this Section when air temperatures are within 5 degrees F of the dew point.
 3. Do not attempt to apply paints to any surfaces which are sweating, damp, wet or otherwise compromised by presence of moisture.
 4. Interior Work:
 - a. Mechanical system is to be operating and maintaining temperature and relative humidity at occupancy levels during work of this Section continuously through the remainder of the construction period.
 5. Exterior Work:
 - a. Perform exterior work of this Section when exterior temperatures and substrate temperatures are 45 degrees F or above.
 - b. Do not perform exterior work of this Section, including surface preparation, when conditions of snow, fog, rain, or mist.

PART 2 PRODUCTS

2.01 SUSTAINABLE PRODUCTS

- A. Finish products and systems shall have recycled content and shall be extracted, processed, and manufactured within 500 miles of the project site.
- B. Heavy materials should be sourced within 50 miles of the project site.
- C. Any interior or exterior adhesives or sealants, including aerosol applied within the weather barrier shall comply with the VOC limits and shall not contain carcinogens or reproductive toxicants per Section 018113 Sustainable Building Requirements.
- D. Architectural paints, coatings, and primers applied to interior walls and ceilings shall comply with the VOC limits per Section 018113 and shall be lead and cadmium free.

2.02 FINISHES

- A. MPI #35, Bituminous Coating, range E3 or E2.

1. Locations: Dissimilar metals in contact, or close contact with one another.
 2. Coats: One (1)
- B. MPI #50, Interior Latex Primer/Sealer, range E3.
1. Locations: Surface primer on gypsum wall board, medium-density fiberboard or concrete interior wall surfaces to receive latex or alkyd finish coat.
 2. Coats: Per manufacturer's instructions for the surfaces intended.
- C. MPI #145, Latex Interior Institutional Low VOC (MPI Gloss Level 3), range E3
1. Locations: Intermediate and topcoat on gypsum wall board, medium-density fiberboard or concrete interior wall surfaces.
 2. Coats: Two (2)
- D. MPI #47, Alkyd Interior Semi-Gloss (MPI Gloss Level 5), range E3 or E2.
1. Locations: Intermediate and topcoat on gypsum wall board, medium-density fiberboard or concrete interior wall surfaces; interior metal doors and frames, metal fabrications and materials not concealed by finish construction, structural steel.
 2. Coats: Two (2)
- E. MPI #23, Interior/Exterior Solvent Based Metal Primer, Surface Tolerant, range E3.
1. Locations: Surface primer on metal doors and frames, ferrous metal fabrications and materials not concealed by finish construction, structural steel.
 2. Coats: Per manufacturer's instructions for the surfaces intended.
- F. MPI #79, Interior/Exterior Solvent Based Alkyd Metal Primer, Anti-Corrosive, range E2 or E3.
1. Locations: Surface primer on metal doors and frames, ferrous metal fabrications and materials not concealed by finish construction, structural steel.
 2. Coats: Per manufacturer's instructions for the surfaces intended.
- G. MPI #151, Water Based Interior Light industrial Coating (MPI Gloss Level 3), range E2 or E3.
1. Locations: Intermediate and topcoat on interior metal doors and frames, ferrous metal fabrications and materials not concealed by finish construction, structural steel.
 2. Coats: Two (2)
- H. MPI #153, Water Based Semi-Gloss Interior Light Industrial Coating (MPI Gloss Level 5), range E2 or E3.
1. Locations: Intermediate and topcoat on interior metal doors and frames, ferrous metal fabrications and materials not concealed by finish construction, structural steel.
 2. Coats: Two (2)
- I. MPI #105, Solvent or Water Based Graffiti Protection Top Coat, range E3.
1. Locations: Exposed concrete masonry surfaces.
 2. Coats: Per manufacturer's instructions for the surfaces intended.
 3. Comply and coordinate application with the requirements of water repellent coatings applied to surface in accordance with Section 071900.

- J. MPI #108, High Build Epoxy, Low Gloss, two component system, range E3.
 - 1. Locations: Interior or exterior concrete, masonry, primed metal surfaces.
 - 2. Coats: Per manufacturer's instructions.

- K. Polyurethane, Moisture-Cured, Pigmented, Gloss Level 5 or 6.
 - 1. Locations: Topcoat over MPI #108 at elevator cab floors.

2.03 SOURCE QUALITY CONTROL

- A. VOC Guidelines: Utilize products listed by MPI for conformance to VOC guidelines.

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 099623
GRAFFITI-RESISTANT COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Graffiti-resistant coatings on masonry and concrete.

1.02 RELATED SECTIONS

- A. Section 018113 Sustainable Building Requirements.

1.03 SYSTEM DESCRIPTION

- A. Install two-part graffiti resistant system.
 - 1. Base: Water-Repellent Coating.
 - a. Comply with the requirements of Division 07 Section 'Water-Repellant Coatings', and conform to manufacturer's instructions.
 - 2. Top Coat: Graffiti Protection Top Coat.
 - a. Comply with the requirements of Division 09 Section 'Painting', and conform to manufacturer's instructions.

1.04 SUBMITTALS:

- 1. Product Data: Submit manufacturer's product data sheets for each item.
- 2. Material Safety Data Sheets (MSDS).
- 3. Maintenance instructions.

1.05 PERFORMANCE REQUIREMENTS

- A. Provide anti-graffiti system complying with the following:
 - 1. Capable of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate. No evidence of graffiti shall remain on the surface.
 - 2. Capable of withstanding a minimum of 200 cleaning cycles without measurable coating deterioration.

1.06 PROJECT/SITE CONDITIONS

- A. Plan application to occur on windless days; with no rain in the forecast; and ambient temperatures in the range of forty (40) to ninety (90) degrees Fahrenheit.

1.07 MAINTENANCE

- A. Maintenance Material: Manufacturer's recommended maintenance materials shall be readily available and distributed in the Pacific Northwest.

1. Provide products in one (1) gallon containers.
 2. Containers shall be new, unopened, and with full two (2) year shelf life indicated by the manufacturer's date on the containers.
- B. Provide the following quantities of product to King County Metro:
1. Graffiti Resistant Coating: Six (6) gallons.
 2. Graffiti Cleaner: Six (6) gallons.

PART 2 PRODUCTS

2.01 SUSTAINABLE PRODUCTS

- A. Finish products and systems shall have recycled content and shall be extracted, processed, and manufactured within 500 miles of the project site.
- B. Heavy materials should be sourced within 50 miles of the project site.
- C. Any interior or exterior adhesives or sealants, including aerosol applied within the weather barrier shall comply with the VOC limits and shall not contain carcinogens or reproductive toxicants per Section 018113 Sustainable Building Requirements.
- D. Architectural paints, coatings, and primers applied to interior walls and ceilings shall comply with the VOC limits per Section 018113 and shall be lead and cadmium free.

2.02 ACCEPTABLE PRODUCTS

- A. Graffiti-Resistant Coating: Per Division 09 Section "Painting."

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 APPLICATION

- A. Install coating in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.
- B. Apply graffiti resistant coating within seven (7) days of application of the water repellent coating indicated in Section 071900 – Water Repellent Coatings.

3.02 CLEANING

- A. Remove spills and over-spray immediately, paying particular attention to horizontal surfaces, which may subsequently become slippery.

END OF SECTION

SECTION 101400

SIGNAGE

PART 1 GENERAL

1.01 SUMMARY

- A. This work consists of furnishing and installing permanent signage in accordance with the requirements of the Design Criteria and Standard Details of the governing Codes at the locations indicated by the Work. Section includes:
 - 1. Panel signs.
 - 2. Illuminated panel signs.
 - 3. Room-identification signs.
 - 4. Sign removal, relocation and resurfacing.
 - 5. Signage accessories for complete installation.

1.02 RELATED DOCUMENTS

- A. Comply with the requirements of the following:
 - 1. "Manual of Uniform Traffic Control Devices" (MUTCD), US Department of Transportation Federal Highway Administration, current edition and revisions.
 - 2. "Signing Standards Manual", King County Department of Transportation, Metro Transit Division, current edition.
 - 3. National Association of Architectural Metal Manufacturers (NAAM) "Metal Finishes Manual for Architectural and Metal Products", current edition.
 - 4. The Codes and Guidelines in the Standards set forth in the Design Criteria for this Work, and provisions as adopted by authorities having jurisdiction, shall apply.
- B. Referenced Sections
 - 1. Section 142100 "Electric Traction Elevators" for code-required conveying equipment signage.
 - 2. Section 220553 "Identification for Mechanical Equipment" for labels, tags, and nameplates for plumbing systems, mechanical and HVAC equipment.
 - 3. Section 260553 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
 - 4. Section 265000 "Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.03 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.
- B. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.04 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For adhesives, documentation including printed statement of VOC content.
- B. Shop Drawings: For panel signs.
 - 1. Comply with requirements of the King County Metro Transit 'Signing Standards Manual'.
 - 2. Include fabrication and installation details and attachments to other work.
 - 3. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 4. Show message list, typestyles, and graphic elements, including raised characters and Braille, and layout for each sign.
 - 5. Show locations of electrical service connections.
 - 6. Include diagrams for power, signal, and control wiring.
- C. Installation Instructions: Submit manufacturer's printed installation and/or assembly instructions.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: [Not less than 12 inches (300 mm) square, including corner] .
 - 2. Room-Identification Signs: [Full-size Sample].
 - 3. Exposed Accessories: [Full-size Sample] [Half-size Sample] of each accessory type.
- E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.
- F. Sample Warranty: For special warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with the Americans with Disabilities Act (ADA), ICC/ANSI and with code provisions as adopted by authorities having jurisdiction.
- B. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.

1.07 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - d. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Accessibility Standard: Comply with applicable provisions in [the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.02 SIGNS, POSTS AND MOUNTING

- A. General: Conform to the types and fabrication requirements of the King County Metro Transit 'Signing Standards Manual', as applicable to the Work.
- B. Posts and Mounting: Comply with the requirements of
 1. The Bellevue City Code, including Standard Details appropriate for the application.
 2. The Kirkland Municipal Code, including Standard Details appropriate for the application.
 3. The King County Metro Transit 'Signing Standards Manual' as applicable to the Work.
 4. The "Manual of Uniform Traffic Control Devices", as applicable to the Work.
- C. Timber Posts:
 1. Timber Sign Posts
 - a. Timber sign posts, if included, shall be treated Douglas fir or treated Hem-fir meeting the grades and treatment noted on the Drawings.

2.03 SIGNS

- A. 'Dimensional Letters':
 1. Acceptable Manufacturers include, but are not limited to:
 - a. ASI Sign Systems. (800) 274-7732.
 - b. Gemini, Inc. (800) 538-8377.
 - c. DPA Signs. (206) 362-2323.

2. Acceptable Installers include, but are not limited to:
 - a. Messenger Sign Company.
 - b. Foley Sign Company.
 - c. Shoreline Sign & Awning.
- B. Cast Dimensional Letters:
1. Description:
 - a. Cast lugs into back of characters and tap to receive threaded mounting studs (also identified in this Section as 'stand-offs'.
 - b. Alloy and temper cast dimensional letters as recommended by sign manufacturer for the casting process used, and for the use and finish characteristics indicated in this Section.
 2. Characteristics:
 - a. Material: Solid Aluminum.
 - b. Thickness: Three-quarter (3/4) inch.
 - c. Finish: Dark bronze anodized, satin.
 3. Mounting:
 - a. When finished, cast dimensional letters shall be proud of the finished wall surface three-quarters (3/4) inch.
 - b. Stand-offs shall be 304 or 316 stainless steel material; threaded on one end for attachment to the cast dimensional letter; and smooth on the opposite end for attachment to the building.
 - c. Provide and install an appropriate non-staining two-part epoxy adhesive approved by the manufacturer for securing stand-offs to brick masonry.
 - d. Stand-offs shall penetrate the finished surface of brick masonry at least one (1) inch.
- C. 'Information Signs':
1. Characteristics:
 - a. Materials: 3mm Dibond composite aluminum sheet or equal.
 - b. The matte color bands on signs are to be 0.080 thick acrylic.
 - c. Graphics: All surfaces to be painted a matte color.
 - d. Paint shall be a two-part acrylic polyurethane by Matthews Paint Corp.
 - e. Prime and paint according to the manufacturer's substrate preparation instructions.
 - f. Surface to be protected with a clear top coat.
 - g. Mounting: Wall mounting of flat sheet sign types to be with mechanical fasteners, countersunk stainless steel square drive screws to be installed at top and bottom edges.
 - h. Screw faces to be painted to match sign faces.
 - i. Attachment: Signs with acrylic color bands to be attached with 'VHB' tape by 3M.
 2. Acceptable Manufacturers include, but are not limited to:
 - a. Graphic Systems, Inc.
 - b. APCO Northwest. (206) 835-6830.

- c. ASI Sign Systems. (800) 274-7732.
- D. 'Directional Signs':
 - 1. Locations: Mounted on beams and walls.
 - 2. Characteristics:
 - a. Materials: 3mm Dibond composite aluminum sheet or equal. The matte color bands on signs are to be 0.080 thick acrylic.
 - b. Font: Color shall be white; seven (7) mil 'Scotchlite #680-10' pressure sensitive reflective vinyl by 3M.
 - c. Graphics: All surfaces to be painted a matte color.
 - d. Paint shall be a two-part acrylic polyurethane by Matthews Paint Corp.
 - e. Prime and paint according to the manufacturer's substrate preparation instructions.
 - f. Mounting: Wall mounting of flat sheet sign types to be with mechanical fasteners, countersunk stainless steel square drive screws to be installed at top and bottom edges.
 - g. Screw faces to be painted to match sign faces.
 - h. Flush mount to wall and columns with concealed hardware.
 - i. Mounting on beam at center of the drive aisle.
 - j. Attachment: Signs with acrylic color bands to be attached with 'VHB' tape by 3M.
 - 3. Acceptable Manufacturers include, but are not limited to:
 - a. Graphic Systems, Inc.
 - b. APCO Northwest. (206) 835-6830.
 - c. ASI Sign Systems. (800) 274-7732.
- E. 'Clearance Warning Bars':
 - 1. Location: Mounted at entrance and ramp up location.
 - 2. Characteristics:
 - a. Materials: Six (6) inch pipe.
 - b. Font: Color shall be black; Seven (7) mil 'Scotchlite #680-85' pressure sensitive reflective vinyl by 3M.
 - c. Graphics: All surfaces to be painted a matte color.
 - d. Paint shall be a two-part acrylic polyurethane by Matthews Paint Corp.
 - e. Prime and paint according to the manufacturer's substrate preparation instructions.
 - f. All exposed surfaces to be free of blemishes and imperfections.
 - g. Mounting: Ceiling mounted hanging pipes to be suspended with 3/32 inch '#332 CWR' wire rope by T.C. International.
 - h. Wire crimps to be '#05403' oval sleeves.
 - i. Concrete anchors shall be one-quarter (1/4) inch diameter '#52037 Trubolt Wedge Anchor' by ITW Ramset/Redhead.
- F. 'Miscellaneous Informational Signs':
 - 1. Locations: Mounted on columns and walls.

2. Characteristics:

- a. Materials: 3mm Dibond composite aluminum sheet. The matte color bands on signs are to be 0.080 thick acrylic.
- b. Graphics: All surfaces to be painted a matte color.
- c. Paint shall be a two-part acrylic polyurethane by Matthews Paint Corp.
- d. Prime and paint according to the manufacturer's substrate preparation instructions.
- e. All exposed surfaces to be free of blemishes and imperfections.
- f. Mounting: Wall mounting of flat sheet sign types to be with mechanical fasteners, countersunk stainless steel square drive screws to be installed at top and bottom edges. Screw faces to be painted to match sign faces.
- g. Attachment: Signs with acrylic color bands to be attached with 'VHB' tape by 3M.

PART 3 EXECUTION

3.01 GENERAL

- A. Work shall conform to MUTCD Chapter 2, and the Codes and Standards set forth in the Design Criteria for this Work.

3.02 SIGN INSTALLATION

- A. Location of Signs: Signs are shall be located in on the Drawings by station numbers. These are tentative locations subject to change by conformance to the Design Criteria and the Milestone Review Process.
- B. Placement of Signs: All reflectorized signs located less than 30-feet from the edge of the lane should be turned out approximately 3-degrees from the pavement edge of oncoming traffic lanes, and those located 30-feet or more from the edge of the lane should be turned in approximately 3-degrees from the pavement edge of oncoming traffic lanes. All sign posts shall be plumb and signs level. The signs shall be inspected at night by the Project Representative and, if specular glare occurs from failure to install at 3-degrees as stipulated, the Contractor shall reinstall the signs at no expense to the County.
- C. Sign Removal: Where indicated by the Work, sign structures shall be removed. Remove concrete pedestals to a minimum of 2-feet below subgrade or finished ground elevation and backfill conforming to these Performance Specifications.
 1. Where an existing sign post is located within a sidewalk area, the Contractor shall remove the post and finish the area so as to make the sidewalk continuous. Aluminum signs, wood signs, wood sign posts, wood structures, metal sign posts, windbeams, and other metal structural members shall become the property of the Contractor and shall be removed from the project.
- D. Sign Relocation: Where indicated by the requirements of the Work, sign structures shall be relocated. Where the existing sign structure is mounted on concrete pedestals, remove the pedestal to a minimum of 12-inches below finished grade and backfill the remaining hole with material similar to that surrounding the hole.

1. Where the existing structure is to be relocated, the provide necessary materials, labor, and hardware, and if so indicated, electrical conduit, conductors, etc., electrical services, and connections so as to erect and provide an operable unit. All materials damaged by the Contractor shall be replaced at no cost to King County.
 2. Unless otherwise allowed, relocation of each existing sign and structure shall be accomplished during the day in which it is removed. Relocation of overhead signs and structures shall be accomplished during the hours between 12 midnight and 4:00 a.m. or as approved by the jurisdictional authority.
- E. Sign Cleaning: Signs shall be cleaned after relocation or installation. The Contractor shall not use cleaning solvents that would be harmful to the sign finish.

i. END OF SECTION

SECTION 101453

TRAFFIC SIGNAGE

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies road signs, consisting of furnishing and placing road signs.

1.02 REFERENCES

- A. All work to be performed and materials to be used shall be in accordance with the Bellevue City Code Design Standards, unless otherwise indicated herein.
- B. MUTCD, Manual on Uniform Traffic Control Devices (2000).
- C. Washington State Department of Transportation (WSDOT) Standard Specifications 2012.

PART 2 PRODUCTS

2.01 GENERAL

- A. King County Transit prefers that all products shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 SIGN BLANKS

- A. Sign blanks shall be sheet aluminum complying with Section 9-28.1 of WSDOT.

2.03 REFLECTIVE SHEETING

- A. Reflective sheeting for sign faces shall be in accordance with Section 9-28.1 of WSDOT.

2.04 POSTS

- A. Sign posts shall be per the Bellevue City Code standard details.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. Sign legends shall comply with the Manual on Uniform Traffic Control Devices.

3.02 ROAD SIGN SCHEDULE

- A. Provide as required to meet BCC and MUTCD.

END OF SECTION

SECTION 104413

FIRE EXTINGUISHER CABINETS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Fire extinguisher cabinets.

1.02 SYSTEM DESCRIPTION

- A. Provide non-rated, surface-mounted, enameled steel box fire extinguisher cabinets in locations indicated on the Drawings, and as directed.
- B. Fire extinguisher cabinets shall include anodized aluminum doors and trims, with inset glazing panels.
- C. Every fire extinguisher cabinet shall receive and include an approved fire extinguisher bracket.
- D. Quantity:
 - 1. Meet quantity and location requirements of the authority having jurisdiction.
 - 2. Also provide one (1) each in Mechanical and Electrical Rooms and Electrical Closets.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with the Conditions of Contract and Section 013300:
 - 1. Product Data.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Provide models and types designed to accommodate the fire extinguishers identified in Section 104416 – Fire Extinguishers.
 - 1. Characteristics:
 - a. Cold-rolled stainless steel box enclosure, with manufacturer's corrosion-resistant powder coating; color shall be white
 - b. Door: Matching stainless steel door and trim; one piece; with tempered safety glass inset into door.
 - c. Provide manufacturer's standard pull handle with self-adjusting roller catch.
 - d. Provide surface-mount cabinets.

2. Fire Extinguisher Brackets:
 - a. Locations: Provide inside fire extinguisher cabinets, and in each location where fire extinguishers are required.
 - b. Characteristics:
 - i. Material: Steel.
 - ii. Finish: Red enamel.
 - c. Provide products of one of the following:
 3. Braden & McSweeney, Inc. (412) 279-3320.
- B. Provide fire extinguisher cabinets from one of the following manufacturers:
1. Larsen's Manufacturing Company (800) 527-7367.
 2. J.L. Industries (800) 554-6077.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 104416

FIRE EXTINGUISHERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Portable fire extinguishers.

1.02 REFERENCES

- A. The following is a list of standards referenced in this Section:
 - 1. NFPA 10 – Standard for Portable Fire Extinguishers.
 - 2. UL 299 – Dry Chemical Fire Extinguishers.
 - 3. UL 711 – Determinations of Small Specimens of Material.
 - 4. UL – Product Directory.

1.03 SYSTEM DESCRIPTION

- A. Provide dry-chemical type portable fire extinguishers.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with the Conditions of Contract and Section 013300 Submittal Procedures:
 - 1. Product Data.
 - 2. Shop Drawings:
 - a. Provide a floor plan for each level; plans shall be marked with the proposed fire extinguisher locations.
- B. Operation and Maintenance Data:
 - 1. Submit manufacturer's operation and maintenance data.
 - 2. Provide test information; refill and recharge schedules; procedures; and re-certification requirements.

PART 2 PRODUCTS

2.01 PRODUCTS

- A. Comply with governing authorities' requirements; this Section; and manufacturer's published product data.
- B. Characteristics:
 - 1. Multi-purpose dry chemical, under-pressure type OR as required by local agencies.

2. Steel tank with pressure-indicating gage.
 3. Tested and listed in accordance with UL 299 and UL 711, and identified in UL Product Directory for Class A, B, and C fires.
 4. Five (5) pound capacity.
 5. Tank Finish: Enamel; red color.
 6. Fill and service extinguishers in accordance with governing authorities' requirements.
- C. Provide fire extinguishers from one of the following manufacturers:
1. Larsen's Manufacturing Company. (800) 527-7367.
 2. J.L. Industries. (800) 554-6077.
 3. Amerex Corp. (205) 655-3271.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install system in accordance with applicable codes and regulations, manufacturer's written instructions, and this Section.

END OF SECTION

SECTION 110513

MOTORS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Terms and Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 26 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.03 SUMMARY

- A. This Section includes basic requirements for factory-installed and field-installed motors.

1.04 SUBMITTALS

- A. Product Data: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
- B. Factory Test Reports: For specified tests.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Listing and Labeling: Provide motors specified in this Section that are listed and labeled.
 - 1. Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

PART 2 PRODUCTS

2.01 BASIC MOTOR REQUIREMENTS

- A. Basic requirements apply to mechanical equipment motors, unless otherwise indicated.
- B. Motors Smaller than 1/2 HP: Single phase.
- C. Frequency Rating: 60 Hz.
- D. Voltage Rating: Determined by voltage of circuit to which motor is connected or as indicated.
- E. Service Factor: According to NEMA MG 1, unless otherwise indicated.
- F. Capacity and Torque Characteristics: Rated for continuous duty and sufficient to start, accelerate, and operate connected loads at designated speeds, in indicated environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- G. Enclosure:
 - 1. Indoor Service: Open Drip-proof, unless otherwise indicated.

2.02 POLYPHASE MOTORS

- A. Description: NEMA MG 1, medium induction motor.
 - 1. Design Characteristics: NEMA MG 1, Design B, unless otherwise indicated.
 - 2. Energy-Efficient Design: Minimum motor efficiency as required by Washington State Energy Code. Test according to IEEE 112, Test Method B. Provide higher efficiency motors where indicated.
 - 3. Stator: Copper windings, unless otherwise indicated. Multispeed motors have separate winding for each speed.
 - 4. Rotor: Squirrel cage, unless otherwise indicated.
 - 5. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.
 - 6. Temperature Rise: Match insulation rating, unless otherwise indicated.
 - 7. Insulation: Class F, unless otherwise indicated.
- B. Source Quality Control: Perform the following routine tests according to NEMA MG 1:
 - 1. Measurement of winding resistance.
 - 2. No-load readings of current and speed at rated voltage and frequency.
 - 3. Locked rotor current at rated frequency.
 - 4. High-potential test.
 - 5. Alignment.

2.03 SINGLE-PHASE MOTORS

- A. Type: As indicated or selected by manufacturer from one of the following, to suit starting torque and other requirements of specific motor application.
 - 1. Permanent-split capacitor.
 - 2. Split-phase start, capacitor run.
 - 3. Capacitor start, capacitor run.
- B. Shaded-Pole Motors: Do not use, unless motors are smaller than 1/20 hp.
- C. Thermal Protection: Where indicated or required, internal protection automatically opens power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device automatically resets when motor temperature returns to normal range, unless otherwise indicated.
- D. Bearings: Ball-bearing type for belt-connected motors and other motors with high radial forces on motor shaft. Sealed, prelubricated sleeve bearings for other single-phase motors.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Use adjustable motor mounting bases for belt-driven motors.
- B. Align pulleys and install belts.
- C. Tension according to manufacturer's written instructions.
 - 1. Ground Equipment: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

END OF SECTION

SECTION 129300

SITE FURNISHINGS

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies the furnishing and installing, salvage and reinstatement, or installation of the following:
 - 1. Tree grates.
 - 2. Bike racks.
 - 3. Bike storage lockers.
 - 4. Newspaper vending boxes and stands.
 - 5. Benches.
 - 6. Litter receptacles.
 - 7. Bollards.

1.02 RELATED SECTIONS

- A. Related Work Specified Elsewhere:
 - 1. Section 321313 - Concrete Paving
 - 2. Section 328400 – Planting Irrigation
 - 3. Section 329100 – Planting Preparation
 - 4. Section 099100 – Painting

1.03 REFERENCES

- A. The current edition of the following standards are a part of this Section.

ASTM A153-82	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
ASTM A307-86	Specification for Carbon Steel Externally Threaded Standard Fasteners.
FS FF-B-561 C	Bolts (Screw) Lag
FS FF-B-588 C(1)	Bolts, Toggle: And Expansion Sleeve, Screw
FS FF-N-105 B(C)	Nails, Brads, Staples, and Spikes:
INT AMD 4	Wire Cut and Wrought

1.04 PERFORMANCE

- A. Provide, salvage and relocate, and install the items identified in this Section, as specified in Part 2.

B. The Developer is required to perform all work required for salvage and relocation of existing items, and installation of new items.

C. The Developer shall pick up the items provided by King County at the following location:

Attn: Paul Sorenson, Transit Chief
Transit Power & Facilities
King County Metro South Facilities
11911 E. Marginal Way S, Bldg C
Seattle, WA 98168
(206) 684-2254

1.05 QUALITY ASSURANCE

A. Stake out location of all site furnishings prior to installation. Verification by Project Representative is mandatory prior to installation.

1.06 SUBMITTALS

A. Submit product documentation for all items listed in section 1.01 A SUMMARY.

B. Submit the following:

1. 4 sets of Shop Drawings. Drawings to indicate:

- a. Dimensions of site furnishings.
- b. Dimensions verifying field review and measurements.
- c. Fabrication details.

2. Product Data:

- a. Submit Manufacturer's published literature for specified products and accessories as applicable, including Manufacturer's specifications, physical characteristics, and performance data.
- b. Submit, as a supplement, Manufacturer's instructions and directions for installation if not included in Manufacturer's published literature.

3. Color samples:

- a. Submit 4 sets of color chips for every painted item. Color chips must be at least 2 square inches in size on the material that will be painted.

C. Certificates

1. Manufacturer's certification that materials meet Specification requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials with Manufacturer's tags and labels intact.

1.08 SEQUENCING/SCHEDULING

A. Phase-in properly with Project Representative's reviewed and accepted construction schedule and as required to coordinate with Metro Transit.

PART 2 PRODUCTS

2.01 GENERAL

- A. Comply with Design Criteria and Performance Specifications, referenced standards, and Manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.

2.02 SITE FURNISHINGS

- A. Tree Grates. Provide and install the following:
 - a. Size: 4'X6' (2 piece)
 - b. Manufacturer- Olympic Foundry, Model No. CNK4872 CNK Series or approved equal.
 - i. Distributor Contact information:
 - a) Fairweather, www.fairweathersf.com
 - b) Sitelines, Tel: 800.541.0869, www.sitelines.com
 - c. Frame Style: Style CI sized to match grate with 2 cross bars for added support.
 - d. Pattern: CNK Series.
 - e. Material: Ductile iron.
 - f. Finish/Color: Unfinished.
- B. Bike Racks. Unless directed otherwise, relocate existing bike rack:
 - 1. Manufacturer- Cora Bike Rack Co., Cora EXPO, W Series, Steel, Model #4508.
 - a. Contact information – Cora: www.cora.com , 1-800-354-8624
 - 2. Size: 8-bicycle capacity.
 - 3. Installation – Surface mount per manufacturer's recommendations.
 - 4. Finish/Color: Comply with the requirements of Division 09 Section "Painting."
- C. Bike Storage Lockers. Unless directed otherwise, relocate existing lockers as follows:
 - 1. Up to 3 units with capacity for 10 bikes.
 - 2. Three styles: 2-bike fiberglass (existing), 4-bike fiberglass (existing), 4-bike steel (currently in separate contract). Provide capacity for units described, if unit under contract is not installed at time of demolition/salvage.
 - a. Nominal Sizes: 76" length x 39" width x height 47" height (4-bike units); 36" length x 39" width x 47" height (2-bike unit).
 - 3. Manufacturers:
 - a. Cycle Safe PROPark Series Bicycle Lockers.
 - i. Contact Information: www.cycle-safe.com , 888-950-6531
 - b. Cora Bicycle Lockers.
 - i. Contact Information: www.cora.com , 1-800-354-8624
 - c. On-Demand Bike Locker Program awarded Contractor. Verify with Project Representative.
 - 4. Installation – Surface mount per manufacturer's recommendations.
 - 5. Finish/Color: Comply with the requirements of Division 09 Section "Painting."

- D. Newspaper vending boxes and stand. Install boxes and stand supplied by others, as stated in the Design Criteria.
1. Size – 4 modular boxes on a single pedestal.
 2. Finish/Color: Comply with the requirements of Division 09 Section 'Painting'.
- E. Benches: Provide and install benches, as applicable. Described as follows:
1. Size: 4' long bench.
 2. Material: Steel.
 3. Finish/Color: Comply with the requirements of Division 09 Section 'Painting'.
- F. Litter Receptacles. Shall be Metro Transit standard litter receptacles, described as follows:
1. Size: 25" diameter x 33" height.
 2. Material: Steel.
 3. Finish/Color: Comply with the requirements of Division 09 Section 'Painting'.
- G. Bollards. Provide and install as follows.
1. Size: 6" diameter x 42" height.
 2. Material: Steel, schedule 80 pipe.
 3. Manufacturers:
 - a. Fairweather: www.fairweathersf.com.
 - b. Sitelines: www.sitelines.com 800-541-0869.
 4. Style: Fairweather Model # B-1, with rivets and welded dome top, or approved equal.
 5. Installation – Embed mount per manufacturer's recommendations.
 6. Finish/Color: Comply with the requirements of Division 09 Section 'Painting'.

2.03 FASTENERS

A. General:

1. Materials: Fasteners for work of this Section shall be one of the following two types of metal:
 - a. Type 316 stainless steel.
 - b. Zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5.
2. Fasteners for Aluminum: Provide stainless steel.
3. Select fasteners for type, grade, and class appropriate to the work.
4. Sex Bolts: Provide sex bolts as needed for assembly.

The Developer is advised to research, source and obtain the appropriate sex bolts commonly utilized in the assembly of the County's transits shelters throughout the County's service area prior to fabrication of steel elements.
5. Cast-in-Place Anchors in Concrete: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXAMINATION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install in accordance with Design Criteria and Performance Specifications, referenced standards, and Manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.
- B. Protect from damage during construction activities after installation. Touch up paint where installed items are damaged by construction activities.

3.03 ADJUST AND CLEANING

- A. Assure that hardware, fasteners, and accessories operate smoothly and as intended by manufacturer.
- B. Remove excess and waste materials from project site.

END OF SECTION

SECTION 142000

ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes:
 - 1. Electric traction passenger elevators
 - 2. Hydraulic passenger elevators.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections apply to this Section.
- B. Related Sections:
 - 1. Division 01 Section 'Sustainable Building Requirements'.
 - 2. Division 03 Section 'Embedded Items'.
 - 3. Division 05 Sections.
 - 4. Division 11 Section 'Motors'.

1.03 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by the manufacturer for installation of units required for this Project.
- B. Source Limitations: Obtain elevators through one source from a single manufacturer.
 - 1. Provide major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.

1.05 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.

1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
 2. Affected peak velocity acceleration (Av) for Project's location is per ASCE 7.
 3. Provide earthquake equipment required by ASME A17.1/CSA B44.
 4. Provide seismic switch required by ASCE/SEI 7.
 5. Design earthquake spectral response acceleration short period (Sds) for Project: Per ASCE 7.
 6. Project Seismic Design Category: Per ASCE 7.
 7. Elevator Component Importance Factor: 1.0.
- D. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.

1.06 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
- C. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- D. Sample of Manufacturer's Special Warranty.

1.07 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 2. Warranty Period: One year from date of Substantial Completion.

1.08 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide one year's full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: Two hours or less.

PART 2 PRODUCTS

2.01 GENERAL

- A. King County Transit prefers that all interior and exterior products shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.
- B. No underground hydraulic cylinders or buried hydraulic lines shall be allowed.

2.02 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 1. Fujitec America, Inc.
 2. KONE Inc.
 3. Otis Elevator Co.
 4. Schindler Elevator Corp.
 5. ThyssenKrupp Elevator.

2.03 SYSTEMS AND COMPONENTS FOR TRACTION ELEVATORS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for complete system.
- B. Elevator Machines: Provide variable-voltage, variable-frequency, ac-type hoisting machines. Provide solid-state power converters.
 1. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
 2. Provide means for absorbing regenerated power when elevator system is operating on standby power.
 3. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.
- C. Fluid for Oil Buffers: If oil buffers are used, use only fire-resistant hydraulic fluid containing antioxidant, anticorrosive, antifoaming, and metal-passivating additives.
- D. Car Frame and Platform: Welded steel units.
- E. Guides: Provide roller guides or polymer-coated, nonlubricated sliding guides at top and bottom of car and counterweight frames.

2.04 SYSTEMS AND COMPONENTS FOR HYDRAULIC ELEVATORS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for complete system.
 - 1. No underground hydraulic cylinders or buried hydraulic lines shall be allowed.
- B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - 1. Motor shall have variable-voltage, variable-frequency control.
- C. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- D. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
 - 1. Cylinder units shall be connected with dielectric couplings.
- E. Hydraulic Fluid: Nontoxic, biodegradable fluid made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives and approved by elevator manufacturer for use with elevator equipment.
- F. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
- G. Protective Cylinder Casing: PVC or HDPE pipe casing complying with ASME A17.1/CSA B44, of sufficient size to provide not less than 1-inch (25-mm) clearance from cylinder and extending above pit floor. Casing shall have means of monitoring effectiveness to comply with ASME A17.1/CSA B44.
- H. Corrosion-Protective Filler: A nontoxic, petroleum-based gel formulated for filling the space between hydraulic cylinder and protective casing. Filler shall be electrically nonconductive, displace or absorb water, and gel or solidify at temperatures below 60 deg F (16 deg C).
- I. Car Frame and Platform: Welded steel units.
- J. Guides: Roller guides; polymer-coated, nonlubricated sliding guides; or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.05 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation system indicated.
- B. Group Automatic Operation with Demand-Based Dispatching: Provide group automatic system that assigns cars to hall calls based on a dispatching program designed to minimize passenger waiting time. System automatically adjusts to changes in demand

for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.

2.06 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

2.07 FINISH MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

2.08 CAR ENCLOSURES

- A. General: Provide enameled-steel car enclosures to receive removable wall panels, with removable car roof, access doors, power door operators, and ventilation.
- B. Materials and Finishes: Provide manufacturer's standards, but not less than the following:
 - 1. Subfloor: Underlayment grade, exterior plywood, 5/8-inch (16-mm) nominal thickness.
 - 2. Floor Finish: Industrial grade vinyl floor; color as selected by Architect from manufacturer's full range.
 - 3. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - 4. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - 5. Sight Guards: Provide sight guards on car doors.
 - 6. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
 - 7. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
 - 8. Handrails: Manufacturer's standard handrails.

2.09 HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
- B. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:
 - 1. Stainless-Steel Frames: Formed from stainless-steel sheet.
 - 2. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - 3. Sight Guards: Provide sight guards on doors matching door edges.

4. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.10 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers.
- B. Car Control Stations: Provide manufacturer's standard car control stations. Mount in return panel adjacent to car door.
- C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
- D. Car Position Indicator: Provide digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
 1. Include travel direction arrows if not provided in car control station.
- E. Hall Push-Button Stations:
 1. Provide manufacturer's standard wall-mounted units.
- F. Hall Lanterns:
 1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
- G. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel.
- H. Hall Position Indicators: Provide digital-display-type position indicators, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 1. Integrate ground-floor hall lanterns with hall position indicators.

2.11 ELEVATORS

- B. Elevator Description:
 1. Elevator Number(s)
 2. Type: Geared traction.
 3. Machine Location: Machine room above hoistway.
 4. Rated Load: 2500 lb (1135 kg).
 5. Rated Speed: 350 fpm (1.8 m/s).
 6. Operation System: Group automatic operation.
 7. Car Enclosures:

- a. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
 - b. Car Fixtures: Satin stainless steel, No. 4 finish.
 - c. Side and Rear Wall Panels: Satin stainless steel, No. 4 finish.
 - d. Door Faces (Interior): Satin stainless steel, No. 4 finish.
 - e. Door Sills: Aluminum, mill finish.
 - f. Ceiling: Luminous ceiling.
 - g. Handrails: 1-1/2 inches (38 mm) round.
 - h. Floor: Manufacturer's standard carpet.
8. Hoistway Entrances: As follows:
- a. Type: Single-speed side sliding.
 - b. Frames: Satin stainless steel, No. 4 finish.
 - c. Doors: Satin stainless steel, No. 4 finish.
 - d. Sills Aluminum, mill finish.
9. Hall Fixtures Satin stainless steel, No. 4 finish.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- C. Leveling Tolerance: 1/8 inch (3 mm), up or down, regardless of load and direction of travel.
- D. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- E. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - 2. Place hall lanterns either above or beside each hoistway entrance.
 - 3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.02 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

3.03 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate elevator(s).
- B. Check operation of each elevator with Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION

SECTION 210500

BASIC FIRE SUPPRESSION SYSTEM DESIGN-BUILD REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational fire suppression system installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 REQUIREMENTS

- A. Scope: The Mechanical Contractor is responsible for the design and mechanical construction of a complete and operating facility. The Mechanical Contractor is responsible for providing all labor and materials, equipment, and transportation necessary or reasonably inferable as being necessary for the execution of the work. Division 21 Specifications are not intended to include ALL mechanical system requirements, equipment, or coordination with other trades. These specifications are intended to provide general design criteria and construction guidelines and shall be used as such.
- B. The Mechanical Contractor shall submit design drawings and equipment submittals for design build criteria compliance review and resubmit as necessary to comply with requirements. Submit design drawings to the King County Project Representative. Details of equipment sizing and configuration shall be the responsibility of the Designer of Record. Submit catalog cuts as indicated herein to the King County Project Representative.
- C. Contract requirements of the General Conditions, Supplementary Conditions, and Division 1 apply to all work in this Section.
- D. The Mechanical Contractor is required to review and coordinate all requirements with the architectural and structural drawings, and with the electrical design build contractor.

1.03 SUBMITTALS AND SHOP DRAWINGS

- A. Submit full sized, scaled (1/8" = 1'-0") floor plan drawings, calculations, and equipment submittals for design build criteria compliance review. Submit design drawings to the King County Project Representative with the following data indicated:
- B. Drawings
 - 1. Equipment schedule with following:
 - 2. Pipe routing with sizes
 - 3. Equipment locations with unique callouts for each fixture
- C. Calculations:

1. Sprinkler systems calculations

D. Shop Drawings

1. Equipment submittal sheets with model and relevant data clearly indicated using an arrow pointing at data relevant to this project.

1.04 COMPLIANCE AND COORDINATION

- A. Comply with all applicable codes, rules, regulations, design, and construction standards including, but not limited to:
1. IBC - International Building Code with Washington Amendments
 2. IMC - International Mechanical Code with Washington Amendments
 3. UPC - Uniform Plumbing Code with Washington Amendments
 4. NFPA - National Fire Protection Association
 5. Local Codes
 6. And other trades.

1.05 WORK SPECIFIED ELSEWHERE

- A. Where other divisions call for work under this division of the specifications, comply with all requirements herein. Mechanical work required by other divisions which is not shown on the mechanical drawings and/or specified in this division of these specifications shall be provided by the trade or subtrade requiring the mechanical work.

1.06 DEFINITIONS AND ABBREVIATIONS

- A. Organizations:
1. ANSI American National Standards Institute
 2. ASME American Society of Mechanical Engineers
 3. ASTM American Society of Testing and Materials

1.07 DESIGN CRITERIA

- A. Mechanical systems design by the Developer shall be in accordance with IBC.
- B. Coordinate mechanical systems design and equipment locations with the Architect. Insure that all service clearance requirements are defined on the drawings, accessible and coordinated with other trades. Locating equipment in areas which cannot be easily serviced will be unacceptable.

1.08 DRAWINGS

- A. The Developer shall provide detailed shop drawings to include but not limited to, exact duct and pipe routing, equipment sizes, service clearance requirements, diffuser and grille sizes and locations, thermostat locations, louver sizes and locations, roof and wall penetration locations and details, volume damper and plumbing shut-off valve locations and access panels in walls and ceilings. Do not proceed with construction until the design has been approved by the Architect.

1.09 SUBMITTALS, APPROVALS, AND REVIEWS

- A. **Shop Drawings and Product Data:** After the Contract is awarded but prior to manufacture or installation of any equipment, prepare complete Design Drawings and Brochures for materials and equipment as required by each section of the specification. Submit seven (6) complete sets for review within 30 days after award of Contract. Prior to submission of the Design Drawings and Project Data, review and certify that they are in compliance with the Design Criteria and Performance Specifications. Verify dimensional information to ensure proper clearance for installation of equipment. Check all materials and equipment after arrival on the job site and verify compliance with the Design Criteria and Performance Specifications. A minimum period of two weeks, exclusive of transmittal time, shall be required each time a Design Drawing and/or Brochure is submitted or resubmitted for review. This time period shall be considered by the Developer when scheduling submittal data.
- B. Review of Design Drawings and Brochures shall not relieve the Developer of responsibility for dimensions and/or errors that may be contained therein, or deviations from Contract Document requirements. The noting of some errors, but the overlooking of others, does not grant the Developer permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Design Criteria and Performance Specifications shall govern and are not waived or superseded in any way by the review of the Design Drawings and Brochures. Certify in writing or in the form of rubber stamp impressions as follows:
1. Each Design Drawing shall indicate in the lower right hand corner and each Brochure shall indicate on the front cover the following: Title of the sheet or brochure, name and location of the building; names of the Mechanical Engineer, Developer, subcontractors, manufacturer, supplier/vendor, etc., date of submittal, and the date of correction and revision. Unless the above information is included, the submittal will be returned for resubmittal.
 2. Design Drawings shall contain sufficient plans, elevations, sections, and isometrics to clearly describe the equipment or apparatus, and its location. Drawings shall be prepared by an Engineer/Drafter skilled in this type of work. Provide drawings drawn to at least 1/8" = 1'-0" scale
 3. Submit manufacturers' brochures and data published by the manufacturers containing complete and detailed engineering and dimensional information relevant to the particular equipment or materials to be furnished in this Contract. Do not submit information which describes several different items in addition to those items to be used, unless all irrelevant information is marked out, or unless relevant information is clearly highlighted. Review all submittals and stamp approved before forwarding to the King County's Representative for review. Establish quantities, verify space requirements, dimensions, and possible interferences with other trades. Include all specified materials in submittal. Partial submittals of individual items, or those that do not follow specified format, will not be accepted.
 4. Identify each item submitted with the pertinent specification paragraph number.

1.10 QUALITY ASSURANCE

- A. All materials shall be new. Properly store all materials and equipment for protection from physical damage or damage due to corrosion.

- B. Standardization of Manufacturer: Make every effort to furnish all equipment of any variance with these specifications.
- C. Equipment Furnished by Others: For installation of equipment furnished by others and installed by this Developer, obtain rough-in dimensions from approved shop drawings, by measurements from the actual equipment, from details shown on drawings or as directed by the Engineer.

1.11 STORAGE AND PROTECTION OF MATERIALS

- A. Provide a secure storage space for storage of materials and apparatus and assume complete responsibility for all losses and damage. Protect completed work, work underway, and apparatus against loss or damage.
- B. Temporary Heating: Apply temporary heat according to manufacturer's recommendations within equipment enclosures during periods when equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

1.12 PERMITS AND FEES

- A. Obtain and pay for all permits relating to the work in this Contract. Contact the various agencies involved relating to the mechanical work and include all inspection and other fees in the Contract.

1.13 COOPERATION

- A. Cooperate completely with all other crafts in the matter of planning and laying out of the Work. Every reasonable effort shall be made to prevent conflicts as to space requirements, dimensions, locations, access openings or other matters tending to obstruct or delay the work of any craft.

1.14 COORDINATION AND SCHEDULING

- A. Coordinate all mechanical work with other trades. Any changes required in the Work caused by the Developer's neglect to coordinate with others shall be made at the Developer's expense.
- B. Review all The Design Criteria and Performance Specifications and verify at the site all measurements necessary for the proper installation of the work.
- C. Refer to all Construction Drawings, details, and specifications, including Architectural, Structural, and Electrical, and fully coordinate all Mechanical work with other trades.
- D. Provide all required offsets and special fittings.
- E. Pay special attention to all visible devices and equipment in finished areas. Verify the exact location and receive approval from King County's Representative prior to installation.

- F. Schedule work with all other Developers in order to maintain job progress schedule and to avoid conflicts in the installation of work by other trades. Coordinate with the General Contractor to provide adequate access for installing large equipment.

1.15 SAFETY AND PROTECTION

- A. Safety Measures To Be Taken: The Developer will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Engineer to conduct construction observations of the Developer's performance is not intended to include review of the adequacy of the Developer's safety measures, in, on or near the construction site. It shall be the Developer's responsibility to comply with "Safety and Health Regulations for Construction," Volume 36, No. 75, Part II of the Federal Register by the U.S. Department of Labor. Developer shall be responsible for providing all such safety measures and shall consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether he is or is not in compliance with state or federal regulations.
- B. Protection: Ensure that mechanical safety and protection are maintained, including the proper covering, signage, and securing of pressurized pipe.

1.16 GUARANTEE

- A. Ensure that the mechanical system installed under this Contract is in proper working order and in compliance with drawings, specifications, and/or authorized changes. Without additional charge, replace any work or materials that develop defects, except from ordinary wear and tear, within one year from the date of substantial completion.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SITE CLEAN UP

- A. Remove from site all waste and rubbish resulting from the work. Keep Site clean on a day-to-day basis.

3.02 SERVICE OUTAGES

- A. Keep outages to an absolute minimum. Any essential outages required in the course of construction, whether for temporary services, cutovers or testing, shall be closely coordinated with the King County Project Representative and Engineer. They shall occur at times convenient with the King County Project Representative.

- B. Submit written request at least seven days in advance of any scheduled outage and proceed with the outage only after receiving authorization from King County's Representative.

3.03 MECHANICAL CONNECTIONS FOR EQUIPMENT

- A. General: Provide mechanical connection of all equipment having ductwork and/or piping requirements.
- B. IMC Compliance: Comply with applicable portions of IMC as to the type of products used and provisions for mechanical ductwork and piping connections.
- C. Underwriters Laboratories acceptance: All material and equipment within the scope of the UL re-examination service shall be approved by Underwriters Laboratories, Inc. for the purpose for which they are used and shall bear their label.
- D. Execution: Make mechanical ductwork and piping connections in accordance with connector manufacturer's written instructions, with recognized industry practices, and complying with requirements of ASME and SMACNA standards. Coordinate installation of mechanical connections for equipment with equipment installation work. Verify all mechanical loads (voltage, phase, full load amperes, number and point of connections, minimum circuit capacity, etc.) for equipment furnished under other divisions of this specification by reviewing respective shop drawings furnished under each division. Obtain and review equipment shop drawings to determine all final connection requirements before rough-in begins for each equipment item. Meet with each subcontractor furnishing equipment requiring mechanical service and review mechanical characteristics. Report any variances from mechanical characteristics noted on the mechanical drawings to Engineer before proceeding with rough-in work.

3.04 EQUIPMENT ACCESSIBILITY AND INSTALLATION

- A. Accessibility of Equipment: Comply with applicable codes and install equipment so as to be accessible for operation, maintenance or repair. Equipment deemed inaccessible shall be relocated as directed.
- B. Manufacturer's Installation Details: Follow Manufacturer's installation details exactly, where available. Provide special ductwork, piping or fittings as required.

3.05 MECHANICAL WORK EXPOSED TO WEATHER

- 1. Provide corrosion protection for all copper and ferrous metal portions of mechanical work exposed to weather, including ductwork, piping, supports, valves and other items. All ferrous metal shall be hot-dip galvanized after fabrication, painted or cadmium plated, or similarly protected against corrosion. All enclosures and equipment shall be weathertight.

3.06 EQUIPMENT BASES AND FASTENING

- A. Housekeeping Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment unless noted otherwise. Bases shall be 4" thick reinforced concrete, 3000-psi, 28-day compressive strength, with #4 rebar each way on 12" centers and doweled to floor slab. Trowel finish with 1" bevel edge all around.

- B. Floor-Mounted Equipment Fastening: All floor-mounted equipment shall be secured to the housekeeping bases with ductile steel anchor bolts, preset in the concrete base. Secure vibration mounts, where required, to the concrete bases such that the equipment is free to vibrate but cannot move from the base.
- C. Roof-Mounted Equipment and Roof Penetrations: Provide sealed roof curbs per local jurisdiction and King County's requirements for all rooftop equipment and ductwork or piping penetrations of the roof. Flash and seal weathertight to the existing roof structure and cover to match existing roof construction.

3.07 ANCHORAGE AND BRACING OF MECHANICAL SYSTEMS

- A. General: Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and mechanical equipment as required by Section 1621 of the International Building Code and local codes and ordinances.
- B. Ductwork and/or Piping Crossing Structural Separations: Install ductwork and piping that crosses structural separations between buildings or building units with flexible connections, suitable to accommodate longitudinal and transverse displacements.
- C. Anchorage of Equipment: Brace or anchor all mechanical and mechanical equipment to resist a horizontal force acting in any direction per requirements of the International Building Code for seismic zone 4.
- D. All anchorage and bracing must be designed by a licensed structural engineer and submitted to the project structural engineer for review and approval. The Contractor shall pay all costs.

3.08 CUTTING AND PATCHING

- A. Coordinate location of all openings required in the building construction for the installation of the work. Any cutting and patching made necessary through the neglect of the Contractor will be done at the expense of the Contractor.
- B. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved. In no case shall any structural member be cut.
- C. Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.09 SLEEVES AND OPENINGS

- A. Sleeves and openings required through floors and walls for mechanical work shall be the responsibility of this Contractor. Carefully coordinate this work with the other trades involved. Use approved sleeves and seal all openings around conduits in sleeves with a material of equal fire rating as the surface penetrated.

3.10 PAINTING

- A. Equipment painted at the factory shall not be repainted unless damaged or as otherwise specified. Touchup equipment using paint provided by the equipment manufacturer and selected to match the equipment finish.
- B. Touchup damaged non-equipment surfaces with paint matching type and color of existing undamaged adjacent finish.
- C. Touchup damaged galvanized surfaces using zinc-rich paint as recommended by the item manufacturer.
- D. All exposed mechanical materials (ductwork, piping, hangers and supports, equipment and registers or diffusers) shall be painted with color per the Architect's discretion.

3.11 TESTS

- A. Fully test and adjust the equipment installed under this specification and demonstrate its proper operation to the Engineer. No equipment shall be tested or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions. Test and adjust equipment prior to employee instruction. Submit test report for each system or component to the Engineer for approval. Where specified, submit certified test reports by certified service organizations representing the system or equipment involved. Include all test reports in operation and maintenance manuals.

3.12 CLEANING

- A. Clean up all equipment to factory condition. Use touch-up paint where required. Remove all packing cartons and other debris that is a direct result of the installation of the work of this Division.
- B. Clean registers and diffusers, interiors and exteriors of all equipment in accordance with manufacturer's recommendations.
- C. Vacuum the interior of all ductwork. Wipe all mechanical work down to remove dust and dirt.

3.13 PROJECT FINALIZATION AND START UP

- A. Upon completion of equipment and system installation, assemble all equipment factory representatives and subcontractors for system start up.
- B. Each major equipment and system representative and subcontractor shall assist in start-up and shall check out their respective system and remain at the site until the total system operation is accepted by King County's Representative.
- C. The project foreman shall accompany the reviewing party and remove cover plates, panel covers and other access panels as requested in order to allow review of the entire mechanical system.

3.14 CERTIFICATION OF INSPECTION

- A. Present The King County Project Representative with Certification of Inspection from the code enforcing agency upon completion of work stating that all work complies with all applicable Codes and Ordinances.

3.15 RECORD DRAWINGS

- A. Maintain, on a daily basis, a complete set of "Record Drawings," reflecting an accurate dimensional record of the precise locations of all buried or concealed work. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite authorization for such changes. The "Record Drawings" for daily recording shall consist of a set of blue line prints of the Contract Drawings.
- B. Record dimensions clearly and accurately, delineating the work as installed. Identify locations by at least two dimensions to permanent reference points. Upon completion of the work, provide a complete set of electronic files of mechanical systems including all "Record" information to the King County Project Representative.

3.16 OPERATION AND MAINTENANCE MANUALS

- A. General: Prepare instruction manuals describing the operation, servicing and maintenance requirements of all mechanical equipment provided, including complete parts lists.
- B. Equipment Described in the Manual: Include all equipment submitted for approval. Each section shall have a separate index tab.
- C. Information Contained in the Manual:
 - 1. Each manual shall contain the following information:
 - a. Complete and legible equipment data cut sheets.
 - b. Legend of all symbols and abbreviations.
 - c. A complete instruction manual necessary for the proper operation and maintenance of the system.
 - d. Complete list of all test and diagnostic equipment, including testing procedures to utilize same.
 - e. Replacement parts list for each piece of equipment in the system with a brief description of functions.
 - 2. Index all contents listed in an orderly presentation. Include tabulations describing the type of equipment, frequency and type of service.
- D. Binding: Bind material in a post-type expandable three-hole binder with cloth-covered heavy-duty hardboard cover and cloth back panel. Imprint the front cover with the name of the project, King County, year of completion, the words "Mechanical Equipment," and the names of the Engineer and Mechanical Contractor. Imprint the back edge with the name of the project, King County and year of completion. If the thickness of the manual

exceeds 3", provide separate volumes, each not to exceed 3" thick, with each volume imprinted as described above.

- E. Number of Copies: Submit one preliminary copy for review approval. Deliver three final bound copies to the King County Project Representative upon final approval.

3.17 OPERATING PERSONNEL INSTRUCTION

- A. General: Provide instruction of facility operating personnel sufficiently prior to facility acceptance, upon mutually satisfactory arrangement with King County Metro Transit.
- B. Instruction: Instruction shall not begin until the component, assembly, or system has been tested and is in acceptable operating condition. Otherwise, instruction shall be deemed incomplete. Instruction shall encompass normal operation, emergency operation, fire and other hazards, safety provisions, provisions for pollution prevention, and maintenance procedures for all work provided.
- C. Instructors: Instructors shall include the Contractor's staff, supplemented by authorized representatives of the component, assembly or system manufacturer.
- D. Time: Provide all necessary instruction to the complete understanding of the operating personnel. Minimum instruction periods shall be as recommended by manufacturer unless noted otherwise. Provide a time schedule to the King County Project Representative for review and approval.

END OF SECTION

SECTION 210533

HEAT TRACING FOR FIRE SUPPRESSION PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section establishes minimum standards and guidelines for providing an energy efficient freeze protection system for fire sprinkler piping including standpipes, mains and branch lines with sprinklers on a Design-Build basis.
- B. This Section includes
 - 1. A UL Listed system to prevent the freezing of fire sprinkler piping consisting of self-regulating heating cable, connection kits and electronic controller.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specifications are a part of this Section.
- B. Referenced Sections include:
 - 1. Division 21 'Common Work Results for Fire Suppression'.
 - 2. Division 21 Section 'Facility Fire Suppression Water Service Piping'.
 - 3. Division 26 Section 'Common Work Results for Electrical'.
 - 4. Division 26 Section 'Grounding and Bonding for Electrical Systems'.
 - 5. Division 26 Section 'Low-Voltage Electrical Power Conductors and Cables'.
 - 6. Division 28 Section 'Fire Detection and Alarm'.

1.03 SYSTEM DESCRIPTION

- A. System for freeze protection of fire sprinkler piping using self-regulating heating cables with proportional ambient sensing control (PASC), monitoring, integrated ground-fault circuit protection & Building Management System (BMS) communication capabilities.

1.04 PERFORMANCE REQUIREMENTS

- A. Furnish and install a UL listed system of electric self-regulating heating cable and components for maintaining the water temperature in the pipes as indicated by the approved Design.
- B. The system must be compliant with NFPA-13 requirements. It shall be the Developer's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.05 SUBMITTALS

- A. Product Data
 - 1. Heating cable data sheet
 - a. Manufacturer's catalog cuts showing materials and performance data and UL Compliance.

2. UL Listing Certificate for freeze protection of fire standpipes and supply piping.
 3. Fire sprinkler freeze protection design guide
 4. System installation and operation manual
 5. System installation details
 6. Connection kits and accessories data sheet
 7. Controller data sheet
 8. Controller wiring diagram
- B. Project list of at least 20 projects, installed for at least 5 years, with at least 2000 ft (600m) of heating cable in each project.

1.06 QUALITY ASSURANCE

- A. Manufacturers' Qualifications
1. Manufacturer to show minimum of thirty (30) years experience in manufacturing electric self-regulating heating cables.
 2. Manufacturer will be ISO-9001 registered.
 3. Manufacturer to provide products consistent with IEEE 515.1 and CSA 22.2 No 130-03 requirements.
- B. Installer Qualifications
1. System installer shall have complete understanding of product and product literature from manufacturer or authorized representative prior to installation. Electrical connections shall be performed by a licensed electrician.
- C. Regulatory Requirements and Approvals
1. The system (heating cable, connection kits, and controller) shall meet NFPA-13 and NFPA-14 requirements by carrying UL Listing for fire standpipes and supply piping.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a Nationally Recognized Testing Laboratory (NRTL), and marked for intended use.

PART 2 PRODUCTS

2.01 GENERAL

- A. Furnish heat tracing system for fire-suppression piping from a single manufacturer.
- B. Manufacturer Basis of Design: Tyco Thermal Controls.
- C. The system (heating cable, connection kits, and controller) shall meet NFPA-13 requirements by carrying UL system listing for freeze protection of fire standpipes and supply piping. No parts of the system may be substituted or exchanged.

2.02 CONSTRUCTION

- A. The self-regulating heating cable shall consist of two (2) 16-AWG nickel-coated copper bus wires embedded in a radiation-crosslinked conductive polymer core. It shall be

covered by a radiation-crosslinked, polyolefin, dielectric jacket and enclosed in a tinned copper braid of 14 AWG equivalent wire size. The braid shall be covered with a (nominal) 40-mil polyolefin outer jacket, color-coded for easy identification. The cable shall be specifically designed, manufactured, and UL listed for freeze-protection.

- B. The heating cable shall have a self-regulating factor of at least 90 percent for 5/8XL or at least 70 percent for 12XL. The self-regulating factor is defined as the percent reduction of the heating cable power output going from a 40 degrees F pipe temperature to 150 degrees F pipe temperature.
 - 1. Operating Temperature: The freeze protection system shall not exceed a nominal temperature of 40°F.
 - 2. Maintenance Temperature: Temperatures shall be maintained with straight runs of heating cable on the pipe. The use of a 40°F fixed thermostat shall ensure heating cable is off when pipe temperature is over 40°F.
- C. Heating Cable Connection Kit:
 - 1. Manufacturer shall provide power connection, splice/tee and end seal kits compatible with selected heating cable.
 - 2. Installation shall not require the installing contractor to cut into the heating-cable core to expose the bus wires.
 - 3. Connection kits shall be rated NEMA 4X to prevent water ingress and corrosion. All components shall be UV stabilized.
 - 4. Connection kits shall be UL Listed.
- D. Heating Cable Installation Accessories:
 - 1. High temperature, glass filament tape for attachment of heating cable to fire sprinkler piping. Cable ties are not permitted.
 - 2. Provide warning labels every 10 feet on exterior of insulation, opposite sides of pipe.
- E. Digital Temperature Controller with built-in Ground-Fault Protection Device (GFPD).

2.03 MECHANICAL

- A. The cable shall have a minimum cut-through resistance of 600 lb per CSA 22.2 0.3. Cutting test 4.14. The cable shall have a minimum impact resistance of 25 ft lb per UL 1588.11. The cable shall withstand a glancing impact of 22 ft lb per UL 1581.590. The cable shall have a minimum abrasion resistance of 7000 cycles per UL 719.19. The cable shall withstand a crush resistance of 4500 N per IEEE 515 Deformation Test 5.1.5.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Installer shall be familiar with installing heat-trace cable and equipment.
 - 1. The installer shall be responsible for providing a functional system, installed in accordance with applicable national and local code requirements.

2. Each circuit shall be protected with a 30-mA ground-fault protection device.
- B. Comply with manufacturer's recommendations in Installation and Operation Manuals.
- C. Apply the heating cable linearly on the pipe after piping has successfully completed any pressure tests. Secure the heating cable to piping with fiberglass tape.
- D. Install electric heating cable according to the manufacturer's instructions. The installer shall be responsible for providing a complete functional system, installed in accordance with applicable national and local requirements.
- E. Grounding of controller shall be equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- F. Connection of all electrical wiring shall be according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- G. Electrical Connections:
 1. Electrical power wiring is specified in Division 26.
 2. Freeze protection for the fire line shall be monitored by the fire alarm control panel.

3.02 FIELD QUALITY CONTROL

- A. Start-up of system shall be performed by factory technician or factory representative. Coordinate with King County Project Representative.
- B. Field Testing and Inspections
 1. The system shall be commissioned in accordance to the system's Installation and Operation manuals.
 2. The heating cable circuit integrity shall be tested using a 2500 Vdc megohmmeter at the following intervals below. Minimum acceptable insulation resistance shall be 1000 megohms or greater.
 - a. Before installing the heating cable
 - b. After heating cable has been installed onto the pipe
 - c. After installing connection kits
 - d. After the thermal insulation is installed onto the pipe
 - e. Prior to initial start-up (commissioning)
 - f. As part of the regular system maintenance.
 3. The technician shall verify that the C910-485 or ACCS-30 control parameters are set to the application requirements.
 4. The technician shall verify that the C910-485 or ACCS-30 alarm contacts are corrected connected to the fire alarm panel.
 5. The technician shall verify that the C910-485 or ACCS-30 and ProtoNode-RER/LER are configured correctly with the BMS.
 6. Submit all records of the test data to the King County Project Representative.
 - a. Acceptable Results: The heater circuit shall be continuous and megger readings shall be at least 20 megohms regardless of heater length.
 - b. Circuits yielding unacceptable readings must be repaired or replaced.

END OF SECTION

SECTION 211100

FACILITY FIRE SUPPRESSION WATER SERVICE PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing a complete and operational facility fire suppression water service piping systems on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes fire-suppression piping and equipment for the following building systems:
 - 1. Dry-pipe fire-suppression Ordinary Hazard Group 1 sprinkler system and Class I standpipes, including piping, valves, specialties, automatic sprinklers, air compressor(s), and accessories.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 28 Section 'Fire Alarm System' for alarm devices not in this Section.
 - 2. Division 21 Section 'Common Work Results for Fire Suppression'.

1.03 DEFINITIONS

- A. Hose Connection: Valve with threaded outlet matching fire hose coupling thread for attaching fire hose.
- B. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 and NFPA 14 for obtaining approval from authorities having jurisdiction.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Design standpipes and sprinklers obtain approval from authorities having jurisdiction. Include minimum residual pressures at hydraulically remote outlets. Existing Utility District estimated minimum water pressure at 472-foot elevation is 117+ psi.
 - 1. NPS 2-1/2 Hose Connections: 100 psig.
- B. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:
 - 1. Include 10 percent margin of safety for available water flow and pressure.

2. Include losses through water-service piping, valves, backflow preventers, and hose allowance of 250 gpm.
 3. Sprinkler Occupancy Hazard Classifications: As follows:
 - a. Building Service Areas: Ordinary Hazard, Group 1.
 - b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - c. General Storage Areas: Ordinary Hazard, Group 1.
 - d. Garage Public Areas: Ordinary Hazard, Group 1.
 4. Minimum Density for Closed Head Automatic-Sprinkler Piping Design: As follows:
 - a. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 3500- sq. ft. area.
 5. Maximum Protection Area per Sprinkler: As follows:
 - a. Electrical Equipment Rooms: 130 sq. ft.
 - b. According to NFPA 13 recommendations, unless otherwise indicated.
- C. Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

1.05 SUBMITTALS

- A. Product Data: For the following:
1. Pipe and fitting materials and methods of joining for standpipe piping.
 2. Pipe and fitting materials and methods of joining for sprinkler piping.
 3. Pipe hangers and supports.
 4. Piping seismic restraints.
 5. Valves, including specialty valves, accessories, and devices.
 6. Alarm devices. Include electrical data.
 7. Air compressors. Include electrical data.
 8. Hose connections. Include size, type, and finish.
 9. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
 10. Fire Department Connections: Include type, number, size, and arrangement of inlets, caps and chains, size and direction of outlet, escutcheon and marking, and finish.
- B. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been stamped approved by Burien Fire Marshal. Include hydraulic calculations, if applicable and seismic bracing calculations.
- C. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
- D. Maintenance Data: For each type of standpipe and sprinkler specialty to include in maintenance manuals specified in Division 1.

- E. Developer shop drawings, product data, hydraulic and seismic calculations to be submitted to King County Metro Transit for insurance compliance review in addition to the other required parties.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
- B. Engineering Responsibility: Design and preparation of stamped working plans, calculations, and field test reports by a qualified licensed fire protection engineer. Base calculations on flow information included under "System Performance Requirements."
- C. Professional Qualifications: A professional who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.
- D. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- E. Standpipe and Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."
 - 2. NFPA 14, "Standpipe and Hose Systems."
- H. All sprinkler systems work shall conform to FM Global Property Loss Statement Data Sheets 2-8. Earthquake protection for water-based fire protection systems, 2-8N installation of sprinkler systems and 3-26 fire protection water demand for non-storage sprinkler and D properties.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Paragraph for applications of pipe, tube, fitting, and joining materials.

2.02 PIPES AND TUBES

- A. Ductile-Iron Pipe: AWWA C151, mechanical-joint type; with cement-mortar lining and seal coat according to AWWA C104. Include gland, rubber gasket, and bolts and nuts according to AWWA C111.
- B. Standard-Weight Steel Pipe: Galvanized interior and exterior, ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 and smaller, and Schedule 30 in NPS 8 and larger. Schedule 10 pipe is not allowed on project.
- C. Copper Tube: ASTM B 88, water tube, drawn temper. -

2.03 PIPE AND TUBE FITTINGS

- A. Ductile-Iron Fittings: ASTM A 47, malleable-iron or ASTM A 536, ductile-iron casting complying with AWWA pipe size; with ends factory grooved according to AWWA C606. Include cement-mortar lining and seal coat according to AWWA C104 or epoxy, interior coating according to AWWA C550.
- B. Malleable-Iron Threaded Fittings: ASME B16.3. Shall be Ward, American Anvil, or Grinnell.
- C. Steel, Threaded Couplings: ASTM A 865.
- D. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
- E. Steel Flanges and Flanged Fittings: ASME B16.5.
- F. Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.04 JOINING MATERIALS

- A. Refer to Division 21 Section "Common Work Results for Fire Suppression" for pipe-flange gasket materials and welding filler metals.
- B. Ductile-Iron, Keyed Couplings: UL 213 and AWWA C606, for ductile-iron pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts.
- C. Ductile-Iron, Flanged Joints: AWWA C115, ductile-iron or gray-iron pipe flanges, rubber gaskets, and steel bolts and nuts.

- D. Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for dry-pipe service for couplings for dry piping.
- E. Brazing Filler Metals: AWS A5.8, Classification BCuP-3 or BCuP-4.
- F. Copper, Keyed Couplings: UL 213 and equivalent to AWWA C606, for copper-tube dimensions. Include ASTM A 47, malleable-iron or ASTM A 536, ductile-iron housing with copper-colored enamel finish, rubber gaskets, and steel bolts and nuts.
- G. Transition Couplings: AWWA C219, sleeve type, or other manufactured fitting the same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

2.05 POLYETHYLENE ENCASEMENT

- A. Polyethylene Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, film, 0.008-inch minimum thickness, tube or sheet.

2.06 GENERAL-DUTY VALVES

- A. Refer to Division 21 Section "Valves" for gate, ball, butterfly, globe, and check valves not required to be UL listed and FM approved.

2.07 FIRE-PROTECTION-SERVICE VALVES

- A. General: UL listed and FM approved, with minimum 175-psig nonshock working-pressure rating. Valves for grooved-end piping may be furnished with grooved ends instead of type of ends specified.
- B. Gate Valves, NPS 2 and Smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.
- C. Indicating Valves, NPS 2-1/2 and Smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
 1. Indicator: Visual.
 2. Indicator: Electrical 115-V ac, prewired, single-circuit, supervisory switch.
 3. Indicator: Electrical 115-V ac, prewired, two-circuit, supervisory switch.
- D. Gate Valves, NPS 2-1/2 and Larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
- E. Swing Check Valves, NPS 2 and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.
- F. Swing Check Valves, NPS 2-1/2 and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.

2.08 SPECIALTY VALVES

- A. Alarm Check Valves: UL 193, 175-psig working pressure; designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
 - 1. Option: Grooved-end connections for use with keyed couplings.
 - 2. Drip Cup Assembly: Pipe drain without valves, and separate from main drain piping.
 - 3. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
- B. Dry-Pipe Valves: UL 260; differential type; 175-psig working pressure; with cast-iron flanged inlet and outlet, bronze seat with O-ring seals, and single-hinge pin and latch design. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - 1. Option: Grooved-end connections for use with keyed couplings.
 - 2. Air-Pressure Maintenance Devices: Automatic device to maintain correct air pressure in piping. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and 175-psig maximum inlet pressure.
 - 3. Air Compressor: Fractional horsepower, 120-V ac, 60 Hz, single phase.
- C. Pressure-Regulating Valves: UL 1468, 400-psig minimum rating, brass. Include NPS 1-1/2 or NPS 2-1/2, female NPS inlet and outlet; adjustable setting feature; and straight or 90-degree angle pattern design as indicated.
 - 1. Finish: Rough chrome-plated.
- D. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4, ball check device with threaded ends.

2.09 MANUAL CONTROL STATIONS

- A. Manual Control Stations: Hydraulic operation, with union, NPS 1/2 pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.10 SPRINKLERS

- A. Automatic Sprinklers: With heat-responsive element complying with the following:
 - 1. UL 199, for applications except residential.
 - 2. UL 1626, for residential applications.
 - 3. UL 1767, for early suppression, fast-response applications.

- B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
 - 1. Open Sprinklers: UL 199, without heat-responsive element.
 - i. Orifice: 1/2 inch, with discharge coefficient K between 5.3 and 5.8.
 - ii. Orifice: 17/32 inch, with discharge coefficient K between 7.4 and 8.2.
- C. Sprinkler types, features, and options include the following:
 - 1. Pendent, dry-type sprinklers.
 - 2. Sidewall, dry-type sprinklers.
- D. Sprinkler Finishes: Chrome-plated, bronze, and painted.
- E. Special Coatings: Wax, lead, and corrosion-resistant paint.
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - 1. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- G. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.11 SPECIALTY SPRINKLER FITTINGS

- A. Specialty Fittings: UL listed and FM approved; made of steel, ductile iron, or other materials compatible with piping.
- B. Dry-Pipe-System Fittings: UL listed for dry-pipe service.
- C. Press-Seal Fittings: UL 213, steel housing with butylene O-rings and pipe stop.
- D. Locking-Lug Fittings: UL 213, ductile-iron body with locking-lug ends.
- E. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.
- F. Sprinkler, Drain and Alarm Test Fittings: UL-listed, cast- or ductile-iron body; with threaded inlet and outlet, test valve, and orifice and sight glass.
- G. Sprinkler, Branch-Line Test Fittings: UL-listed, brass body; with threaded inlet and capped drain outlet and threaded outlet for sprinkler.
- H. Sprinkler, Inspector's Test Fittings: UL-listed, cast- or ductile-iron housing; with threaded inlet and drain outlet and sight glass.

2.12 HOSE CONNECTIONS

- A. Description: UL 668, 300-psig minimum pressure rating, brass, hose valve for connecting fire hose. Include 90-degree angle pattern design; female NPS inlet and male hose outlet; and lugged cap, gasket, and chain. Include NPS 2-1/2 as indicated,

and hose valve threads according to NFPA 1963 and matching local fire department threads.

1. Valve Operation: Nonadjustable type, unless pressure-regulating type is indicated.
2. Finish: Rough brass.

2.13 ALARM DEVICES

- A. General: Types matching piping and equipment connections.
- B. Electric-Motor-Operated Alarms: Sleeve to suit wall construction and 10-inch- diameter, cast-aluminum alarm gong with red-enamel factory finish.
- C. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250-psig pressure rating; and designed for horizontal or vertical installation. Include two single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
- D. Pressure Switches: UL 753; electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
- E. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
- F. Indicator-Post Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.

2.14 PRESSURE GAGES

- A. Pressure Gages: UL 393, 3-1/2- to 4-1/2-inch- diameter dial with dial range of 0 to 250 psig.

2.15 CONTROL PANELS

- A. Description: Single-area, two-area, or single-area cross-zoned type as indicated. Control panel includes NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
 1. Panels: UL listed and FM approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 2. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and a cover held closed by breakable strut.

2.16 FIRE DEPARTMENT CONNECTIONS

- A. Wall, Fire Department Connections: UL 405; cast-brass body with brass, wall, escutcheon plate; brass, lugged caps with gaskets and brass chains; and brass, lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking "AUTO SPKR & STANDPIPE."
 - 1. Type: Flush mounting.
 - 2. Escutcheon Plates: Rectangular.
 - 3. Finish: Polished Brass.

2.17 BACKFLOW PREVENTERS

- A. General: ASSE standard, backflow preventers.
 - 1. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
 - 2. NPS 2-1/2 (DN 65) and Larger: Bronze, cast-iron, steel, or stainless steel body with flanged ends.
 - a. Interior Lining: AWWA C550 or FDA approved, epoxy coating for backflow preventers having cast-iron or steel body.
 - 3. Interior Components: Corrosion-resistant materials.
 - 4. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
 - 5. Strainer: On inlet, if indicated.
- B. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valves. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
- C. Double-Check Detector Assembly Backflow Preventers: ASSE 1048, FM approved and UL listed, and suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet. Include test cocks; two positive-seating check valves; and bypass with displacement-type water meter, valves, and double-check backflow preventer. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article in Part 1 of this Section.
- B. Report test results promptly and in writing.

3.02 EARTHWORK

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.03 EXAMINATION

- A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.
- B. Examine walls and partitions for suitable thickness, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.04 PIPING APPLICATIONS

- A. Do not use welded joints with galvanized steel pipe.
- B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- C. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
- D. Underground Service-Entrance Piping: Use ductile-iron, grooved-end pipe and fittings; ductile-iron, keyed couplings; and grooved joints.
- E. Service-Entrance Piping Inside Building: If backflow preventer is not within 5 feet underground service-entrance piping, use Type K hard drawn copper tubing upstream of backflow preventer. Do not use steel pipe on municipal water system upstream of backflow preventer.
- F. Dry-Pipe Sprinklers: Use the following:
 1. NPS 1-1/2 and Smaller: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
 2. NPS 1-1/2 and Smaller: Galvanized, standard-weight steel pipe with plain ends; locking-lug fittings; and twist-locked joints.
 3. NPS 2: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
 4. NPS 2: Galvanized, standard-weight steel pipe with plain ends; locking-lug fittings; and twist-locked joints.
 5. NPS 2: Galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
 6. NPS 2-1/2 to NPS 4: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
 7. NPS 2-1/2 to NPS 4: Galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.

G. Wet-Pipe Sprinklers: Use the following:

1. NPS 1-1/2 and Smaller: Standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded joints.
2. NPS 1-1/2 and Smaller: Standard-weight steel pipe with plain ends, locking-lug fittings, and twist-locked joints.
3. NPS 1-1/2 and Smaller: Standard-weight steel pipe with plain ends, steel welding fittings, and welded joints.
4. NPS 1-1/2 and Smaller: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded joints.
5. NPS 1-1/2 and Smaller: Galvanized, standard-weight steel pipe with plain ends; locking-lug fittings; and twist-locked joints.
6. NPS 2: Standard-weight steel pipe with plain ends, locking-lug fittings, and twist-locked joints.
7. NPS 2: Standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
8. NPS 2: Standard-weight steel pipe with plain ends, steel welding fittings, and welded joints.
9. NPS 2: Galvanized, standard-weight steel pipe with plain ends; locking-lug fittings; and twist-locked joints.
10. NPS 2: Galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
11. NPS 2-1/2 and Larger: Galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
12. NPS 2-1/2 and Larger: Standard weight steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.
13. NPS 2-1/2 and Larger: Standard Weight steel pipe with plain ends, steel welding fittings, and welded joints.

3.05 VALVE APPLICATIONS

A. Where specific valve types are not indicated, the following requirements apply:

1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use gate valves.
2. General-Duty Valves: For applications where UL-listed and FM-approved valves are not required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use gate, ball, or butterfly valves.
 - b. Throttling Duty: Use globe, ball, or butterfly valves.

3.06 JOINT CONSTRUCTION

- A. Refer to Division 21 Section "Common Work Results for Fire Suppression" for basic piping joint construction.
- B. Ductile-Iron-Piping, Grooved Joints: Use ductile-iron pipe with radius-cut-grooved ends; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings. Assemble joints with

couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.

- C. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.

3.07 SERVICE-ENTRANCE PIPING

- A. Connect standpipe and sprinkler piping to water-service piping of size and in location indicated for service entrance to building.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping. Refer to Division 21 Section "Plumbing Specialties" for backflow preventers.

3.08 WATER-SUPPLY CONNECTION

- A. Connect standpipe and sprinkler piping to building interior water distribution piping. Refer to Division 21 Section "Water Distribution Piping" for interior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water distribution piping. Refer to Division 21 Section "Plumbing Specialties" for backflow preventers.

3.09 PIPING INSTALLATION

- A. Refer to Division 21 Section "Common Work Results for Fire Suppression" for basic piping installation.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Project Representative before deviating from approved working plans.
- C. Install underground service-entrance piping according to NFPA 24 and with restrained joints.
- D. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
- F. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.

- G. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install drain valves on standpipes.
- K. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
- L. Install alarm devices in piping systems.
- M. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping and to NFPA 14 for standpipes.
- N. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.
- O. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
- P. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

3.10 SPECIALTY SPRINKLER FITTING INSTALLATION

- A. Install specialty sprinkler fittings according to manufacturer's written instructions.

3.11 VALVE INSTALLATION

- A. Refer to Division 21 Section "Valves" for installing general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13 and NFPA 14, manufacturer's written instructions, and authorities having jurisdiction.
- B. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.
- C. Valves for Wall Fire Hydrants: Install gate valve with nonrising stem in supply pipe.
- D. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
- E. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.

- F. Dry-Pipe Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - 1. Air-Pressure Maintenance Devices for Dry-Pipe Systems: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.
 - 2. Install air compressor and compressed-air supply piping.

3.12 SPRINKLER APPLICATIONS

- A. General: Use sprinklers according to the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Wall Mounting: Sidewall sprinklers.
 - 3. Spaces Subject to Freezing: Dry-pendent type and/or dry-sidewall type sprinklers.
 - 4. Sprinkler Finishes: Use sprinklers with the following finishes:
 - i. Upright, Pendent, and Sidewall Sprinklers: Chrome-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

3.13 SPRINKLER INSTALLATION

- A. Install sprinklers in patterns indicated on approved shop drawings.

3.14 HOSE-CONNECTION INSTALLATION

- A. Install hose connections adjacent to standpipes, unless otherwise indicated.
- B. Install freestanding hose connections for access and minimum passage restriction.
- C. Install NPS 2-1/2 hose connections with quick-disconnect NPS 2-1/2 by NPS 1-1/2 reducer adapter and flow-restricting device, unless otherwise indicated.

3.15 CONNECTIONS

- A. Connect water supplies to standpipes and sprinklers. Include backflow preventers.
- B. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
- C. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.
- D. Electrical Connections: Power wiring is specified in Division 26.
- E. Connect alarm devices to fire alarm.
- F. Connect compressed-air supply to dry-pipe sprinkler piping.

- G. Connect air compressor to the following piping and wiring:
 - 1. Pressure gages and controls.
 - 2. Electrical power system.
 - 3. Fire alarm system devices, including low-pressure alarm.

3.16 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and NFPA 14 and in Division 21 Section "Common Work Results for Fire Suppression."
- B. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and NFPA 14 and in Division 21 Section "Mechanical Identification."

3.17 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
- B. Flush, test, and inspect standpipes according to NFPA 14, "Tests and Inspection" Chapter.
- C. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- D. Report test results promptly and in writing to project representative and authorities having jurisdiction.

3.18 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers having paint other than factory finish.

3.19 PROTECTION

- A. Protect sprinklers from damage.

3.20 START-UP PROCEDURES

- A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- B. Verify that excess-pressure pumps and accessories are installed and operate correctly.
- C. Verify that air compressors and their accessories are installed and operate correctly.
- D. Verify that specified tests of piping are complete.
- E. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.

- F. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
- G. Verify that potable-water supplies have correct types of backflow preventers.
- H. Drain dry-pipe sprinkler piping.
- I. Pressurize and check dry-pipe sprinkler piping air-pressure maintenance devices and air compressors.
- J. Verify that hose connections and fire department connections have threads compatible with local fire department equipment.
- K. Fill standpipes with water.
- L. Verify that hose stations are correct type and size.
- M. Energize circuits to electrical equipment and devices.
- N. Start and run air compressors.
- O. Adjust operating controls and pressure settings.
- P. Coordinate with fire alarm tests. Operate as required.

3.21 DEMONSTRATION

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
 - 1. Schedule demonstration with King County Metro Transit with at least seven days' advance notice.

END OF SECTION

SECTION 220500

COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Developer's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 REQUIREMENTS

- A. Scope: The Mechanical Contractor is responsible for the design and mechanical construction of a complete and operating facility. The Mechanical Contractor is responsible for providing all labor and materials, equipment, and transportation necessary or reasonably inferable as being necessary for the execution of the work. Division 22 Specifications are not intended to include ALL mechanical system requirements, equipment, or coordination with other trades. These specifications are intended to provide general design criteria and construction guidelines and shall be used as such.
- B. The Mechanical Contractor shall submit design drawings and equipment submittals for design build criteria compliance review and resubmit as necessary to comply with requirements. Submit design drawings to the King County Project Representative. Details of equipment sizing and configuration shall be the responsibility of the Designer of Record. Submit catalog cuts as indicated herein to the King County Project Representative.
- C. Contract requirements of the General Conditions, Supplementary Conditions and Division 1 apply to all work in this Section.
- D. The Mechanical Contractor is required to review and coordinate all requirements with the architectural and structural drawings, and with the electrical design build contractor.

1.03 SUBMITTALS AND SHOP DRAWINGS

- A. Submit full sized, scaled (1/8" = 1'-0") floor plan drawings, calculations, and equipment submittals for design build criteria compliance review. Submit design drawings to the King County Project Representative with the following data indicated:
 - B. Drawings
 - 1. Equipment schedule with following:
 - 2. Pipe routing with sizes
 - 3. Plumbing fixture locations with unique callouts for each fixture
 - C. Plumbing fixture connection schedule with the following:

1. Fixture callout
2. Hot and cold water supply sizes
3. Waste piping size
4. Supply and waste fixture units per fixture
5. Storm drainage piping

D. Shop Drawings

1. Equipment submittal sheets with model and relevant data clearly indicated using an arrow pointing at data relevant to this project.

1.04 COMPLIANCE AND COORDINATION

- A. Requirements of the Design Criteria and other Performance Specifications Sections apply to this work.
- B. Comply with all applicable codes, rules, regulations, design, and construction standards including, but not limited to:
1. ASHRAE Standards
 2. Washington Energy Code
 3. IBC - International Building Code with Washington Amendments
 4. IMC - International Mechanical Code with Washington Amendments
 5. UPC - Uniform Plumbing Code with Washington Amendments
 6. NFPA - National Fire Protection Association
 7. IFGC - International Fuel Gas Code
 8. Local Codes
 9. And other trades.

1.05 INTENT

- A. Examination of Site and Drawings: Submittal of milestone review Documents shall indicate that the Developer has examined the site, the Design Criteria and the Performance specifications, and has determined that the Development Proposal is sufficient, adequate, and satisfactory for the construction of the Work under these requirements.
- B. Discrepancies: Bring to the King County Project Representative's attention any discrepancies between the Documents and field conditions, and any design and layout changes required due to specific equipment selection, etc., prior to purchasing and installing equipment and material. Corrective work necessitated by discrepancies after purchasing and installation shall be at the Developer's expense.

1.06 WORK SPECIFIED ELSEWHERE

- A. Where other divisions call for work under this division of the specifications, comply with all requirements herein. Mechanical work required by other divisions which is not shown on the mechanical drawings and/or specified in this division of these specifications shall be provided by the trade or subtrade requiring the mechanical work.

1.07 DEFINITIONS AND ABBREVIATIONS

A. Organizations:

1. ANSI American National Standards Institute
2. ASME American Society of Mechanical Engineers
3. ASTM American Society of Testing and Materials

1.08 DESIGN CRITERIA

- A. Mechanical systems design by the Developer shall be in accordance with IBC.
- B. Coordinate mechanical systems design and equipment locations with the Architect. Insure that all service clearance requirements are defined on the drawings, accessible and coordinated with other trades. Locating equipment in areas which cannot be easily serviced will be unacceptable.

1.09 DRAWINGS

The Developer shall provide detailed shop drawings to include but not limited to, exact duct and pipe routing, equipment sizes, service clearance requirements, diffuser and grille sizes and locations, thermostat locations, louver sizes and locations, roof and wall penetration locations and details, volume damper and plumbing shut-off valve locations and access panels in walls and ceilings. Do not proceed with construction until the design has been approved.

1.10 SUBMITTALS, APPROVALS, AND REVIEWS

A. Shop Drawings and Product Data:

1. Prior to manufacture or installation of any equipment under the Design Criteria and this Performance Specification Section, prepare complete
 - a. Design Drawings and provide
 - b. Product Data and
 - c. Test Certificatesfor materials and equipment as required by the Documents.
2. Verify dimensional information to ensure proper clearance for installation of equipment.
3. Check all materials and equipment after arrival on the job site and verify compliance with the requirements of the Work.
4. A minimum period of two weeks, exclusive of transmittal time, shall be required each time material is submitted or resubmitted for review. This time period shall be considered by the Developer when scheduling submittal data.

- B. Review of Submittals shall not relieve the Developer of responsibility for dimensions and/or errors that may be contained therein, or deviations from Design Criteria and Performance Specification requirements. The noting of some errors, but the overlooking of others, does not grant the Developer permission to proceed in error. Regardless of any information contained in the Submittals, the requirements of the Design Criteria and Performance Specifications shall govern and are not waived or superseded in any way by the review. Certify in writing or in the form of rubber stamp impressions as follows:

1. Each Design Drawing shall indicate in the lower right hand corner and each Brochure shall indicate on the front cover the following: Title of the sheet or brochure, name and location of the building; names of the Mechanical Engineer, Developer, subcontractors, manufacturer, supplier/vendor, etc., date of submittal, and the date of correction and revision. Unless the above information is included, the submittal will be returned for resubmittal.
2. Design Drawings shall contain sufficient plans, elevations, sections, and isometrics to clearly describe the equipment or apparatus, and its location. Drawings shall be prepared by an Engineer/Drafter skilled in this type of work. Provide drawings drawn to at least 1/8" = 1'-0" scale
3. Submit complete and detailed engineering and dimensional information relevant to the particular equipment or materials to be furnished. Make selections clear on submitted product information where multiple selections are available. Establish quantities, verify space requirements, dimensions, and possible interferences with other trades. Include all specified materials in submittal. Partial submittals of individual items, or those that do not follow specified format, will not be accepted.
4. Identify each item submitted with the pertinent specification paragraph number.

1.11 QUALITY ASSURANCE

- A. All materials shall be new. Properly store all materials and equipment for protection from physical damage or damage due to corrosion.
- B. Standardization of Manufacturer: Make every effort to furnish all equipment of any variance with these specifications.
- C. Equipment Furnished by Others: For installation of equipment furnished by others and installed by this Developer, obtain rough-in dimensions from approved shop drawings, by measurements from the actual equipment, from details shown on drawings or as directed by the King County Project Representative.

1.12 STORAGE AND PROTECTION OF MATERIALS

- A. Provide a secure storage space for storage of materials and apparatus and assume complete responsibility for all losses and damage. Protect completed work, work underway, and apparatus against loss or damage.
- B. Temporary Heating: Apply temporary heat according to manufacturer's recommendations within equipment enclosures during periods when equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

1.13 PERMITS AND FEES

- A. Obtain and pay for all permits relating to the work in this Contract. Contact the various agencies involved relating to the mechanical work and include all inspection and other fees in the Contract.

1.14 COOPERATION

- A. Cooperate completely with all other crafts in the matter of planning and laying out of the Work. Every reasonable effort shall be made to prevent conflicts as to space requirements, dimensions, locations, access openings or other matters tending to obstruct or delay the work of any craft.

1.15 COORDINATION AND SCHEDULING

- A. Coordinate all mechanical work with other trades. Any changes required in the Work caused by the Developer's neglect to coordinate with others shall be made at the Developer's expense.
- B. Review all Contract Documents and verify at the site all measurements necessary for the proper installation of the work.
- C. Refer to all Construction Drawings, details, and specifications, including Architectural, Structural, and Electrical, and fully coordinate all Mechanical work with other trades.
- D. Provide all required offsets and special fittings.
- E. Pay special attention to all visible devices and equipment in finished areas. Verify the exact location and receive approval from the King County Project's Representative prior to installation.
- F. Schedule work to maintain job progress schedule and to avoid conflicts in the installation of work by other trades. Coordinate to provide adequate access for installing large equipment.

1.16 SAFETY AND PROTECTION

- A. Safety Measures To Be Taken: The Developer will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. The duty of the King County Project Representative to conduct construction observations of the Developer's performance is not intended to include review of the adequacy of the Developer's safety measures, in, on or near the construction site. It shall be the Developer's responsibility to comply with "Safety and Health Regulations for Construction," Volume 36, No. 75, Part II of the Federal Register by the U.S. Department of Labor. Developer shall be responsible for providing all such safety measures and shall consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether he is or is not in compliance with state or federal regulations.
- B. Protection: Ensure that mechanical safety and protection are maintained, including the proper covering, signage, and securing of pressurized pipe.

1.17 GUARANTEE

- A. Ensure that the mechanical system installed under this Contract is in proper working order and in compliance with drawings, specifications, and/or authorized changes.

Without additional charge, replace any work or materials that develop defects, except from ordinary wear and tear, within one year from the date of substantial completion.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SITE CLEAN UP

- A. Remove from site all waste and rubbish resulting from the work. Keep Site clean on a day-to-day basis.

3.02 SERVICE OUTAGES

- A. Keep outages to an absolute minimum. Any essential outages required in the course of construction, whether for temporary services, cutovers or testing, shall be closely coordinated with the King County Project Representative, the utility and the governing jurisdiction.
- B. Submit written request at least seven days in advance of any scheduled outage and proceed with the outage only after receiving authorization from the King County Project Representative.

3.03 MECHANICAL CONNECTIONS FOR EQUIPMENT

- A. General: Provide mechanical connection of all equipment having ductwork and/or piping requirements.
- B. IMC Compliance: Comply with applicable portions of IMC as to the type of products used and provisions for mechanical ductwork and piping connections.
- C. Underwriters Laboratories acceptance: All material and equipment within the scope of the UL re-examination service shall be approved by Underwriters Laboratories, Inc. for the purpose for which they are used and shall bear their label.
- D. Execution: Make mechanical ductwork and piping connections in accordance with connector manufacturer's written instructions, with recognized industry practices, and complying with requirements of ASME and SMACNA standards. Coordinate installation of mechanical connections for equipment with equipment installation work. Verify all mechanical loads (voltage, phase, full load amperes, number and point of connections, minimum circuit capacity, etc.) for equipment furnished under other divisions of this specification by reviewing respective shop drawings furnished under each division. Obtain and review equipment shop drawings to determine all final connection requirements before rough-in begins for each equipment item. Meet with each subcontractor furnishing equipment requiring mechanical service and review mechanical

characteristics. Report any variances from mechanical characteristics noted on the mechanical drawings to The King County Project Representative before proceeding with rough-in work.

3.04 EQUIPMENT ACCESSIBILITY AND INSTALLATION

- A. Accessibility of Equipment: Comply with applicable codes and install equipment so as to be accessible for operation, maintenance or repair. Equipment deemed inaccessible shall be relocated as directed.
- B. Manufacturer's Installation Details: Follow Manufacturer's installation details exactly, where available. Provide special ductwork, piping or fittings as required.

3.05 MECHANICAL WORK EXPOSED TO WEATHER

- A. Provide corrosion protection for all copper and ferrous metal portions of mechanical work exposed to weather, including ductwork, piping, supports, valves and other items. All ferrous metal shall be hot-dip galvanized after fabrication, painted or cadmium plated, or similarly protected against corrosion. All enclosures and equipment shall be weathertight.

3.06 EQUIPMENT BASES AND FASTENING

- A. Housekeeping Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment unless noted otherwise. Bases shall be 4" thick reinforced concrete, 3000-psi, 28-day compressive strength, with #4 rebar each way on 12" centers and doweled to floor slab. Trowel finish with 1" bevel edge all around.
- B. Floor-Mounted Equipment Fastening: All floor-mounted equipment shall be secured to the housekeeping bases with ductile steel anchor bolts, preset in the concrete base. Secure vibration mounts, where required, to the concrete bases such that the equipment is free to vibrate but cannot move from the base.
- C. Roof-Mounted Equipment and Roof Penetrations: Provide sealed roof curbs per local jurisdiction and King County's requirements for all rooftop equipment and ductwork or piping penetrations of the roof. Flash and seal weathertight to the existing roof structure and cover to match existing roof construction.

3.07 ANCHORAGE AND BRACING OF MECHANICAL SYSTEMS

- A. General: Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and mechanical equipment as required by Section 1621 of the International Building Code and local codes and ordinances.
- B. Ductwork and/or Piping Crossing Structural Separations: Install ductwork and piping that crosses structural separations between buildings or building units with flexible connections, suitable to accommodate longitudinal and transverse displacements.
- C. Anchorage of Equipment: Brace or anchor all mechanical and mechanical equipment to resist a horizontal force acting in any direction per requirements of the International Building Code for seismic zone 4.

- D. All anchorage and bracing must be designed by a licensed structural engineer and submitted to the project structural engineer for review and approval. The Contractor shall pay all costs.

3.08 CUTTING AND PATCHING

- A. Coordinate location of all openings required in the building construction for the installation of the work. Any cutting and patching made necessary through the neglect of the Contractor will be done at the expense of the Contractor.
- B. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved. In no case shall any structural member be cut.
- C. Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.09 SLEEVES AND OPENINGS

- A. Sleeves and openings required through floors and walls for mechanical work shall be the responsibility of this Contractor. Carefully coordinate this work with the other trades involved. Use approved sleeves and seal all openings around conduits in sleeves with a material of equal fire rating as the surface penetrated.

3.10 PAINTING

- A. Equipment painted at the factory shall not be repainted unless damaged or as otherwise specified. Touchup equipment using paint provided by the equipment manufacturer and selected to match the equipment finish.
- B. Touchup damaged non-equipment surfaces with paint matching type and color of existing undamaged adjacent finish.
- C. Touchup damaged galvanized surfaces using zinc-rich paint as recommended by the item manufacturer.
- D. All exposed mechanical materials (ductwork, piping, hangers and supports, equipment and registers or diffusers) shall be painted with color per the Architect's discretion.

3.11 TESTS

- A. Fully test and adjust the equipment installed under this specification and demonstrate its proper operation to the King County Project Representative. No equipment shall be tested or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions. Test and adjust equipment prior to employee instruction. Submit test report for each system or component to the King County Project Representative for approval. Where specified, submit certified test reports by certified service organizations representing the system or equipment involved. Include all test reports in operation and maintenance manuals.

3.12 CLEANING

- A. Clean up all equipment to factory condition. Use touch-up paint where required. Remove all packing cartons and other debris that is a direct result of the installation of the work of this Division.
- B. Clean registers and diffusers, interiors and exteriors of all equipment in accordance with manufacturer's recommendations.
- C. Vacuum the interior of all ductwork. Wipe all mechanical work down to remove dust and dirt.

3.13 PROJECT FINALIZATION AND START UP

- A. Upon completion of equipment and system installation, assemble all equipment factory representatives and subcontractors for system start up.
- B. Each major equipment and system representative and subcontractor shall assist in start-up and shall check out their respective system and remain at the site until the total system operation is accepted by the King County Project Representative.
- C. The project foreman shall accompany the reviewing party and remove cover plates, panel covers and other access panels as requested in order to allow review of the entire mechanical system.

3.14 CERTIFICATION OF INSPECTION

- A. Present King County Project Representative with Certification of Inspection from the code enforcing agency upon completion of work stating that all work complies with all applicable Codes and Ordinances.

3.15 RECORD DRAWINGS

- A. Maintain, on a daily basis, a complete set of "Record Drawings," reflecting an accurate dimensional record of the precise locations of all buried or concealed work. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite authorization for such changes. The "Record Drawings" for daily recording shall consist of a set of blue line prints of the Contract Drawings.
- B. Record dimensions clearly and accurately, delineating the work as installed. Identify locations by at least two dimensions to permanent reference points. Upon completion of the work, provide a complete set of electronic files of mechanical systems including all "Record" information to the King County Project Representative.

3.16 OPERATION AND MAINTENANCE MANUALS

- A. General: Prepare instruction manuals describing the operation, servicing and maintenance requirements of all mechanical equipment provided, including complete parts lists.

- B. Equipment Described in the Manual: Include all equipment submitted for approval. Each section shall have a separate index tab.
- C. Information Contained in the Manual:
 - 1. Each manual shall contain the following information:
 - a. Complete and legible equipment data cut sheets.
 - b. Legend of all symbols and abbreviations.
 - c. A complete instruction manual necessary for the proper operation and maintenance of the system.
 - d. Complete list of all test and diagnostic equipment, including testing procedures to utilize same.
 - e. Replacement parts list for each piece of equipment in the system with a brief description of functions.
 - 2. Index all contents listed in an orderly presentation. Include tabulations describing the type of equipment, frequency and type of service.
- D. Binding: Bind material in a post-type expandable three-hole binder with cloth-covered heavy-duty hardboard cover and cloth back panel. Imprint the front cover with the name of the project, King County, year of completion, the words "Mechanical Equipment," and the names of the Engineer and Mechanical Contractor. Imprint the back edge with the name of the project, King County and year of completion. If the thickness of the manual exceeds 3", provide separate volumes, each not to exceed 3" thick, with each volume imprinted as described above.
- E. Number of Copies: Submit one preliminary copy for review approval. Deliver three final bound copies to the King County Project Representative upon final approval.

3.17 OPERATING PERSONNEL INSTRUCTION

- A. General: Provide instruction of facility operating personnel sufficiently prior to facility acceptance, upon mutually satisfactory arrangement with King County Metro Transit.
- B. Instruction: Instruction shall not begin until the component, assembly, or system has been tested and is in acceptable operating condition. Otherwise, instruction shall be deemed incomplete. Instruction shall encompass normal operation, emergency operation, fire and other hazards, safety provisions, provisions for pollution prevention, and maintenance procedures for all work provided.
- C. Instructors: Instructors shall include the Developer's staff, supplemented by authorized representatives of the component, assembly or system manufacturer.
- D. Time: Provide all necessary instruction to the complete understanding of the operating personnel. Minimum instruction periods shall be as recommended by manufacturer unless noted otherwise. Provide a time schedule to the King County Project Representative for review and approval.

END OF SECTION

SECTION 220519

METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 0 and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Section 331000 "Water Utilites" for water meters outside the building.
 - 2. Mechanical equipment Sections that specify meters and gages as part of factory-fabricated equipment.

1.03 SUMMARY

- A. This Section includes meters and gages for mechanical systems and water meters installed outside the building.

1.04 SUBMITTALS

- A. Product Data: Include scale range, ratings, and calibrated performance curves for each meter, gage, fitting, specialty, and accessory specified.
- B. Shop Drawings: Include schedule indicating manufacturer's number, scale range, fittings, and location for each meter and gage.
- C. Product Certificates: Signed by manufacturers of meters and gages certifying accuracies under specified operating conditions and compliance with specified requirements.
- D. Shop Drawings: For brackets for duct-mounting thermometers.

PART 2 PRODUCTS

2.01 THERMOMETERS, GENERAL

- A. Scale Range: Temperature ranges for services listed are as follows:
 - 1. Domestic Hot Water: 30 to 240 deg F, with 2-degree scale divisions.
 - 2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.

3. Hot Water: 30 to 300 deg F, with 2-degree scale divisions.
 4. Condenser Water: 0 to 160 deg F, with 2-degree scale divisions.
- B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.02 LIQUID-IN-GLASS THERMOMETERS

- A. Description: ASTM E 1.
- B. Case: Die cast and aluminum finished in baked-epoxy enamel, glass front, spring secured, 9-inches long.
- C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
- D. Tube: Red or blue reading, organic-liquid filled with magnifying lens.
- E. Tube: Red or blue reading, mercury filled with magnifying lens.
- F. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
- G. Stem: Copper-plated steel, aluminum, or brass for separable socket; of length to suit installation.

2.03 BIMETAL DIAL THERMOMETERS

- A. Description: ASME B40.3; direct-mounting, universal-angle dial type.
- B. Case: Stainless steel with 5-inch- diameter, glass lens.
- C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
- D. Element: Bimetal coil.
- E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
- F. Stem: Stainless steel for separable socket, of length to suit installation.

2.04 PRESSURE GAGES

- A. Description: ASME B40.1, phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated. U.S. standard only, no dual scales.
- B. Case: Drawn steel, brass, or aluminum with 4-1/2-inch- diameter, glass lens.
- C. Connector: Brass, NPS 1/4.
- D. Scale: White-coated aluminum with permanently etched markings.
- E. Accuracy: Grade A, plus or minus 1 percent of middle 50 percent of scale.

- F. Accuracy: Grade B, plus or minus 2 percent of middle 50 percent of scale.
- G. Accuracy: Grade C, plus or minus 3 percent of middle 50 percent of scale.
- H. Accuracy: Grade D, plus or minus 5 percent of whole scale.
- I. Range: Comply with the following:
 1. Vacuum: 30 inches Hg of vacuum to 15 psig of pressure.
 2. Fluids under Pressure: Two times the operating pressure.

2.05 PRESSURE-GAGE FITTINGS

- A. Valves: NPS 1/4 brass or stainless-steel needle type.
- B. Syphons: NPS 1/4 coil of brass tubing with threaded ends.
- C. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.06 TEST PLUGS

- A. Description: Nickel-plated, brass-body test plug in NPS 1/2 fitting.
- B. Body: Length as required to extend beyond insulation.
- C. Pressure Rating: 500 psig minimum.
- D. Core Inserts: One or two self-sealing valves, suitable for inserting 1/8-inch OD probe from dial-type thermometer or pressure gage.
- E. Core Inserts: Two self-sealing valves, suitable for inserting 1/8-inch OD probe from dial-type thermometer or pressure gage.
- F. Core Insert: Self-sealing valve, suitable for inserting 1/8-inch OD probe from dial-type thermometer or pressure gage.
- G. Core Material for Air, Water, Oil, and Gas: 20 to 200 deg F, chlorosulfonated polyethylene synthetic rubber.
- H. Core Material for Air and Water: Minus 30 to plus 275 deg F, ethylene-propylene-diene terpolymer rubber.
- I. Test-Plug Cap: Gasketed and threaded cap, with retention chain or strap.
- J. Test Kit: Pressure gage and adapter with probe, two bimetal dial thermometers, and carrying case. Turn test kit over to King County's Project Representative at end of project.
 1. Pressure Gage and Thermometer Ranges: Are specified in this Section.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 METER AND GAGE INSTALLATION, GENERAL

- A. Install meters, gages, and accessories according to manufacturer's written instructions for applications where used.

3.02 THERMOMETER INSTALLATION

- A. Install thermometers and adjust vertical and tilted positions.
- B. Install in the following locations:
 - 1. Inlet and outlet of each thermal storage tank.
- C. Install thermometer wells in vertical position in piping tees where test thermometers are indicated.
 - 1. Install with stem extending a minimum of 2 inches into fluid.
 - 2. Install with stem extending to one-third of diameter of pipe.
 - 3. Install with stem extending to center of pipe.
 - 4. Fill wells with oil or graphite and secure caps.

3.03 PRESSURE-GAGE INSTALLATION

- A. Install pressure gages in piping tees with pressure-gage valve located on pipe at most readable position.
- B. Install dry-type pressure gages in the following locations:
 - 1. Discharge of each pressure-reducing valve.
 - 2. Building water-service entrance.
- C. Install liquid-filled-type pressure gages at suction and discharge of each pump.
- D. Install pressure-gage needle valve and snubber in piping to pressure gages.
 - 1. Exception: Install syphon instead of snubber in piping to steam pressure gages.

3.04 ADJUSTING AND CLEANING

- A. Adjust faces of gages to proper angle for best visibility.
 - 1. Clean windows of gages and clean factory-finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touchup paint.

END OF SECTION

SECTION 230523

GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational plumbing installations on a Design-Build basis. It shall be the Plumbing Developer's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Special purpose valves are specified in other Division 21 piping system sections.
 - 2. Valve tags and charts are specified in Section 230553 "Identification for Plumbing Piping and Equipment."

1.03 SUMMARY

- A. This Section includes general duty valves common to several mechanical piping systems.

1.04 SUBMITTALS

- A. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.
- B. Maintenance data for valves shall include an operation and maintenance manual. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.05 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. MSS Compliance: Comply with MSS Standard Practice documents referenced.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set globe and gate valves closed to prevent rattling.
 - 4. Set ball and plug valves open to minimize exposure of functional surfaces.

5. Set butterfly valves closed or slightly open.
 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
1. Maintain valve end protection.
 2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use hand wheels and stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 BASIC, COMMON FEATURES

- A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.
1. Non-rising stem valves may be used only where headroom prevents full extension of rising stems.
- B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.
- C. Sizes: Same size as upstream pipe, unless otherwise indicated.
- D. Operators: Use specified operators and hand wheels, except provide the following special operator features:
1. Hand wheels: For valves other than quarter turn.
 2. Lever Handles: For quarter-turn valves 6 inches and smaller, except for plug valves, which shall have square heads. Furnish King County with one wrench for every 10-plug valves.
 3. Chain-Wheel Operators: For valves 4 inches and larger, installed 96 inches or higher above finished floor elevation.
 4. Gear-Drive Operators: For quarter-turn valves 8 inches and larger.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- G. Threads: ASME B1.20.1.
- H. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.
- I. Solder Joint: ASME B16.18.
1. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

2.02 GATE VALVES

- A. Gate Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi cold working pressure (CWP), or Class 150, 300-psi CWP as required in Application Schedule; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum, zinc plated steel, or malleable-iron handwheel.
- B. Gate Valves, 3 Inches and Larger: MSS SP-70, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with 2-piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

2.03 BALL VALVES

- A. Ball Valves, 4 Inches and Smaller: MSS SP-110, 600-psi CWP, ASTM B 584 bronze body, 2-piece or 3-piece construction as required in the Application Schedule; chrome-plated brass ball, full port for 3/4-inch valves and smaller and conventional port for 1-inch valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections. Operator: Vinyl-covered steel lever handle.
 - 1. Options:
 - a. Stem Extension: For valves installed in insulated piping (if required in Application Schedule).
 - b. Memory Stop: For operator handles (if required in Application Schedule).

2.04 GLOBE VALVES

- A. Globe Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, Class 150, 300-psi CWP or Class 300, 600-psi CWP as required in the Application Schedule; ASTM B 62 cast-bronze body and screwed bonnet, rubber, bronze, or teflon disc, silicon bronze-alloy stem, teflon-impregnated packing with bronze nut, threaded or soldered end connections; and with aluminum or malleable-iron hand wheel.
- B. Globe Valves, 3 Inches and Larger: MSS SP-85, Class 125, 200-psi CWP or Class 250, 500-psi CWP; ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron hand wheel.

2.05 BUTTERFLY VALVES

- A. Butterfly Valves: MSS SP-67, 200-psi CWP, 150-psi maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals, non-slam, lug, or grooved style:
 - 1. Disc Type: Nickel-plated ductile iron.
 - 2. Disc Type: Aluminum bronze.
 - 3. Disc Type: Elastomer-coated ductile iron.
 - 4. Disc Type: Epoxy-coated ductile iron.
 - 5. Operator for Sizes 2 Inches to 6 Inches: Standard lever handle with memory stop.

6. Operator for Sizes 8 Inches to 24 Inches: Gear operator with position indicator.
7. Operator for Sizes 8 Inches and Larger, 96 Inches or Higher above Floor: Chain-wheel operator.

2.06 CHECK VALVES

- A. Swing Check Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, Class 150, 300-psi CWP, or Class 300, 600-psi CWP as required in the Application Schedule; horizontal swing, Y-pattern, ASTM B 62 (ASTM B 61 for Class 300) cast-bronze body and cap, rotating bronze disc with renewable seat, threaded or soldered end connections.
- B. Swing Check Valves, 3 Inches and Larger: MSS SP-71, Class 125, 200-psi CWP or Class 250, 500-psi CWP as required in the Application Schedule, ASTM A 126 Class B cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
- C. Non-Slam Check Valves: Class 125 or Class 250 as required in the Application Schedule, ASTM A 48 Class 35, cast-iron body, bronze disc, stainless-steel pins and springs, Buna N bonded to bronze seat, flanged connections.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

3.02 INSTALLATION

- A. Install valves as indicated, according to manufacturer's written instructions.

- B. Piping installation requirements and requirements for the general arrangement of piping, fittings, and specialties specified in the Design Criteria or other Performance Specification Sections apply to the Work of this Section.
- C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- D. Locate valves for easy access and provide separate support where necessary.
- E. Install valves in horizontal piping with stem a minimum of 30° above horizontal at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. For chain-wheel operators, extend chains to 60 inches above finished floor elevation.
- H. Installation of Check Valves: Install for proper direction of flow as follows:
 1. Swing Check Valves: Horizontal position with hinge pin level or vertical upflow position.
 2. Non-Slam Check Valves: Horizontal or vertical position, between flanges.

3.03 SOLDERED CONNECTIONS (FOR DOMESTIC WATER SYSTEMS ONLY)

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.
- D. Open gate and globe valves to fully open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.
- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.04 THREADED CONNECTIONS

- A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.05 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.06 VALVE END SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:
 1. Copper Tube Size, 2 Inches and Smaller: Threaded ends, except solder ends can be used for plumbing cold water, hot water, non-potable water and compressed air systems.
 2. Copper Tube Size, 2-1/2 Inches and Larger: Flanged ends. Grooved ends acceptable if specified in Division 15 Section "Water Distribution Piping."
 3. Steel Pipe Sizes, 2 Inches and Smaller: Threaded ends.

3.07 APPLICATION SCHEDULE

- A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe for throttling duty as indicated. Refer to piping system Specification Sections for specific valve applications and arrangements.
- B. Domestic Water Systems: Use the following valve types:
 1. Gate Valves: Class 125.
 2. Ball Valves: 2-piece with stem extension.
 3. Globe Valves: Class 125.
 4. Butterfly Valves: Nickel-plated ductile iron disc; EPDM or Buna N sleeve and stem seals.
 5. Swing Check Valve: Class 125.

3.08 ADJUSTING

- A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION

SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational plumbing installations on a Design-Build basis. It shall be the Plumbing Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 22 Sections on fire-suppression piping for fire-suppression pipe hangers.

1.03 SUMMARY

- A. This Section includes hangers and supports for mechanical system piping and equipment.

1.04 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.05 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Comply with SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems," 2nd Edition, February 1998.

1.06 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.
- C. Welding Certificates: Copies of certificates for welding procedures and operators.

1.07 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, and seismic restraint by a qualified professional engineer.
 - 1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
 - 1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
 - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
 - 1. Material: Steel, structural quality, ASTM 570.
 - 2. Coatings: Hot-dipped galvanized coating. Threaded hardware, zinc plated.
 - 3. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- C. Thermal-Hanger Shield Inserts: 100-psi minimum compressive-strength insulation, encased in sheet metal shield.
 - 1. Material for Cold Piping: ASTM C 552, Type I cellular glass or water-repellent-treated, ASTM C 533, Type I calcium silicate with vapor barrier.
 - 2. Material for Hot Piping: ASTM C 552, Type I cellular glass or water-repellent-treated, ASTM C 533, Type I calcium silicate.
 - 3. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
 - 4. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
 - 5. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.02 MISCELLANEOUS MATERIALS

- A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

- B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- C. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink, and nonmetallic, dry, hydraulic-cement grout.
 1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
 2. Properties: Nonstaining, noncorrosive, and nongaseous.
 3. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 4. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 5. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 6. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
 7. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
- D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.

- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

- F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - 2. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - 3. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 - 4. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.

- G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
 - 2. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi minimum compressive-strength, water-repellent-treated calcium silicate, or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

- H. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 - 2. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 - 3. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.

1. Field assemble and install according to manufacturer's written instructions.
- C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- E. Pipe Seismic Restraint: Install pipe seismic restraints in accordance with SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems."
- F. If concrete inserts cannot be used, install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- K. Insulated Piping: Comply with the following:
1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.9.
 2. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
4. Pipes NPS 8 and Larger: Include wood inserts.
5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.03 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor where indicated.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

3.04 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.06 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
 2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 220533

HEAT TRACING FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section establishes minimum standards and guidelines for providing an energy efficient freeze protection system for fire sprinkler piping including standpipes, mains and branch lines with sprinklers on a Design-Build basis.
- B. This Section includes
 - 1. A UL Listed, CSA Certified and FM Approved heat tracing system for freeze protection of aboveground water lines consisting of self-regulating heating cable, connection kits and electronic controller-related documents.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specifications are a part of this Section.
- B. Referenced Sections include:
 - 1. Division 22 'Common Work Results for Plumbing'.
 - 2. Division 22 Section 'Plumbing Insulation'.
 - 3. Division 26 Sections.

1.03 SYSTEM DESCRIPTION

- A. System for freeze protection of aboveground water lines with Proportional Ambient Sensing Control (PASC), monitoring, integrated ground-fault circuit protection and Building Management System (BMS) communication capabilities.

1.04 SUBMITTALS

- A. Product Data
 - 1. Heating cable data sheet
 - a. Manufacturer's catalog cuts showing materials and performance data.
 - 2. UL, CSA, FM approval certificates for freeze protection for aboveground water lines
 - 3. Pipe freeze protection design guide
 - 4. System installation and operation manual
 - 5. System installation details
 - 6. Connection kits and accessories data sheet
 - 7. Controller data sheet
 - 8. Controller wiring diagram
- B. Project list of at least 20 projects, installed for at least 5 years, with at least 2000 ft (600m) of heating cable in each project.

1.05 QUALITY ASSURANCE

A. Manufacturers Qualifications

1. Manufacturer to show minimum of thirty (30) years experience in manufacturing electric self-regulating heating cables.
2. Manufacturer will be ISO-9001 registered.
3. Manufacturer to provide products consistent with UL 515, CSA 22.2 No 130-03 and IEEE 515.1 requirements.

B. Installer Qualifications

1. System installer shall have complete understanding of product and product literature from manufacturer or authorized representative prior to installation. Electrical connections shall be performed by a licensed electrician.

C. Regulatory Requirements and Approvals

1. The system (heating cable, connection kits, and controller) shall be UL Listed, CSA Certified and FM Approved for freeze protection of aboveground water lines.

D. Electrical Components, Devices, and Accessories: Listed and labelled as defined in NFPA 70, Article 100, by a Nationally Recognized Testing Laboratory (NRTL), and marked for intended use.

PART 2 PRODUCTS

2.01 GENERAL

- A. Furnish heat tracing system for plumbing piping from a single manufacturer.
- B. Manufacturer Basis of Design: Tyco Thermal Controls.
- C. The system (heating cable, connection kits, and controller) shall be UL Listed, CSA Certified and FM Approved for freeze protection of aboveground water lines. No parts of the system may be substituted or exchanged.

2.02 CONSTRUCTION

A. self-regulating heating cable

1. The heating cable shall consist of a continuous core of conductive polymer that is radiation cross-linked, extruded between two (2) 16 AWG nickel-plated copper bus wires that varies its power output in response to pipe temperature changes.
2. The heating cable shall have a modified polyolefin inner jacket and a tinned-copper braid to provide a ground path and enhance the cables ruggedness.
3. The heating cable shall have a polyolefin (-CR) or fluoropolymer (-CT) outer jacket.
4. The heating cable shall have a self-regulating factor of at least 90 percent for 5/8XL or at least 70 percent for 12XL. The self-regulating factor is defined as the percent reduction of the heating cable power output going from a 40°F pipe temperature to 150°F pipe temperature.
5. The heating cable shall operate without the use of transformers.

6. The heating cable shall be UL part of a UL Listed, CSA Certified and FM Approved system.

B. Heating Cable Connection Kit:

1. Manufacturer shall provide power connection, splice/tee and end seal kits compatible with selected heating cable.
2. Installation shall not require the installing contractor to cut into the heating-cable core to expose the bus wires.
3. Connection kits shall be rated NEMA 4X to prevent water ingress and corrosion. All components shall be UV stabilized.
4. Connection kits shall be UL Listed, CSA Certified and FM Approved.

C. Heating Cable Installation Accessories:

1. High temperature, glass filament tape for attachment of heating cable to water lines. Cable ties are not permitted.
2. Provide warning labels every 10 feet on exterior of insulation, opposite sides of pipe.

D. Digital Temperature Controller with built-in Ground-Fault Protection Device (GFPD).

2.03 MECHANICAL

- A. The cable shall have a minimum cut-through resistance of 600 lb per CSA 22.2 0.3. Cutting test 4.14. The cable shall have a minimum impact resistance of 25 ft lb per UL 1588.11. The cable shall withstand a glancing impact of 22 ft lb per UL 1581.590. The cable shall have a minimum abrasion resistance of 7000 cycles per UL 719.19. The cable shall withstand a crush resistance of 4500 N per IEEE 515 Deformation Test 5.1.5.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Installer shall be familiar with installing heat-trace cable and equipment.
 1. The installer shall be responsible for providing a functional system, installed in accordance with applicable national and local code requirements.
- B. Comply with manufacturer's recommendations in Installation and Operation Manuals.
- C. Apply the heating cable linearly on the pipe after piping has successfully completed any pressure tests. Secure the heating cable to piping with fiberglass tape.
- D. Install electric heating cable according to the manufacturer's instructions. The installer shall be responsible for providing a complete functional system, installed in accordance with applicable national and local requirements.
- E. Grounding of controller shall be equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

F. Connection of all electrical wiring shall be according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

G. Electrical Connections:

1. Electrical power wiring is specified in Division 26.
2. Each circuit shall be protected with a 30-mA ground-fault protection device.
3. Freeze protection for the fire line shall be monitored by the fire alarm control panel.

3.02 FIELD QUALITY CONTROL

A. Start-up of system shall be performed by factory technician or factory representative. Coordinate with King County Project Representative.

B. Field Testing and Inspections

1. The system shall be commissioned in accordance to the system's Installation and Operation manuals.
2. The heating cable circuit integrity shall be tested using a 2500 Vdc megohmmeter at the following intervals below. Minimum acceptable insulation resistance shall be 1000 megohms or greater.
 - a. Before installing the heating cable
 - b. After heating cable has been installed onto the pipe
 - c. After installing connection kits
 - d. After the thermal insulation is installed onto the pipe
 - e. Prior to initial start-up (commissioning)
 - f. As part of the regular system maintenance.
3. The technician shall verify that the C910-485 or ACCS-30 control parameters are set to the application requirements.
4. The technician shall verify that the C910-485 or ACCS-30 alarm contacts are corrected connected to the fire alarm panel.
5. The technician shall verify that the C910-485 or ACCS-30 and ProtoNode-RER/-LER are configured correctly with the BMS.
6. Submit all records of the test data to the King County Project Representative.
 - a. Acceptable Results: The heater circuit shall be continuous and megger readings shall be at least 20 megohms regardless of heater length.
 - b. Circuits yielding unacceptable readings must be repaired or replaced.

END OF SECTION

SECTION 220553

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 0 and Division 1 Specification Sections, apply to this Section.
- B. Related Section: Division 09 'Painting'.

1.03 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
 - 1. Equipment nameplates.
 - 2. Pipe markers.
 - 3. Valve tags.
 - 4. Valve schedules.
 - 5. Warning tags.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

1.05 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.06 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - 1. Data:
 - a. Manufacturer, product name, model number, and serial number.
 - b. Capacity, operating and power characteristics, and essential data.
 - c. Labels of tested compliances.
 - 2. Location: Accessible and visible.
 - 3. Fasteners: As required to mount on equipment.

2.02 PIPING IDENTIFICATION DEVICES

- A. Self-Adhesive Pipe Markers: Vinyl with pressure-sensitive, permanent type, self-adhesive back. Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
 - 1. Colors: Comply with ASME A13.1, unless otherwise indicated.
 - 2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 3. Full-band pipe markers extending 360 degrees around pipe at each location.
 - 4. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

2.03 VALVE TAGS

- A. Valve Tags: Two-ply engraved black plastic with lettering cut through to white background.
 - 1. Data: Service, identification number, and temperature of the line controlled.
 - 2. 2-inch round, 1/16-inch thick, with 3/16-inch hole.
 - 3. Fastener: Brass chain or S-hook.

2.04 VALVE SCHEDULES

- A. Valve Schedules: For each piping system, on standard-size bond paper. Assign and tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or

modulating) and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-Schedule Frame: Mount valve schedule in frame with clear plastic cover, include mounting screws.

2.05 WARNING TAGS

- A. Warning Tags: Preprinted plasticized card stock with matte finish.
 1. Size: 4 by 7 inches.
 2. Fasteners: Brass grommet and chain.
 3. Nomenclature: Large-size primary caption such as CAUTION: NONPOTABLE WATER, DO NOT DRINK.
 4. Color: Yellow background with 1/2-inch black lettering.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 22 Sections.

3.02 EQUIPMENT IDENTIFICATION

- A. Nameplate Installation: Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
 1. Fans, blowers and air terminals.

3.03 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows completely around pipe showing direction of flow. Apply to clean surface.
- B. Locate pipe markers where piping is exposed in finished spaces, mechanical spaces; accessible maintenance spaces such as removable accessible ceilings, shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers, minimum one in each space.

3.04 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and air terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

3.05 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

3.06 WARNING-TAG INSTALLATION

- A. Attach warning tags to equipment and other items where required.

3.07 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.08 CLEANING

- A. Clean faces of mechanical identification devices.

END OF SECTION

SECTION 220700

PLUMBING INSULATION

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe insulation shields and protection saddles.

1.03 SUMMARY

- A. This Section includes preformed, rigid, and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

1.04 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type, and grade, and maximum use temperature.

1.07 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for insulation application.
- C. Coordinate installation of electric heat tracing.

1.08 SCHEDULING

- A. Schedule insulation application after testing piping systems and, where required, after installing and testing heat-trace tape. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 PRODUCTS

2.01 INSULATION MATERIALS

- A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
 - 1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
 - 2. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.
 - 3. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:
 - a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
 - b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
 - 4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
 - 5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
 - 6. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
 - 7. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 1. Adhesive: As recommended by insulation material manufacturer.
 - 2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

2.02 FIELD-APPLIED JACKETS

- A. General: ASTM C 921, Type 1, unless otherwise indicated.
- B. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
- C. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming.
 - 1. Adhesive: As recommended by insulation material manufacturer.
 - 2. PVC Jacket Color: White or gray.
 - 3. PVC Jacket Color: Color-code piping jackets based on materials contained within the piping system.
- D. Heavy PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 30-mil-thick, high-impact, ultraviolet-resistant PVC.
 - 1. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
 - 2. Adhesive: As recommended by insulation material manufacturer.
- E. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil-thick, high-impact, ultraviolet-resistant PVC.
 - 1. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
 - 2. Adhesive: As recommended by insulation material manufacturer.
- F. Aluminum Jacket: Factory cut and rolled to indicated sizes. Comply with ASTM B 209, 3003 alloy, H-14 temper.
- G. Aluminum Jacket: Aluminum roll stock, ready for shop or field cutting and forming to indicated sizes. Comply with ASTM B 209, 3003 alloy, H-14 temper.
 - 1. Finish and Thickness: Smooth finish, 0.010 inch thick.
 - 2. Finish and Thickness: Corrugated finish, 0.010 inch thick.
 - 3. Finish and Thickness: Stucco-embossed finish, 0.016 inch thick.
 - 4. Finish and Thickness: Painted finish, 0.016 inch thick.
 - 5. Moisture Barrier: 1-mil-thick, heat-bonded polyethylene and kraft paper.
 - 6. Elbows: Preformed, 45- and 90-degree, short- and long-radius elbows; same material, finish, and thickness as jacket.

2.03 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8-oz./sq. yd.
 - 1. Tape Width: 4 inches.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
 2. Galvanized Steel: 0.005 inch thick.
 3. Aluminum: 0.007 inch thick.
 4. Brass: 0.010 inch thick.
 5. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.
- 2.04 THERMAL INSULATION REMOVABLE PADS
- A. The inner and outer jacketing on the removable pads shall be Lewco 1550 SA silicone impregnated.
 - B. The insulation material inside the pads shall be Owens/Corning fiberglass thermal insulating wool.
 - C. Lacing hooks, and washers shall be Lewco, or approved.
 - D. Tie wire shall be stainless steel.
 - E. Fasteners shall be stainless steel staples STCR 5019-3/8-inch, or approved.
 - F. Thickness for all pads: 2-inch thick thermal insulating wool.
- 2.05 VAPOR RETARDERS
- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.03 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Apply multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- H. Keep insulation materials dry during application and finishing.
- I. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- J. Apply insulation with the least number of joints practical.
- K. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.
- L. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.
 - 1. Apply insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
 - 3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- M. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- N. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- O. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.

2. Circumferential Joints: Cover with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches o.c.
 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
 4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.
- P. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
1. Seal penetrations with vapor-retarder mastic.
 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 3. Extend metal jacket of exterior insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal metal jacket to roof flashing with vapor-retarder mastic.
- Q. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.
- R. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.
- S. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.
- T. Floor Penetrations: Apply insulation continuously through floor assembly.
1. For insulation with vapor retarders, seal insulation with vapor-retarder mastic where floor supports penetrate vapor retarder.

3.04 MINERAL-FIBER INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
 2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet to form a vapor retarder between pipe insulation segments.
 3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
 4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

- B. Apply insulation to flanges as follows:
 - 1. Apply preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 - 4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch, and seal joints with vapor-retarder mastic.

- C. Apply insulation to fittings and elbows as follows:
 - 1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - 2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
 - 3. Cover fittings with standard PVC fitting covers.

- D. Apply insulation to valves and specialties as follows:
 - 1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - 2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
 - 3. Apply insulation to flanges as specified for flange insulation application.
 - 4. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
 - 5. For larger sizes where PVC fitting covers are not available, seal insulation with canvas jacket and sealing compound recommended by the insulation material manufacturer.

3.05 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
 - 1. Follow manufacturer's written instructions for applying insulation.
 - 2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

- B. Apply insulation to flanges as follows:
 - 1. Apply pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of the same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.
- C. Apply insulation to fittings and elbows as follows:
1. Apply mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.
- D. Apply insulation to valves and specialties as follows:
1. Apply preformed valve covers manufactured of the same material as pipe insulation and attached according to the manufacturer's written instructions.
 2. Apply cut segments of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, fabricate removable sections of insulation arranged to allow access to stainer basket.
 3. Apply insulation to flanges as specified for flange insulation application.
 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.06 FIELD-APPLIED JACKET APPLICATION

- A. Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.
1. Apply jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 2. Embed glass cloth between two 0.062-inch- thick coats of jacket manufacturer's recommended adhesive.
 3. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.
- B. Foil and Paper Jackets: Apply foil and paper jackets where indicated.
1. Draw jacket material smooth and tight.
 2. Apply lap or joint strips with the same material as jacket.
 3. Secure jacket to insulation with manufacturer's recommended adhesive.
 4. Apply jackets with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-retarder mastic.
- C. Apply PVC jacket where indicated, with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
- D. Apply metal jacket where indicated, with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with

weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

1. King County prefers metal jackets over all insulation for durability and bird-proofing.

3.07 FINISHES

- A. Glass-Cloth Jacketed Insulation: Paint insulation finished with glass-cloth jacket as specified in Division 9 Section "Painting."
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of the insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by the Project Representative. Vary first and second coats to allow visual inspection of the completed Work.

3.08 PIPING SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 - 1. Flexible connectors.
 - 2. Vibration-control devices.
 - 3. Fire-suppression piping.
 - 4. Drainage piping located in crawl spaces, unless otherwise indicated.
 - 5. Below-grade piping, unless otherwise indicated.
 - 6. Unions, strainers, check valves, plug valves, and flow regulators.

3.09 FIELD QUALITY CONTROL

- A. Inspection: Perform the following field quality-control inspections, after installing insulation materials, jackets, and finishes, to determine compliance with requirements:
 - 1. Inspect fittings and valves randomly selected by the Project Representative.
 - 2. Remove fitting covers from 20 elbows or 1 percent of elbows, whichever is less, for various pipe sizes.
 - 3. Remove fitting covers from 20 valves or 1 percent of valves, whichever is less, for various pipe sizes.
- B. Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.
- C. Reinstall insulation and covers on fittings and valves uncovered for inspection according to these Specifications.

3.10 THERMAL INSULATION REMOVABLE PADS

- A. All flanges and valves including control valves, gate valves and butterfly valves shall be insulated with removable pads for systems that are indicated under the applications schedule.

3.11 INSULATION APPLICATION SCHEDULE, GENERAL

- A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.
- B. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.12 INTERIOR INSULATION APPLICATION SCHEDULE

- A. Service: Hose bibb cold water.
 - 1. Operating Temperature: 35 to 60 deg F.
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following insulation thicknesses:
 - 4. Copper Pipe, 1-inch.
 - 5. Field-Applied Jacket: Aluminum Jacket.
 - 6. Vapor Retarder Required: Yes.
 - 7. Finish: None.
 - 8. Insulation Conductivity Range: 0.23 – 0.27 BTU·in/(hr·ft²·°F).
- B. Service: Fire protection where heat tracing is installed for freeze protection.
 - 1. Operating Temperature: 35 to 60 deg F.
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Copper Pipe, 1-inch.
 - 4. Field-Applied Jacket: Aluminum Jacket.
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- C. Service: Rainwater conductors.
 - 1. Operating Temperature: 32 to 100 deg F.
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Cast Iron Pipe, 1/2-inch.
 - 4. Field-Applied Jacket: Aluminum Jacket.
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- D. Service: Roof drain bodies.
 - 1. Operating Temperature: 32 to 100 deg F.
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: 1/2-inch.
 - 4. Field-Applied Jacket: PVC.
 - 5. Vapor Retarder Required: Yes.

6. Finish: None.

E. Service: Domestic hot and recirculated hot water.

1. Operating Temperature: 60 to 140 deg F.
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Pipe, 1/2-inch – 2-inch: 1-inch.
4. Field-Applied Jacket: Aluminum Jacket.
5. Vapor Retarder Required: Yes.
6. Finish: None.
7. Insulation Conductivity Range: 0.24 – 0.28 BTU-in/(hr-ft²·°F).

F. Service: Domestic cold water.

1. Operating Temperature: 35 to 60 deg F.
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Pipe, 3/4-inch to 2-inch: 1-inch.
4. Field-Applied Jacket: Aluminum Jacket.
5. Vapor Retarder Required: Yes.
6. Finish: None.
7. Insulation Conductivity Range: 0.23 – 0.27 BTU-in/(hr-ft²·°F).

3.13 EXTERIOR INSULATION APPLICATION SCHEDULE

A. Service: Domestic cold water.

1. Operating Temperature: 60 to 140deg F.
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Copper Pipe, 1-1/2 inch.
4. Field-Applied Jacket: Aluminum Jacket.
5. Vapor Retarder Required: Yes.
6. Finish: None.

END OF SECTION

SECTION 221113

FACILITY WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Furnish and install a UL listed system of electric self-regulating heating cable and components for maintaining the water temperature in the pipes as indicated on the drawings.

1.02 SUBMITTALS

- A. Manufacturer's catalog cuts showing materials and performance data and UL Compliance.
- B. Project list of at least 20 projects, installed for at least 5 years, with at least 2000 ft (600m) of heating cable in each project.

PART 2 PRODUCTS

2.01 CONSTRUCTION

- A. The self-regulating heating cable shall consist of two (2) 16-AWG nickel-coated copper bus wires embedded in a radiation-crosslinked conductive polymer core. It shall be covered by a radiation-crosslinked, polyolefin, dielectric jacket and enclosed in a tinned copper braid of 14 AWG equivalent wire size. The braid shall be covered with a (nominal) 40-mil polyolefin outer jacket, color-coded for easy identification. The cable shall be specifically designed, manufactured, and UL listed for freeze-protection.

2.02 MECHANICAL

- A. The cable shall have a minimum cut-through resistance of 600 lb per CSA 22.2 0.3. Cutting test 4.14. The cable shall have a minimum impact resistance of 25 ft lb per UL 1588.11. The cable shall withstand a glancing impact of 22 ft lb per UL 1581.590. The cable shall have a minimum abrasion resistance of 7000 cycles per UL 719.19. The cable shall withstand a crush resistance of 4500 N per IEEE 515 Deformation Test 5.1.5.

2.03 EXPERIENCE

- A. The manufacturer shall have more than ten years experience with self-regulating heating cables for temperature maintenance of domestic hot water.

- B. The manufacturer's Quality Assurance Program shall be certified to ISO 9001 standard.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 OPERATING TEMPERATURES

- A. The freeze protection system shall not exceed a nominal temperature of 40°F.

3.02 MAINTENANCE TEMPERATURE

- A. Each freeze protection system shall be maintained using only one product. Temperatures shall be maintained with straight runs of heating cable on the pipe. The use of a 40°F fixed thermostat shall ensure heating cable is off when pipe temperature is over 40°F.

3.03 INSTALLATION

- A. The system shall be installed by factory trained certified installers.
- B. The system shall be installed according to the drawings and the manufacturer's instruction. The installer shall be responsible for providing a functional system, installed in accordance with applicable national and local code requirements. Each circuit shall be protected with a 30-mA ground-fault protection device.
- C. Electrical Connections: The following requirements apply:
 - 1. Electrical power wiring is specified in Division 26.
 - 2. Freeze protection for the fire line shall be monitored by the fire alarm control panel.

3.04 TESTING

- A. Procedure: Measure the heater circuit continuity and the insulation resistance between the braid and bus wires with a 2500-Vdc megohmmeter (megger).
- B. Acceptable Results: The heater circuit shall be continuous and megger readings shall be at least 20 megohms regardless of heater length. Circuits yielding unacceptable readings must be repaired or replaced.
- C. Submittal of Results: Submit records of the test data to the King County Project Representative.

END OF SECTION

SECTION 221116

DOMESTIC WATER PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections, apply to this Section.
 - 1. Washington State Department of Transportation (WSDOT) Standard Specifications 2012.
- B. Related Sections include the following:
 - 1. Division 22 Section "Hangers and Supports" for pipe hangers and seismic restraints.
 - 2. Division 22 Section "Pipe Insulation" for pipe insulation requirements.
 - 3. Division 22 Section "Meters and Gages" for thermometers, pressure gages, and fittings.
 - 4. Division 22 Section "Plumbing Specialties" for water distribution piping specialties.

1.03 SUMMARY

- A. This Section includes water distribution piping from locations indicated to fixtures and equipment inside building.

1.04 DEFINITIONS

- A. Water Service Piping: Water piping outside building that conveys water to building.
- B. Service Entrance Piping: Water piping at entry into building between water service piping and water distribution piping.
- C. Water Distribution Piping: Water piping inside building that conveys water to fixtures and equipment throughout the building.

1.05 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Service Entrance Piping: 160 psig.
 - 2. Water Distribution Piping: 125 psig.

1.06 SUBMITTALS

- A. Water Samples, Test Results, and Reports: Specified in "Field Quality Control."

1.07 QUALITY ASSURANCE

- A. Provide listing/approval stamp, label, or other marking on piping made to specified standards.
- B. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
- C. Comply with ANSI/NSF 61, "Drinking Water System Components—Health Effects," Sections 1 through 9 for potable-water piping and components.

PART 2 PRODUCTS

2.01 PIPE AND TUBE MATERIALS

- A. General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Paragraph.
- B. Soft Copper Tube: ASTM B 88, Types K, and L, water tube, annealed temper.
- C. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.
- D. Ductile-Iron Pipe: AWWA C151, 250-psig minimum pressure rating with mechanical-joint bell, plain spigot end, and AWWA C104 cement-mortar lining. Include AWWA C111 ductile-iron gland, rubber gasket, and steel bolts.

2.02 PIPE AND TUBE FITTINGS

- A. General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Paragraph.
- B. Copper, Solder-Joint Pressure Fittings: ASME B16.22 wrought copper.
- C. Copper, Grooved-End Fittings shall be Victaulic full flow copper fittings with grooved ends. Standard fittings shall be wrought copper per ASTM B-16.22.
- D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- E. Copper Unions: ASME B16.22, wrought copper, hexagonal-stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends. Include threads conforming to ASME B1.20.1 on threaded ends.
- F. Ductile-Iron, Mechanical-Joint Fittings: AWWA C110, ductile- or gray-iron standard pattern; with 250-psig minimum pressure rating and AWWA C104 cement-mortar lining. Include AWWA C111 ductile- or gray-iron glands, rubber gaskets, and steel bolts.

- G. Ductile-Iron Flanged Fittings: AWWA C110, ductile- or gray-iron standard pattern; with 250-psig minimum pressure rating and AWWA C104 cement-mortar lining.

2.03 JOINING MATERIALS

- A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Paragraph.
- B. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for commonly used joining materials.
- C. Solder: ASTM B 32, Alloy Sn95, Sn94, or E; lead free.
- D. Brazing Filler Metal: AWS A5.8, BCuP, copper phosphorus or BAg, silver classification.
- E. Copper keyed couplings shall have angle bolt pads and shall be cast of ductile iron conforming to ASTM A-536, Grade 65-45-12 with a copper color alkyd enamel paint coating. Couplings rated to 300 psi. Gaskets shall be flush-seal style Grade 'F'. FPDM compound molded of materials conforming to ASTM B-2000, UL/ULC classified to ANSI/NSF 61 for cold and hot potable water service.
- F. Transition Couplings: Coupling or other manufactured fitting same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

2.04 POLYETHYLENE ENCASEMENT

- A. Polyethylene Encasement for Piping: ASTM A 674 or AWWA C105 polyethylene film, 0.008-inch minimum thickness, tube, or sheet.

2.05 VALVES

- A. Refer to Division 22 Section "Valves" for general-duty valves.
- B. Refer to Division 22 Section "Plumbing Specialties" for special-duty valves.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXCAVATION

- A. Refer WSDOT, Section 7-08 for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground piping, unless otherwise indicated.

- C. Underground, Service Entrance Piping: Double wrap with plastic tape. Do not use valves underground. Use the following:
 - 1. 4-Inch NPS and Smaller: Soft copper tube, Type K; copper, solder-joint pressure fittings; and brazed joints.
 - 2. 6- to 12-Inch NPS: Ductile-iron pipe and fittings, and mechanical joints.
- D. Aboveground, Water Distribution Piping: Use the following:
 - 1. 4-Inch NPS and Smaller: Hard copper tube, Type L; copper, solder-joint fittings; and soldered joints.
 - 2. The Victaulic Copper Groove Piping System may be used on 2-1/2 – 4-inch Type L copper. System consists of mechanical couplings with angular bolt pads with flush-seal style gaskets, UL classified in accordance with ANSI/NSF 61, copper or cast bronze fittings with grooved ends. Install per latest edition of the Manufacturer's Installation Instruction Handbook.
 - 3. 6 to 12-Inch NPS: Hard copper tube, Type L with grooved ends; copper, grooved-end fittings. Install per manufacturers recommendations.
- E. Underground, Water Distribution Piping: Do not use flanges or valves underground. Use the following:
 - 1. 2-Inch NPS and Smaller: Soft copper tube, Type K; wrought-copper, solder-joint pressure fittings; and brazed joints.
 - 2. 2-1/2- to 4-Inch NPS: Hard copper tube, Type L; wrought-copper, solder-joint pressure fittings; and brazed joints.
- F. Non-Potable-Water Piping: Use the following:
 - 1. 4-Inch NPS and Smaller: Hard copper tube, Type L; solder-joint pressure fittings; and brazed joints.

3.03 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use gate, ball, or butterfly valves. Grooved-end butterfly valves may be used with grooved-end piping.
 - 2. Balancing: Use circuit balancing valve.

3.04 PIPING INSTALLATION, GENERAL

- A. Refer to Division 22 Section "Common Work results for Plumbing" for basic piping installation.

3.05 SERVICE ENTRANCE PIPING INSTALLATION

- A. Extend service entrance piping to exterior water service piping in sizes and locations indicated for service entrances into building.
- B. Install shutoff valve, hose-end drain valve, strainer and pressure gage inside building at each service entrance pipe.

- C. Install water-pressure regulators and backflow preventers downstream from shutoff valves. Refer to Division 22 Section "Plumbing Specialties" for water-pressure regulators and backflow preventers.
- D. Ductile-Iron, Service Entrance Piping: Comply with AWWA C600. Install buried piping between shutoff valve and connection to water service piping with restrained joints. Anchor pipe to wall or floor at entrance. Include thrust-block supports at vertical and horizontal offsets.
 - 1. Encase piping with polyethylene film according to ASTM A 674 or AWWA C105.
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service entrance pipe penetration through exterior wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

3.06 WATER DISTRIBUTION PIPING INSTALLATION

- A. Install piping with 0.25 percent slope downward toward drain.

3.07 JOINT CONSTRUCTION

- A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Grooved Joints: Assemble joints with coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- C. Mechanically Formed Copper Tube Tee Fittings: Mechanically formed tee fitting, as created by T-Drill Industries, Inc. is an acceptable method of installation. Installers shall be trained and certified in using this technique. Limited to applications where the branch line is smaller than the main line. Form tee in copper tube according to equipment manufacturer's written instructions. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar. Soft Solder joints shall not be permitted.

3.08 VALVE INSTALLATION

- A. Sectional Valves: Install sectional valves close to main on each branch and riser serving plumbing fixtures or equipment, and where indicated. Use gate or ball valves for piping 2-inch NPS and smaller. Use gate or butterfly valves for piping 2-1/2-inch NPS and larger.
- B. Shutoff Valves: Install shutoff valves on each water supply to equipment, close to main, on each plumbing fixture without supply stops, and where indicated. Use ball valves for piping 2-inch NPS and smaller. Use gate or butterfly valves for piping 2-1/2-inch NPS and larger.
- C. Drain Valves: Install hose end drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.

- D. Circuit Balancing Valves: Install in each hot-water circulation return branch, discharge side of each pump and circulator, and where indicated. Refer to Division 22 Section "Plumbing Specialties" for calibrated balancing valves.

3.09 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 1. Riser clamps, MSS Type 8 or Type 42, for vertical runs.
 2. Adjustable steel clevis hangers, MSS Type 1, for individual, straight, horizontal runs of cold water and hot water 100 feet and less.
 3. Adjustable roller hangers, MSS Type 43, for individual, straight, horizontal runs of hot water longer than 100 feet.
 4. Pipe rolls, MSS Type 44, for multiple, straight, horizontal runs of hot water 100 feet or longer. Support pipe rolls on trapeze.
 5. Spring hangers, MSS Type 52, for supporting base of vertical runs.
- B. Install supports and seismic restraints according to Division 22 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor and at maximum distance of 15 feet (whichever is less).
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- E. Horizontal pipe hanger spacing and rod diameters:

Nom. Pipe Size (inches)	Steel Pipe Span (feet)	Max. Copper Tube Span (feet)	Min. Rod Diameter (Inches)
Up to 1	7	5	3/8
1 1/4	7	7	3/8
1 1/2	9	8	3/8
2	10	8	3/8
2 1/2	11	9	1/2
3	12	10	1/2

- F. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.10 CONNECTIONS

- A. Connect service entrance piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.
- B. Connect water distribution piping to service entrance piping at shutoff valve, and extend to and connect to the following:
 1. Water Heaters: Connect cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

2. **Plumbing Fixtures:** Connect hot- and cold-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."

3.11 FIELD QUALITY CONTROL

- A. Inspect water distribution piping as follows:
- B. Inspect service entrance piping and water distribution piping as follows:
 1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - a. **Roughing-In Inspection:** Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. **Final Inspection:** Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 3. **Reinspection:** If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 4. **Reports:** Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Test service entrance piping and water distribution piping as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
 3. Cap and subject piping to static water pressure of 150 psig or 1-1/2 times the operating pressure, whichever is greater, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 24 hours. Leaks and loss in test pressure constitute defects that must be repaired.
 4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 5. Prepare and submit reports for tests and required corrective action.
 6. Test hose bibb system to ensure proper temperature settings have been made at the riser drain valves and the main fill valve, provide report.

3.12 CLEANING

- A. Clean and disinfect potable-water distribution piping as follows:
 1. Purge new piping and parts of existing water piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, procedure described in either AWWA C651 or AWWA C652 or as described below:

- a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - i. Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - ii. Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for 3 hours.
 - c. Flush system with clean, potable water until chlorine is no longer in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows contamination.
- B. Prepare and submit reports for purging and disinfecting activities.
- C. Clean interior of piping system. Remove dirt and debris as work progresses.

3.13 START-UP PROCEDURES

- A. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- B. Perform the following steps before putting into operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
 - 5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.
- C. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- D. Check plumbing specialties and verify proper settings, adjustments, and operation.
 - 1. Water-Pressure Regulators: Set outlet pressure at 80 psig maximum, unless otherwise indicated.

END OF SECTION

SECTION 221316

SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 22 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, basic installation requirements, and labeling and identifying requirements; and escutcheons, dielectric fittings, sleeves, and sleeve seals that are not in this Section.
 - 2. Division 22 Section "Hangers and Supports" for pipe hangers and seismic restraints.
 - 3. Division 22 Section " Identification for Plumbing Piping and Equipment" for labeling and identifying requirements.
 - 4. Division 22 Section " General Duty Valves for Plumbing Piping" for general-duty ball, butterfly, check, gate, and globe valves.
 - 5. Division 22 Sections " Facility Water Distribution Piping" and "Domestic Water Piping" for water-supply piping and connections.
 - 6. Division 22 Section "Sanitary Waste and Vent Piping" for drainage and vent piping and connections.
 - 7. Division 22 Section "Mechanical Equipment".

1.03 SUMMARY

- A. This Section includes plumbing specialties for the following:
 - 1. Soil, waste, and vent systems.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.05 SUBMITTALS

- A. Product Data: For each plumbing specialty indicated. Include rated capacities of selected equipment and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:
 - 1. Backflow preventers.
 - 2. Water pressure regulators.
 - 3. Strainers.
 - 4. Trap seal primer valves.
 - 5. Cleanouts.
 - 6. Drains.
 - 7. Miscellaneous piping specialties.
 - 8. Sand/oil interceptors.
- B. Maintenance Data: Include the following in the maintenance manuals:
 - 1. Backflow preventers.
 - 2. Water pressure regulators.
 - 3. Trap seal primer valves.
 - 4. Miscellaneous piping specialties.

1.06 QUALITY ASSURANCE

- A. Provide listing/approval stamp, label, or other marking on plumbing specialties made to specified standards.
- B. Listing and Labeling: Provide electrically operated plumbing specialties specified in this Section that are listed and labeled.
 - 1. Terms "Listed" and "Labeled": As defined in National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- C. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
- D. Comply with NFPA 70, "National Electrical Code," for electrical components.

1.07 EXTRA MATERIALS

- A. Deliver extra materials to King County Metro Transit. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Operating Key Handles: Furnish one extra key for each key-operated hose bibb and hydrant installed.
 - 2. Backflow Preventer Test Kits: Provide one test kit suitable for testing backflow preventers for each backflow preventer.

PART 2 PRODUCTS

2.01 GENERAL

- A. Comply with the requirements of Division 22 Section 'Plumbing Equipment'.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. Comply with the requirements of Division 22 Section 'Plumbing Equipment'.

END OF SECTION

SECTION 221413

FACILITY STORM DRAINAGE PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Section: Division 22 Section "Plumbing Specialties" for storm drainage piping system specialties.

1.03 SUMMARY

- A. This Section includes storm-drainage piping inside the building and to locations indicated.

1.04 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Storm Drainage Piping: 10-foot head of water.

1.05 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Shop Drawings: For controlled-flow storm drainage system, include calculations, plans, and details.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.06 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Paragraph for applications of pipe, tube, fitting, and joint materials.

- B. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.
- C. Transition Couplings for Underground Pressure Piping: AWWA C219 metal, sleeve-type coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.02 CAST-IRON SOIL PIPING

- A. Hub-and-Spigot Pipe and Fittings: ASTM A 74, service class.
 - 1. Gaskets: ASTM C 564, rubber.
- A. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301.
 - 2. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral center pipe stop.
 - a. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.
 - i. NPS 1-1/2 to NPS 4: 3-inch wide shield with 4 bands.
 - ii. NPS 5 to NPS 10: 4-inch wide shield with 6 bands.

2.03 DUCTILE-IRON PIPING

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
 - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile or gray-iron standard pattern, or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile or gray-iron glands, rubber gaskets, and steel bolts.
 - 2. Ductile-Iron Piping, Grooved-End Fittings: ASTM A 47, malleable-iron castings, or ASTM A 536, ductile-iron castings with dimensions matching pipe.
 - a. Ductile-Iron Piping, Keyed Couplings: AWWA C606, for ductile-iron pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
 - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile or gray-iron standard pattern, or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
 - 2. Ductile-Iron, Grooved-End Fittings: ASTM A 47, malleable-iron castings, or ASTM A 536, ductile-iron castings with dimensions matching pipe.
 - a. Ductile-Iron Piping, Keyed Couplings: AWWA C606, for ductile-iron pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
 - 3. Ductile-Iron, Flexible Expansion Joints: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed

sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

4. Ductile-Iron, Deflection Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
5. Ductile-Iron, Expansion Joints: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

2.04 PE ENCASUREMENT

- A. PE Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105 PE film, 0.008-inch minimum thickness, tube, or sheet.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXCAVATION

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.
- C. Aboveground Storm Drainage Piping: Use any of the following piping materials for each size range:
 1. NPS 2 to NPS 4: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 2. NPS 2 to NPS 4: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 304, stainless steel.
 - b. Couplings: Heavy-duty, cast iron.
 - c. Couplings: Compact, stainless steel.
 3. NPS 5 and NPS 6: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 4. NPS 5 and NPS 6: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 304, stainless steel.
 - b. Couplings: Heavy-duty, cast iron.
 5. NPS 8: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 6. NPS 8: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 304, stainless steel.

- b. Couplings: Heavy-duty, cast iron.
- D. Underground Storm Drainage Piping: Use the following piping materials for each size range:
1. NPS 3 and NPS 4: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 304, stainless steel.
 - b. Couplings: Heavy-duty, cast iron.
 - c. Couplings: Compact, stainless steel.
 2. NPS 5 and NPS 6: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 3. NPS 5 and NPS 6: Extra-Heavy class, cast-iron soil piping; gaskets; and gasketed joints.
 4. NPS 5 and NPS 6: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 304, stainless steel.
 - b. Couplings: Heavy-duty, cast iron.
 - c. Couplings: Compact, stainless steel.
 5. NPS 8 and NPS 10: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 6. NPS 8 and NPS 10: Extra-Heavy class, cast-iron soil piping; gaskets; and gasketed joints.
 7. NPS 8 and NPS 10: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 304, stainless steel.
 - b. Couplings: Heavy-duty, cast iron.
 - c. Couplings: Compact, stainless steel.

3.03 PIPING INSTALLATION

- A. Refer to Division 2 Section "Storm Drainage" for Project site storm sewer and drainage piping.
- B. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- C. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers.
- D. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.
- E. Underground, Ductile-Iron, Force-Main Piping: Comply with AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 1. Encase piping with PE film according to ASTM A 674 or AWWA C105.
- F. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required

to make installation watertight. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

- G. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for wall penetration systems.
- H. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Encase underground piping with PE film according to ASTM A 674 or AWWA C105.
- I. Make changes in direction for storm piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- J. Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- K. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.
- L. Install engineered controlled-flow storm drainage piping in locations indicated.
- M. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.04 JOINT CONSTRUCTION

- A. Refer to Division 22 Section "Common work Results for Plumbing" for basic piping joint construction.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
 - 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Grooved Joints: Assemble joint with keyed coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

3.05 VALVE INSTALLATION

- A. Refer to Division 22 Section "Valves" for general-duty valves.
- B. Backwater Valves: Install backwater valves in piping subject to backlog.
 - 1. Horizontal Piping: Horizontal backwater valves.
 - 2. Install backwater valves in accessible locations.
 - 3. Refer to Division 22 Section "Plumbing Specialties" for backwater valves.

3.06 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 22 Section "Mechanical Vibration Controls and Seismic Restraints" for seismic-restraint devices.
- B. Refer to Division 22 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 22 Section "Hangers and Supports."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. NPS 6: 60 inches with 3/4-inch rod.
 - 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
 - 6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.07 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect storm drainage piping to roof drains and storm drainage specialties.

3.08 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.
- E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source

and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.09 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
 1. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION

SECTION 223000

PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes plumbing specialties for the following:
 - 1. Water distribution systems.
 - 2. Soil, waste, and vent systems.
 - 3. Storm drainage systems.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, basic installation requirements, and labeling and identifying requirements; and escutcheons, dielectric fittings, sleeves, and sleeve seals that are not in this Section.
 - 2. Division 22 Section "Hangers and Supports" for pipe hangers and seismic restraints.
 - 3. Division 22 Section "Mechanical Identification" for labeling and identifying requirements.
 - 4. Division 22 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.
 - 5. Division 22 Section "Water Distribution Piping" for water-supply piping and connections.
 - 6. Division 22 Section "Drainage and Vent Piping" for drainage and vent piping and connections.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Water Distribution Piping: 125 psig.
 - 2. Soil, Waste, and Vent Piping: 10-foot head of water.
 - 3. Storm Drainage Piping: 10-foot head of water.

1.04 SUBMITTALS

- A. Product Data: For each plumbing specialty indicated. Include rated capacities of selected equipment and shipping, installed, and operating weights. Indicate materials,

finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:

1. Backflow preventers.
2. Water pressure regulators.
3. Strainers.
4. Trap seal primer valves.
5. Cleanouts.
6. Drains.
7. Miscellaneous piping specialties.
8. Sand/oil interceptors.

B. Maintenance Data: For specialties to include in the maintenance manuals specified in Division 1. Include the following:

1. Backflow preventers.
2. Water pressure regulators.
3. Trap seal primer valves.
4. Miscellaneous piping specialties.

1.05 QUALITY ASSURANCE

A. Provide listing/approval stamp, label, or other marking on plumbing specialties made to specified standards.

B. Listing and Labeling: Provide electrically operated plumbing specialties specified in this Section that are listed and labeled.

1. Terms "Listed" and "Labeled": As defined in National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

C. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

D. Comply with NFPA 70, "National Electrical Code," for electrical components.

1.06 EXTRA MATERIALS

A. Deliver extra materials to King County Metro Transit. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Operating Key Handles: Furnish one extra key for each key-operated hose bibb and hydrant installed.
2. Backflow Preventer Test Kits: Provide one test kit suitable for testing backflow preventers for each backflow preventer.

PART 2 PRODUCTS

2.01 BACKFLOW PREVENTERS

- A. General: ASSE standard, backflow preventers, of size indicated for maximum flow rate and maximum pressure loss indicated.
 - 1. 2-Inch NPS and Smaller: Bronze body with threaded ends.
 - 2. 2-1/2-Inch NPS and Larger: Bronze, cast-iron, steel, or stainless steel body with flanged ends.
 - 3. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
 - 4. Interior Components: Corrosion-resistant materials.
 - 5. Exterior Finish: Polished chrome-plate if used in chrome-plated piping system.
 - 6. Strainer on inlet, if indicated.
- B. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
- C. Hose-Connection Vacuum Breakers: ASSE 1011, nickel-plated, with nonremovable and manual drain features, and ASME B1.20.7 garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.
- D. Reduced-Pressure Backflow Assemblies: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves.
 - 1. Pressure Loss: 12 psig maximum, through middle one-third of flow range.
- E. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet; and test cocks with two positive-seating check valves.
 - 1. Pressure Loss: Five psig maximum, through middle one-third of flow range.
- F. Antisiphon-Pressure-Type Vacuum Breakers: ASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.
 - 1. Pressure Loss: Five psig maximum, through middle one-third of flow range.
- G. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3-gpm flow and applications with up to 10-foot head back pressure. Include two check valves; intermediate atmospheric vent; and nonremovable, ASME B1.20.7 garden-hose thread on outlet.
- H. Back-Siphonage Backflow Vacuum Breakers: ASSE 1056, suitable for continuous pressure and backflow applications. Include shutoff valves, check valve, test cocks, and vacuum vent.

2.02 WATER PRESSURE REGULATORS

- A. General: ASSE 1003, water regulators, rated for initial working pressure of 150 psig minimum, of size, flow rate, and inlet and outlet pressures indicated. Include integral factory-installed or separate field-installed Y-pattern strainer.
 - 1. 2-Inch NPS and Smaller: Bronze body with threaded ends.
 - 2. 2-1/2-Inch NPS and Larger: Bronze or cast-iron body with flanged ends. Include AWWA C550 or FDA-approved interior epoxy coating for regulators with cast-iron body.
 - 3. Interior Components: Corrosion-resistant materials.
 - 4. Exterior Finish: Polished chrome-plate if used in chrome-plated piping system.
- B. Single-seated, direct-operated type.
- C. Single-seated, direct-operated, integral-bypass type.
- D. Pilot-operated type, single- or double-seated, cast-iron-body main valve, with bronze-body pilot valve.

2.03 STRAINERS

- A. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch round perforations, unless otherwise indicated.
 - 1. Pressure Rating: 125-psig minimum steam working pressure, unless otherwise indicated.
 - 2. 2-Inch NPS and Smaller: Bronze body, with female threaded ends.
 - 3. 2-1/2-Inch NPS and Larger: Cast-iron body, with interior AWWA C550 or FDA-approved epoxy coating and flanged ends.
 - 4. Y-Pattern Strainers: Screwed screen retainer with centered blowdown.
 - 5. Drain: Pipe plug.
 - 6. Drain: Factory- or field-installed, hose-end drain valve.
 - 7. T-Pattern Strainers: Malleable-iron or ductile-iron body with grooved ends; access end cap with drain plug and access coupling with rubber gasket.
 - 8. Basket Strainers: Bolted flange or clamp cover, and basket with lift-out handle.
 - a. Simplex Type: Single unit, with one basket.
 - b. Duplex Type: Double unit, with bronze or stainless-steel diverter valve and 2 baskets.
 - c. Drain: Pipe plug.
 - d. Drain: Factory- or field-installed, hose-end drain valve.
- B. Drainage Basket Strainers: Non-pressure-rated, cast-iron or coated-steel body; with bolted flange or clamp cover and drain with plug.
 - 1. Basket: Bronze or stainless steel with 1/8- or 3/16-inch- diameter holes and lift-out handle.
 - 2. Female threaded ends for 2-inch NPS and smaller, and flanged ends for 2-1/2-inch NPS and larger.

2.04 TRAP SEAL PRIMER VALVES

- A. Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
 - 1. 125-psig minimum working pressure.
 - 2. Bronze body with atmospheric-vented drain chamber.
 - 3. Inlet and Outlet Connections: 1/2-inch NPS threaded, union, or solder joint.
 - 4. Gravity Drain Outlet Connection: 1/2-inch NPS threaded or solder joint.
 - 5. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
- B. Trap Seal Primer System: Factory-fabricated, automatic-operation assembly for wall mounting with the following:
 - 1. Piping: 3/4-inch NPS, ASTM B 88, Type L; copper, water tubing inlet and manifold with number of 1/2-inch NPS outlets as indicated.
 - 2. Cabinet: Steel box with stainless-steel cover.
 - 3. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V, ac power.
 - 4. Water Hammer Arrester: ASSE 1010.
 - 5. Vacuum Breaker: ASSE 1001.

2.05 CLEANOUTS

- A. General: Size cleanouts as indicated on drawings, or where not indicated, same size as connected drainage piping.
 - 1. Provide wall cleanouts on each end of water closet ends and one over main drops in addition, provide all cleanouts required per code.
- B. Cleanouts: ASME A1122.36.2M, cast-iron body with straight threads and gasket seal or tapered threads for plug, flashing flange, and clamping ring, and a brass closure plug. Cleanouts for installation in floors not having membrane waterproofing may be furnished without clamping ring.
 - 1. Tiled Areas: Round cleanout top with tile recess top.
 - 2. Quarry Tiled Areas: Square nickel-bronze cleanout cover.
 - 3. Walls: Round cleanout cover with stainless steel finish.
 - 4. All Other Areas: Round cleanout top with nickel-bronze finish.

2.06 DRAINS

- A. Floor Drains: ASME A112.21.1M, cast-iron body, with seepage flange and clamping device, and trap seal primer valve connection. Floor drains for installation in floors not having membrane waterproofing may have seepage flange with clamping device. Floor drains for use as area drains in exterior slab on grade may be furnished with anchor flange instead of seepage flange and clamping device. Provide the following options as indicated:
 - 1. Trap primer connection.
 - 2. Round or square strainer with integral funnel.
 - 3. Polished nickel bronze top.
 - 4. Slotted top.

- B. Roof Drains: ASME A112.21.2M, cast-iron body, with combination flashing ring and gravel stop, cast-iron dome except where other dome material is specified, extension collars, underdeck clamp, and sump receiver. Roof drains for installation in cast-in-place concrete decks may be furnished without underdeck clamp and sump receiver.

2.07 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASME A112.26.1M, ASSE 1010, or PDI-WH 201, bellows or piston type with pressurized cushioning chamber. Sizes are based on water-supply fixture units, ASME A112.26.1M sizes A through F and PDI-WH 201 sizes A through F.
- B. Hose Bibbs: Bronze body, with renewable composition disc, 1/2- or 3/4-inch NPS threaded or solder-joint inlet. Provide ASME B1.20.7 garden-hose threads on outlet and integral or field-installed, nonremovable, drainable, hose-connection vacuum breaker.
 - 1. Finish: Rough brass.
 - 2. Operation: Operating-key (handle) type. Include operation key.
- C. Roof Flashing Assemblies: Manufactured assembly made of 4-lb/sq. ft., 0.0625-inch-thick, lead flashing collar and skirt extending at least 8 inches from pipe with galvanized steel boot reinforcement, and counterflashing fitting.
 - 1. Vent Cap: Extended model with field-installed, vandal-proof vent cap.
- D. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
- E. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
- F. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.
- G. Hose-End Drain Valves: MSS SP-110, 3/4-inch NPS ball valve, rated for 400-psig minimum CWP. Include 2-piece, ASTM B 62 bronze body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.
 - 1. Inlet: Threaded or solder joint.
 - 2. Outlet: Short-threaded nipple with ASME B1.20.7 garden-hose thread and cap.
- H. Stop-and-Waste Drain Valves: MSS SP-110, ball valve, rated for 200-psig minimum CWP or MSS SP-80, Class 125, gate valve, ASTM B 62 bronze body, with 1/8-inch NPS side drain outlet and cap.
- I. Horizontal Backwater Valves: ASME A112.14.1, cast-iron body, with removable bronze swing-check valve and threaded or bolted cover.
 - 1. Closed-Position Check Valve: Factory assembled or field modified to hang closed unless subject to backflow condition.
 - 2. Open-Position Check Valve: Factory assembled or field modified to hang open unless subject to backflow condition.

3. Extension: ASTM A 74, Service class; full-size, cast-iron, soil-pipe extension to field-installed cleanout at floor, instead of cover.
- J. Sand/Oil Interceptor and Sewage Pump Vault: Concrete compressive strength FC=5000 psi, ASTM C 857 minimum structural design loading for underground precast concrete utility structures. All baffles and weirs to be precast concrete. Galvanized diamond plate access and inspection covers.

2.08 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 1. General Use: 4 lb/sq. ft. or 0.0625-inch thickness.
 2. Vent Pipe Flashing: 3 lb/sq. ft. or 0.0469-inch thickness.
 3. Burning: 6 lb/sq. ft. or 0.0937-inch thickness.
- B. Copper Sheet: ASTM B 152, of the following minimum weights and thicknesses, unless otherwise indicated:
 1. General Applications: 12 oz./sq. ft.
 2. Vent Pipe Flashing: 8 oz./sq. ft.
- C. Zinc-Coated Steel Sheet: ASTM A 653, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- E. Fasteners: Metal compatible with material and substrate being fastened.
- F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- G. Solder: ASTM B 32, lead-free alloy.
- H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PLUMBING SPECIALTY INSTALLATION

- A. General: Install plumbing specialty components, connections, and devices according to manufacturer's written instructions.

- B. Install backflow preventers of type, size, and capacity indicated, at each water-supply connection to mechanical equipment and systems, and to other equipment and water systems as indicated. Comply with authorities having jurisdiction. Locate backflow preventers in same room as connected equipment. Install air-gap fitting on units with atmospheric-vent connection and pipe relief outlet drain to nearest floor drain. Do not install bypass around backflow preventer. Assure proper clearances for maintenance and testing per state standards for backflow preventers.
- C. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.
- D. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve, and where indicated.
- E. Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of one percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- F. Install backwater valves in building drain piping as indicated. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
- G. Install expansion joints on vertical risers, stacks, and conductors as indicated.
- H. Install cleanouts in aboveground piping and building drain piping as indicated, and where not indicated, according to the following:
 - 1. Size same as drainage piping up to 4-inch NPS. Use 4-inch NPS for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping 4-inch NPS and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- I. Install cleanout deck plates, of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.
- J. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- K. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- L. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
- M. Install floor drains according to manufacturer's written instructions, in locations indicated.
- N. Install floor drains at low points of surface areas to be drained as indicated. Set grates of drains flush with finished floor or as indicated. Size outlets as indicated.

- O. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- P. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
- Q. Position floor drains for easy access and maintenance.
- R. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions and size outlets as indicated.
- S. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
- T. Position roof drains for easy access and maintenance.
- U. Install interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.
 - 1. Flush with Floor Installation: Set unit and extension as required, with cover flush with finished floor.
 - 2. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.
- V. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.
- W. Fasten recessed, wall-mounting plumbing specialties to reinforcement built into walls.
- X. Secure supplies to supports or substrate.
- Y. Install individual stop valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated.
- Z. Install water-supply stop valves in accessible locations.
- AA. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- BB. Locate drainage piping as close as possible to bottom of floor slab supporting fixtures and drains.
- CC. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- DD. Include wood-blocking reinforcement for recessed and wall-mounting plumbing specialties.
- EE. Include access for trap primers.

FF. Install hose bibbs with integral or field installed vacuum breaker.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:
 - 1. Install piping connections between plumbing specialties and piping specified in other Division 22 Sections.
 - 2. Install piping connections indicated between appliances and equipment specified in other Sections; connect directly to plumbing piping systems.
 - 3. Install piping connections indicated as indirect wastes from appliances and equipment specified in other Sections, to spill over receptors connected to plumbing piping systems.
- B. Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power is specified in Division 16 Sections.
- C. Supply Runouts to Plumbing Specialties: Install hot- and cold-water-supply piping of sizes indicated, but not smaller than required by authorities having jurisdiction.
- D. Drainage Runouts to Plumbing Specialties: Install drainage and vent piping, with approved trap, of sizes indicated, but not smaller than required by authorities having jurisdiction.
- E. Ground electric-powered plumbing specialties.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Arrange for electric-power connections to plumbing specialties and devices that require power. Electric power, wiring, and disconnect switches are specified in Division 16 Sections.

3.03 FLASHING INSTALLATION

- A. Fabricate flashing manufactured from single piece unless large pans, sumps, or other drainage shapes are required.
- B. Burn joints of lead sheets where required.
- C. Solder joints of copper sheets where required.
- D. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.

3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- E. Set flashing on floors and roofs in solid coating of bituminous cement.
- F. Secure flashing into sleeve and specialty clamping ring or device.
- G. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings.
- H. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- I. Fabricate and install flashing and pans, sumps, and other drainage shapes as indicated. Install drain connection if indicated.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Provide services of factory-authorized service representative to supervise the field assembly of components and installation of grease recovery units, including piping and electrical connections, and to report results in writing.
 1. Test and adjust plumbing specialty controls and safeties. Replace damaged and malfunctioning controls and components.

3.05 START-UP PROCEDURES

- A. Before startup, perform the following checks:
 1. System tests are complete.
 2. Damaged and defective specialties and accessories have been replaced or repaired.
 3. Clear space is provided for servicing specialties.
- B. Before operating systems, perform the following steps:
 1. Close drain valves, hydrants, and hose bibbs.
 2. Open general-duty valves to fully open position.
 3. Remove and clean strainers.
 4. Verify that drainage and vent piping are clear of obstructions. Flush with water until clear.
 5. Fill grease interceptors with clean water.
- C. Startup Procedures: Follow manufacturer's written instructions. If no procedures are prescribed by manufacturer, proceed as follows:
 1. Energize circuits for electrically operated units. Start and run units through complete sequence of operations.

3.06 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and train King County Metro Transit's maintenance personnel as specified below:
 - 1. Train King County Metro Transit's maintenance personnel on procedures and schedules related to startup of and servicing interceptors.
 - 2. Train King County Metro Transit's maintenance personnel on procedures and schedules related to startup of and servicing grease recovery units.
 - 3. Review data in the maintenance manuals. Refer to Division 1.
 - 4. Schedule training with Project Representative with at least seven (7) days' advance notice.

3.07 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
 - 1. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 224000

PLUMBING FIXTURES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational plumbing fixtures on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specifications are a part of this Section.

1.03 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities, in accordance with Standards, Codes and Guidelines set forth in the Design Criteria.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- E. FRP: Fiberglass-reinforced plastic.
- F. PMMA: Polymethyl methacrylate (acrylic) plastic.
- G. PVC: Polyvinyl chloride plastic.
- H. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.04 SUBMITTALS

- A. Developer shall submit Plumbing Fixture shop drawings to the King County Project Representative for review and acceptance prior to designing plumbing system.
- B. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

1.06 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - i. Structural failures of unit shell.
 - ii. Faulty operation of controls, blowers, pumps, heaters, and timers.
 - iii. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Period for Commercial Applications: Three years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 Comfort station plumbing and fixtures: Shall comply with the requirements of King county Transit Design & Construction Standard Single-Unit Comfort Station Drawings and Specifications.

2.02 FAUCETS

A. S-1

1. Service Sink:

- i. Description: Service sink faucet, wall mounted, with stops in shanks, vacuum breaker, hose-thread outlet, and pail hook.

2.03 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Cover:

1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

2.04 WATER HEATERS

A. EWH-1:

1. Instant Hot Water Dispenser:

- i. General: Electrically heated, insulated water tank with drain, adjustable temperature control (120°F to 200°F).
- ii. NSF, IAPMO, approvals, UL Listing.
- iii. 1 year parts and labor warranty.

2.05 HYDRANTS AND HOSE BIBBS

A. Interior Hose Bibb:

1. Description: Polished chrome wall outlet with vacuum breaker, removable tee key.

B. Exterior Wall Hydrant:

1. Description: Freeze proof, integral vacuum breaker, wheel type handle.

2.06 FLOOR DRAINS

A. Description: Coated cast iron, trap primer connection, flashing collar, Adjustable height, nickel bronze strainer.

B. Size: To be determined by Architect.

2.07 TRAP PRIMERS, WATER HAMMER ARRESTORS

A. Trap Primers:

1. Description: Brass body, activated by pressure fluctuation of 5 psig, integral backflow preventer, isolation valve with screwdriver operator.
2. Provide with Flush Valve Primer Fitting where required.

B. Water Hammer Arrestors:

1. Description: Stainless steel bellows with brass piston, factory air charge.

2.08 DOUBLE CHECK VALVE ASSEMBLIES

A. Description: Two independent check valves, shutoff valves, with test ports. Bronze or stainless steel body, rubber check assembly, stainless steel test ports, and bronze or stainless steel strainer.

2.09 CLEANOUTS

A. Wall Cleanouts: Cast iron spigot, bronze thread, nickel bronze cover.

- B. Floor Cleanouts: Adjustable cast iron, screwed nickel bronze cap with vandal proof screws. Provide adjustable carpet clamp frame where required.

2.10 OIL WATER SEPARATOR

- A. Type: Flush-with-floor, deep rough-in.
- B. Body: Welded steel with corrosion-resistant coating inside and outside
- C. Coating: Factory fabricated, welded steel with corrosion-resistant coating, height as required to match invert of inlet pipe
- D. Cover: Gasketed, non-skid surface, secured, flush with finished floor
- E. Features: Cascade bottom, removable baffle and sediment bucket, integral deep-seal trap, and adjustable draw-off assembly
- F. Flow Control Fitting: Sized for rated GPM, for installation on inlet pipe

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install in accordance with the manufacturer's requirements and recommendations. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install fixtures level and plumb according to roughing-in drawings.
- D. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 15 Section "Pipe, Pipe Materials, and Valves."
- E. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- F. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

- G. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- H. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- I. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- J. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- K. Set service basins in leveling bed of cement grout. Grout is specified in Division 15 Section "Basic Mechanical Materials and Methods."
- L. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 7 Section "Joint Sealants."

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Coordinate with Division 16 for wiring installation and connection.
- D. Connect Instant Hot Water Dispenser to cold water supply only.

3.03 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms.

3.04 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Operate and adjust disposers. Replace damaged and malfunctioning units.
- C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- D. Replace washers and seals of leaking and dripping faucets and stops.
- E. Install fresh batteries in sensor-operated mechanisms.

3.05 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.06 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 230500

COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational heating, ventilation and air conditioning installations on a Design-Build basis. It shall be the Developer's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 REQUIREMENTS

- A. Scope: The Developer is responsible for the design and mechanical construction of a complete and operating facility. The Developer is responsible for providing all labor and materials, equipment, and transportation necessary or reasonably inferable as being necessary for the execution of the work.
 - 1. Division 23 Specifications are not intended to include ALL mechanical system requirements, equipment, or coordination with other trades. These specifications are intended to provide general design criteria and construction guidelines and shall be used as such.
- B. Submit design drawings, equipment submittals and catalog cuts as indicated herein for design build criteria compliance review to the King County Project Representative. Resubmit as necessary to comply with requirements. Details of equipment sizing and configuration shall be the responsibility of the Designer of Record.

1.03 RELATED DOCUMENTS

- A. The Design Criteria and other Performance Specification Sections apply to all work in this Section.
- B. The Developer is required to review and coordinate all requirements with the work of other disciplines.

1.04 SUBMITTALS AND SHOP DRAWINGS

- A. Submit full sized, scaled (1/8" = 1'-0") floor plan drawings, calculations, and equipment submittals for design build criteria compliance review. Submit design drawings to the King County Project Representative with the following data indicated:
- B. Drawings
 - 1. Equipment schedule with following:
 - 2. External pressure drop
 - 3. Btu input and output

4. Entering and leaving design air temperature
5. Supply, return, exhaust, and outside air airflows
6. Duct routing with sizes
7. Diffuser, grilles, dampers, and louver manufacturer, models, and sizes
8. Air flow rates for all inlets and outlets
9. Thermostat and other control component locations

C. Calculations:

1. Ventilation air calculations

D. Shop Drawings

1. Equipment submittal sheets with model and relevant data clearly indicated using an arrow pointing at data relevant to this project.

1.05 COMPLIANCE AND COORDINATION

- A. Contract requirements of the General Conditions, Supplementary Conditions and Division 1 apply to all work in this Section.
- B. Comply with all applicable codes, rules, regulations, design, and construction standards including, but not limited to:
 1. ASHRAE Standards
 2. Washington Energy Code
 3. IBC - International Building Code with Washington Amendments
 4. IMC - International Mechanical Code with Washington Amendments
 5. IFGC - International Fuel Gas Code
 6. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 7. Local Codes
 8. And other trades.

1.06 INTENT

- A. Examination of Site and Drawings: Submittal of bid shall indicate that the Developer has examined the site, architectural drawings, and has determined that the drawings, specifications and existing conditions are sufficient, adequate, and satisfactory for the construction of the Work under this Contract.
- B. Discrepancies: Bring to the King County Representative's attention any discrepancies between the Contract Documents and field conditions, and any design and layout changes required due to specific equipment selection, etc., prior to purchasing and installing equipment and material. Corrective work necessitated by discrepancies after purchasing and installation shall be at the Developer's expense.

1.07 WORK SPECIFIED ELSEWHERE

- A. Where other divisions call for work under this division of the specifications, comply with all requirements herein. Mechanical work required by other divisions which is not shown

on the mechanical drawings and/or specified in this division of these specifications shall be provided by the trade or subtrade requiring the mechanical work.

1.08 DEFINITIONS AND ABBREVIATIONS

A. Organizations:

1. ANSI American National Standards Institute
2. ASME American Society of Mechanical Engineers
3. ASTM American Society of Testing and Materials
4. AMCA Air Movement and Control Association

1.09 DESIGN CRITERIA

- A. Mechanical systems design by the Developer shall be in accordance with IBC.
- B. Coordinate mechanical systems design and equipment locations with the Architect. Insure that all service clearance requirements are defined on the drawings, accessible and coordinated with other trades. Locating equipment in areas which cannot be easily serviced will be unacceptable.

1.10 DRAWINGS

The Developer shall provide detailed shop drawings to include but not limited to, exact duct and pipe routing, equipment sizes, service clearance requirements, diffuser and grille sizes and locations, thermostat locations, louver sizes and locations, roof and wall penetration locations and details, volume damper and plumbing shut-off valve locations and access panels in walls and ceilings. Do not proceed with construction until the design has been approved by the Architect.

1.11 SUBMITTALS, APPROVALS, AND REVIEWS

- A. Shop Drawings and Product Data: After the Contract is awarded but prior to manufacture or installation of any equipment, prepare complete Design Drawings and Brochures for materials and equipment as required by each section of the specification. Submit seven (6) complete sets for review within 30 days after award of Contract. Prior to submission of the Design Drawings and Project Data, review and certify that they are in compliance with the Contract Documents. Verify dimensional information to ensure proper clearance for installation of equipment. Check all materials and equipment after arrival on the job site and verify compliance with the Contract Documents. A minimum period of two weeks, exclusive of transmittal time, shall be required each time a Design Drawing and/or Brochure is submitted or resubmitted for review. This time period shall be considered by the Developer when scheduling submittal data.
- B. Review of Design Drawings and Brochures shall not relieve the Developer of responsibility for dimensions and/or errors that may be contained therein, or deviations from Contract Document requirements. The noting of some errors, but the overlooking of others, does not grant the Developer permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the review of the Design Drawings and Brochures. Certify in writing or in the form of rubber stamp impressions as follows:

1. Each Design Drawing shall indicate in the lower right hand corner and each Brochure shall indicate on the front cover the following: Title of the sheet or brochure, name and location of the building; names of the Mechanical Engineer, Developer, subcontractors, manufacturer, supplier/vendor, etc., date of submittal, and the date of correction and revision. Unless the above information is included, the submittal will be returned for resubmittal.
2. Design Drawings shall contain sufficient plans, elevations, sections, and isometrics to clearly describe the equipment or apparatus, and its location. Drawings shall be prepared by an Engineer/Drafter skilled in this type of work. Provide drawings drawn to at least 1/8" = 1'-0" scale
3. Submit manufacturers' brochures and data published by the manufacturers containing complete and detailed engineering and dimensional information relevant to the particular equipment or materials to be furnished in this Contract. Do not submit information which describes several different items in addition to those items to be used, unless all irrelevant information is marked out, or unless relevant information is clearly highlighted. Review all submittals and stamp approved before forwarding to the King County's Representative for-review. Establish quantities, verify space requirements, dimensions, and possible interferences with other trades. Include all specified materials in submittal. Partial submittals of individual items, or those that do not follow specified format, will not be accepted.
4. Identify each item submitted with the pertinent specification paragraph number.

1.12 QUALITY ASSURANCE

- A. All materials shall be new. Properly store all materials and equipment for protection from physical damage or damage due to corrosion.
- B. Standardization of Manufacturer: Make every effort to furnish all equipment of any variance with these specifications.
- C. Equipment Furnished by Others: For installation of equipment furnished by others and installed by this Developer, obtain rough-in dimensions from approved shop drawings, by measurements from the actual equipment, from details shown on drawings or as directed by the Engineer.

1.13 STORAGE AND PROTECTION OF MATERIALS

- A. Provide a secure storage space for storage of materials and apparatus and assume complete responsibility for all losses and damage. Protect completed work, work underway, and apparatus against loss or damage.
- B. Temporary Heating: Apply temporary heat according to manufacturer's recommendations within equipment enclosures during periods when equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

1.14 PERMITS AND FEES

- A. Obtain and pay for all permits relating to the work in this Contract. Contact the various agencies involved relating to the mechanical work and include all inspection and other fees in the Contract.

1.15 COOPERATION

- A. Cooperate completely with all other crafts in the matter of planning and laying out of the Work. Every reasonable effort shall be made to prevent conflicts as to space requirements, dimensions, locations, access openings or other matters tending to obstruct or delay the work of any craft.

1.16 COORDINATION AND SCHEDULING

- A. Coordinate all mechanical work with other trades. Any changes required in the Work caused by the Developer's neglect to coordinate with others shall be made at the Developer's expense.
- B. Review all Contract Documents and verify at the site all measurements necessary for the proper installation of the work.
- C. Refer to all Construction Drawings, details, and specifications, including Architectural, Structural, and Electrical, and fully coordinate all Mechanical work with other trades.
- D. Provide all required offsets and special fittings.
- E. Pay special attention to all visible devices and equipment in finished areas. Verify the exact location and receive approval from the King County's Representative prior to installation.
- F. Schedule work with all other Developers in order to maintain job progress schedule and to avoid conflicts in the installation of work by other trades. Coordinate with the General Contractor to provide adequate access for installing large equipment.

1.17 SAFETY AND PROTECTION

- A. Safety Measures To Be Taken: The Developer will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Engineer to conduct construction observations of the Developer's performance is not intended to include review of the adequacy of the Developer's safety measures, in, on or near the construction site. It shall be the Developer's responsibility to comply with "Safety and Health Regulations for Construction," Volume 36, No. 75, Part II of the Federal Register by the U.S. Department of Labor. Developer shall be responsible for providing all such safety measures and shall consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether he is or is not in compliance with state or federal regulations.
- B. Protection: Ensure that mechanical safety and protection are maintained, including the proper covering, signage, and securing of pressurized pipe.

1.18 GUARANTEE

- A. Ensure that the mechanical system installed under this Contract is in proper working order and in compliance with drawings, specifications, and/or authorized changes.

Without additional charge, replace any work or materials that develop defects, except from ordinary wear and tear, within one year from the date of substantial completion.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SITE CLEAN UP

- A. Remove from site all waste and rubbish resulting from the work. Keep Site clean on a day-to-day basis.

3.02 SERVICE OUTAGES

- A. Keep outages to an absolute minimum. Any essential outages required in the course of construction, whether for temporary services, cutovers or testing, shall be closely coordinated with the King County Project Representative and Engineer. They shall occur at times convenient with the King County Project Representative.
- B. Submit written request at least seven days in advance of any scheduled outage and proceed with the outage only after receiving authorization from the King County's Representative.

3.03 MECHANICAL CONNECTIONS FOR EQUIPMENT

- A. General: Provide mechanical connection of all equipment having ductwork and/or piping requirements.
- B. IMC Compliance: Comply with applicable portions of IMC as to the type of products used and provisions for mechanical ductwork and piping connections.
- C. Underwriters Laboratories acceptance: All material and equipment within the scope of the UL re-examination service shall be approved by Underwriters Laboratories, Inc. for the purpose for which they are used and shall bear their label.
- D. Execution: Make mechanical ductwork and piping connections in accordance with connector manufacturer's written instructions, with recognized industry practices, and complying with requirements of ASME and SMACNA standards. Coordinate installation of mechanical connections for equipment with equipment installation work. Verify all mechanical loads (voltage, phase, full load amperes, number and point of connections, minimum circuit capacity, etc.) for equipment furnished under other divisions of this specification by reviewing respective shop drawings furnished under each division. Obtain and review equipment shop drawings to determine all final connection requirements before rough-in begins for each equipment item. Meet with each subcontractor furnishing equipment requiring mechanical service and review mechanical

characteristics. Report any variances from mechanical characteristics noted on the mechanical drawings to Engineer before proceeding with rough-in work.

3.04 EQUIPMENT ACCESSIBILITY AND INSTALLATION

- A. Accessibility of Equipment: Comply with applicable codes and install equipment so as to be accessible for operation, maintenance or repair. Equipment deemed inaccessible shall be relocated as directed.
- B. Manufacturer's Installation Details: Follow Manufacturer's installation details exactly, where available. Provide special ductwork, piping or fittings as required.

3.05 MECHANICAL WORK EXPOSED TO WEATHER

- A. Provide corrosion protection for all copper and ferrous metal portions of mechanical work exposed to weather, including ductwork, piping, supports, valves and other items. All ferrous metal shall be hot-dip galvanized after fabrication, painted or cadmium plated, or similarly protected against corrosion. All enclosures and equipment shall be weathertight.

3.06 EQUIPMENT BASES AND FASTENING

- A. Housekeeping Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment unless noted otherwise. Bases shall be 4" thick reinforced concrete, 3000-psi, 28-day compressive strength, with #4 rebar each way on 12" centers and doweled to floor slab. Trowel finish with 1" bevel edge all around.
- B. Floor-Mounted Equipment Fastening: All floor-mounted equipment shall be secured to the housekeeping bases with ductile steel anchor bolts, preset in the concrete base. Secure vibration mounts, where required, to the concrete bases such that the equipment is free to vibrate but cannot move from the base.
- C. Roof-Mounted Equipment and Roof Penetrations: Provide sealed roof curbs per local jurisdiction and King County Metro Transit's requirements for all rooftop equipment and ductwork or piping penetrations of the roof. Flash and seal weathertight to the existing roof structure and cover to match existing roof construction.

3.07 ANCHORAGE AND BRACING OF MECHANICAL SYSTEMS

- A. General: Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and mechanical equipment as required by Section 1621 of the International Building Code and local codes and ordinances.
- B. Ductwork and/or Piping Crossing Structural Separations: Install ductwork and piping that crosses structural separations between buildings or building units with flexible connections, suitable to accommodate longitudinal and transverse displacements.
- C. Anchorage of Equipment: Brace or anchor all mechanical and mechanical equipment to resist a horizontal force acting in any direction per requirements of the International Building Code for seismic zone 4.

- D. All anchorage and bracing must be designed by a licensed structural engineer and submitted to the project structural engineer for review and approval. The Contractor shall pay all costs.

3.08 CUTTING AND PATCHING

- A. Coordinate location of all openings required in the building construction for the installation of the work. Any cutting and patching made necessary through the neglect of the Contractor will be done at the expense of the Contractor.
- B. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved. In no case shall any structural member be cut.
- C. Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.09 SLEEVES AND OPENINGS

- A. Sleeves and openings required through floors and walls for mechanical work shall be the responsibility of this Contractor. Carefully coordinate this work with the other trades involved. Use approved sleeves and seal all openings around conduits in sleeves with a material of equal fire rating as the surface penetrated.

3.10 PAINTING

- A. Equipment painted at the factory shall not be repainted unless damaged or as otherwise specified. Touchup equipment using paint provided by the equipment manufacturer and selected to match the equipment finish.
- B. Touchup damaged non-equipment surfaces with paint matching type and color of existing undamaged adjacent finish.
- C. Touchup damaged galvanized surfaces using zinc-rich paint as recommended by the item manufacturer.
- D. All exposed mechanical materials (ductwork, piping, hangers and supports, equipment and registers or diffusers) shall be painted with color per the Architect's discretion.

3.11 TESTS

- A. Fully test and adjust the equipment installed under this specification and demonstrate its proper operation to the Engineer. No equipment shall be tested or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions. Test and adjust equipment prior to employee instruction. Submit test report for each system or component to the Engineer for approval. Where specified, submit certified test reports by certified service organizations representing the system or equipment involved. Include all test reports in operation and maintenance manuals.

3.12 CLEANING

- A. Clean up all equipment to factory condition. Use touch-up paint where required. Remove all packing cartons and other debris that is a direct result of the installation of the work of this Division.

- B. Clean registers and diffusers, interiors and exteriors of all equipment in accordance with manufacturer's recommendations.
- C. Vacuum the interior of all ductwork. Wipe all mechanical work down to remove dust and dirt.

3.13 PROJECT FINALIZATION AND START UP

- A. Upon completion of equipment and system installation, assemble all equipment factory representatives and subcontractors for system start up.
- B. Each major equipment and system representative and subcontractor shall assist in start-up and shall check out their respective system and remain at the site until the total system operation is accepted by the King County Metro Transit's Representative.
- C. The project foreman shall accompany the reviewing party and remove cover plates, panel covers and other access panels as requested in order to allow review of the entire mechanical system.

3.14 CERTIFICATION OF INSPECTION

- A. Present the King County Project Representative with Certification of Inspection from the code enforcing agency upon completion of work stating that all work complies with all applicable Codes and Ordinances.

3.15 RECORD DRAWINGS

- A. Maintain, on a daily basis, a complete set of "Record Drawings," reflecting an accurate dimensional record of the precise locations of all buried or concealed work. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite authorization for such changes. The "Record Drawings" for daily recording shall consist of a set of blue line prints of the Contract Drawings.
- B. Record dimensions clearly and accurately, delineating the work as installed. Identify locations by at least two dimensions to permanent reference points. Upon completion of the work, provide a complete set of electronic files of mechanical systems including all "Record" information to the King County Project Representative.

3.16 OPERATION AND MAINTENANCE MANUALS

- A. General: Prepare instruction manuals describing the operation, servicing and maintenance requirements of all mechanical equipment provided, including complete parts lists.
- B. Equipment Described in the Manual: Include all equipment submitted for approval. Each section shall have a separate index tab.
- C. Information Contained in the Manual:
 - 1. Each manual shall contain the following information:
 - a. Complete and legible equipment data cut sheets.
 - b. Legend of all symbols and abbreviations.

- c. A complete instruction manual necessary for the proper operation and maintenance of the system.
 - d. Complete list of all test and diagnostic equipment, including testing procedures to utilize same.
 - e. Replacement parts list for each piece of equipment in the system with a brief description of functions.
2. Index all contents listed in an orderly presentation. Include tabulations describing the type of equipment, frequency and type of service.
- D. **Binding:** Bind material in a post-type expandable three-hole binder with cloth-covered heavy-duty hardboard cover and cloth back panel. Imprint the front cover with the name of the project, King County Metro Transit, year of completion, the words "Mechanical Equipment," and the names of the Engineer and Mechanical Contractor. Imprint the back edge with the name of the project, Owner and year of completion. If the thickness of the manual exceeds 3", provide separate volumes, each not to exceed 3" thick, with each volume imprinted as described above.
- E. **Number of Copies:** Submit one preliminary copy for review approval. Deliver three final bound copies to the Owner upon final approval.
- 3.17 OPERATING PERSONNEL INSTRUCTION**
- A. **General:** Provide instruction of facility operating personnel sufficiently prior to facility acceptance, upon mutually satisfactory arrangement with the King County Metro Transit.
- B. **Instruction:** Instruction shall not begin until the component, assembly, or system has been tested and is in acceptable operating condition. Otherwise, instruction shall be deemed incomplete. Instruction shall encompass normal operation, emergency operation, fire and other hazards, safety provisions, provisions for pollution prevention, and maintenance procedures for all work provided.
- C. **Instructors:** Instructors shall include the Contractor's staff, supplemented by authorized representatives of the component, assembly or system manufacturer.
- D. **Time:** Provide all necessary instruction to the complete understanding of the operating personnel. Minimum instruction periods shall be as recommended by manufacturer unless noted otherwise. Provide a time schedule to the King County Project Representative for review and approval.

END OF SECTION

SECTION 230548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational installations on a Design-Build basis. It shall be the Developer's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes vibration isolators, vibration isolation bases, vibration isolation roof curbs, and seismic restraints and snubbers.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Section:
 - 1. Section 230500 Common Work Results for HVAC.

1.03 SUBMITTALS

- A. Product Data: Indicate types, styles, materials, and finishes for each type of isolator specified. Include load deflection curves.
- B. Shop Drawings: Show designs and calculations, certified by a professional engineer, for the following:
 - 1. Design Calculations: Calculations for selection of vibration isolators, design of vibration isolation bases, and selection of seismic restraints.
 - 2. Seismic Restraint Details: Detail fabrication and attachment of restraints and snubbers.

1.04 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of vibration isolation bases and seismic restraints that are similar to those indicated for this Project in material, design, and extent.

1.05 PROJECT CONDITIONS

- A. Project seismic zone is 3 with a zone factor of 0.030.
- B. Building Importance Factor: 1.0.

1.06 COORDINATION

- A. Coordinate layout and installation of vibration isolation and seismic-restraint devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATORS

- A. Spring Isolators: Freestanding, laterally stable, open-spring-type isolators.
 - 1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 3. Lateral Stiffness: More than 1.2 times the rated vertical stiffness.
 - 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 5. Baseplates: Factory drilled for bolting to structure and bonded to a 1/4-inch- thick, rubber isolator pad attached to the baseplate underside. Size baseplates to limit floor loading to 100 psig.
 - 6. Top Plates: Provide threaded studs for fastening and leveling equipment.
 - 7. Finishes: Manufacturer's standard corrosive-resistant finish.
- B. Rubber Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to formed-steel housings with threaded connections for hanger rods. Color-code to indicate capacity range.
- C. Spring Hangers: Combination spring and elastomeric hanger with coil spring and elastomeric insert in compression.
 - 1. Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.
 - 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 5. Finishes: Baked enamel for metal components. Color-code to indicate capacity range.

2.02 SEISMIC CONTROLS

- A. Thrust Restraints: Combination spring and elastomeric restraints with coil spring and elastomeric insert in compression. Factory set for thrust.
 - 1. Frame: Formed steel, fabricated for connection to threaded rods and to allow for 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
5. Finishes: Baked enamel for metal components. Color-code to indicate capacity range.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install and anchor vibration-, sound-, and seismic-control products according to manufacturer's written instructions and authorities having jurisdiction.

3.02 ADJUSTING AND CLEANING

- A. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operations.
 1. Adjust thrust restraints for a maximum of 1/4 inch of movement at start and stop.

END OF SECTION

SECTION 230593

MECHANICAL COMMISSIONING: FUNCTIONAL PERFORMANCE TESTINGS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 DESCRIPTION

- A. The purpose of functional performance testing (FPT) is to assure the King County Project Representative that all work has been completed as specified and that systems are functioning in the manner intended, within the limits of the design and the contract documents. It will serve as a tool to minimize post-occupancy systems operational difficulty or failure. It will assist operations staff familiarization and training with new systems. It will also be used to develop test protocols and record associated test data in an effort to advance the building systems from a state of substantial completion to full dynamic operation. Functional performance testing will commence as systems startup and startup documentation is completed and reviewed and TAB work is completed. Functional performance testing will be done on a system-by-system basis. The results of these tests will be documented and handed over to the Commissioning Agent and Project Representative for final system acceptance.
- B. Substantial Completion requires that:
 - 1. All functional performance testing be complete and approved.
 - 2. O&M manuals are complete (not in process).
 - 3. All training is complete.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 23 Section "Commissioning of HVAC."

1.04 SYSTEMS TO BE TESTED

- A. FPT will be performed on all energy-consuming systems and equipment and those mechanical systems that affect the performance of the dynamic functioning of the building. Those systems shall include the following:
 - 1. HVAC
 - a. Exhaust Fans.
 - b. Unit Heaters.
 - c. Split-system Air-Conditioning Units.

PART 2 PRODUCTS

Not applicable to this section.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. The Contractor and subcontractors shall be responsible for performing all procedures presented in the specification and contract drawings, unless otherwise specified. The Test Engineer and Commissioning Agent will witness system start up and functional performance for all systems listed in this division.

3.02 FUNCTIONAL PERFORMANCE TESTING

- A. Functional performance testing begins after the systems have been completed by the contractors, the system description and training sessions have been completed, and the O&M manuals have been completed.
- B. The objective of functional performance testing is to advance the building systems from a state of installation and startup completion to full dynamic operation in accordance with the specified design requirements and design intent.
- C. The Test Engineer shall attain this objective by developing individual system-testing protocols which, when implemented by the Contractor, will allow the Test Engineer to observe, evaluate, identify deficiencies, recommend modifications, tune, and document the systems and systems' equipment performance over a range of load and functional levels.
- D. Functional performance testing shall be conducted with the systems in full automatic operation, except as noted in the test procedures. Unless otherwise noted in the testing procedures, motor starter HOA switches shall be in the AUTO position.
- E. Equipment shall be tested for equipment under every operating mode.
- F. All equipment safety devices shall be tested. Coordinate with equipment vendors for safe procedures to test safety devices.

END OF SECTION

SECTION 230800

COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 DESCRIPTION

A. Purpose:

1. The purpose of the commissioning process is to provide the King County Project Representative assurance that the systems have been installed in the prescribed manner and will operate within the performance guidelines. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems to beneficial use by King County Metro Transit.
2. The Developer verifies installation, provides scheduling and coordination of commissioning activities, performs training, starts up equipment, conducts functional performance testing, corrects deficiencies, performs retests, and provides documentation of the process. Developer provides King County Metro Transit an unbiased, objective view of the system's installation, documentation, operation, and performance.
3. Commissioning procedures and results will be reviewed and observed by the Commissioning Authority. The Developer is expected to verify the functional readiness of systems to be tested prior to performing the tests in the presence of the Commissioning Authority. A high rate of test failure will indicate that the Developer has not adequately verified the readiness of the systems.

B. General:

1. Furnish labor and material to accomplish building commissioning as specified herein.
2. Requirements of Commissioning Section shall be accomplished by a qualified Test Engineer, as specified in Division 1. The requirement for and responsibilities of the Test Engineer are indicated in Division 1 and Commissioning Section. The Test Engineer shall be hired by the Developer.
3. The Commissioning Authority is an independent contractor and will work under a separate contract. The responsibilities of the Commissioning Authority are indicated, for information only, in Division 1.
4. Unless noted otherwise, functional performance tests (FPTs) described under "Acceptance Criteria" in the various sections of this division, apply to all equipment and systems identified under "Systems / Equipment to be Tested."

1.03 COORDINATION

- A. The Developer shall provide overall coordination and management of the commissioning program as specified herein. The commissioning process will require cooperation of the Developer, subcontractors, vendors, Architect, Mechanical Engineer, Electrical Engineer, Test Engineer, Commissioning Authority, and the Project Representative.

1.04 SUBMITTALS

- A. General: The Test Engineer shall submit the following with input from the Contractors, Sub-Contractors, and Vendors:
 - B. Commissioning Plan: Submit six (6) copies of a draft commissioning plan to the Project Representative for review and approval within 90 calendar days of Notice to Proceed. Submit six (6) copies of the commissioning plan to the Project Representative after all review comments have been incorporated. Develop a commissioning plan to identify how commissioning activities will be integrated into general construction and trade activities. The plan is the key means to inform all parties as to how each system functions, independently and with respect to other systems. The plan shall be updated regularly and redistributed to the commissioning team for review and comment. The intent of this plan is to evoke questions, expose issues, and resolve them with input from the entire commissioning team early in construction. The commissioning plan shall identify how commissioning responsibilities are distributed.
 - 1. Include an organizational chart showing lines of communication and authority relative to key Contractor positions and to key subcontractors.
 - 2. Identify who will be responsible for producing the various procedures, reports, King County Project Representative notifications, and forms required in this division.
 - 3. Include a summary of all commissioning tests to be performed.
 - 4. Include the commissioning schedule.
 - 5. Describe the test/acceptance procedure.
 - 6. Identify which subcontractors will participate in each of the tests.
 - 7. Identify instrumentation required for each test.
 - 8. Identify who will provide instrumentation for each test.
 - C. Commissioning Schedule: Submit six (6) copies of a draft commissioning schedule to the Project Representative for review and approval by the Project Representative within 90 calendar days of Notice to Proceed.
 - 1. Integrate functional performance testing and commissioning requirements into the Critical Path Method (CPM) master construction schedule. Commissioning scheduling is the responsibility of the Developer. The schedule shall include dates for commissioning testing of each system and shall also include startup prerequisite activities shown linked to specific functional performance testing dates.
 - 2. Commissioning of systems shall proceed per the criteria established in the specific sections that follow, with activities to be performed on a timely basis. Commissioning of systems may proceed prior to final completion of systems. The Test Engineer must be available to respond promptly to avoid delay to the CPM schedule.

3. The commissioning schedule shall incorporate the completion of all commissioning testing, with the exception of retesting resulting from deficiencies and seasonal testing, before the Final Certificate of Occupancy date.
 4. Problems observed shall be addressed immediately, in terms of notification to responsible parties and actions to correct deficiencies.
- D. Start-Up Plan: For each piece of equipment or system for which formal start-up is specified elsewhere in this division, submit a start-up plan to the Project Representative for review and approval within 90 days. Submit six (6) copies of the draft startup plan. Submit six (6) copies of the startup plan after all review comments have been incorporated from the Project Representative. Obtain approval of the plan prior to beginning startup activities. The plan shall include the following:
1. Start-up schedule.
 2. Names of firms/individuals required to participate.
 3. Detailed start-up procedures (may be manufacturer's startup checklist and procedures).
 4. Start-up data forms.
- E. Test Equipment Identification List: For each instrument, sorted according to intended use, submit six (6) copies of a list containing the following information to the Project Representative for review and approval by the Architect and Commissioning Authority. Submit six (6) copies of the list to the Project Representative after all comments have been incorporated:
1. Manufacturer.
 2. Model number.
 3. Serial number.
 4. Calibration certification.
 5. Range.
 6. Accuracy.
 7. Resolution.
 8. Intended use.
- F. Testing, Adjusting, and Balancing (TAB) Data Forms: In addition to the requirements for TAB submittals in other sections of this specification, submit six (6) copies of the testing, adjusting, and balancing (TAB) data forms to the Project Representative for review and approval by the Project Representative and Commissioning Authority. Submit six (6) copies of the TAB forms after all comments have been incorporated. Forms shall be approved prior to the start of TAB activities.
- G. Testing, Adjusting, and Balancing (TAB) Report: In addition to the requirements for TAB report submittals in other sections of this specification, submit (1) additional copy for review and approval by the Commissioning Authority. A preliminary TAB report shall be submitted first for approval. A final TAB report shall be submitted to incorporate review comments or, if additional TAB work is identified by the preliminary review comments, after the additional TAB work is completed.
- H. Functional Performance Test Procedures: Refer to Section 230593 for additional requirements for functional performance test procedures. Submit functional

performance test procedures for functional performance tests to the Project Representative for review and approval by the Project Representative and Commissioning Authority.

1. Each procedure shall have a unique alphanumeric designator.
 2. The same procedure may be applied to multiple identical pieces of equipment or systems.
 3. FPT procedures shall be detailed test instructions, written with sufficient step-by-step information to allow a test to be repeated under identical conditions with repeatable results.
1. Functional Performance Test Procedures: Submit six (6) copies of the draft functional performance test procedures/data forms to the Project Representative for review and approval by the Project Representative and Commissioning Authority.
1. Identify each functional performance test data form by a unique designator, consisting of the applicable functional performance test procedure designator followed by a dash and digit suffix to distinguish multiple repetitions of the same procedure.
 2. Include space to record the following:
 - a. Description of the procedure.
 - b. Whether the form is for a retest of a failed procedure.
 - c. Identification and location of the equipment being tested.
 - d. Observed conditions at each step of the procedure.
 - e. Date of the test.
 - f. Names and company of technicians performing the procedure.
 - g. Name and signature of the Test Engineer.
 - h. Name and signature of the Commissioning Authority or Project Representative witness. Signature of witness shall only indicate concurrence with reported results and observations. Acceptance of the results will be reported separately by the Commissioning Authority after review of the FPT data forms.
 3. Functional performance test procedures and functional performance test data sheets for each system shall be based upon actual system's configuration.
 4. Test procedures shall fully describe system configuration and steps required for each test, appropriately documented so that another party can repeat the tests with virtually identical results.
 5. Acceptance test procedures must confirm the performance of systems to the extent of the design intent and applicable code under which the project was permitted. When a system is accepted, the Commissioning Authority must be assured that the system is complete, works as intended, is correctly documented, and that the Project Representative's staff is trained in the operation and maintenance of the system.
 6. The majority of mechanical equipment requires integral safety devices to stop/prevent equipment operation unless minimum safety standards or conditions are met. This could include adequate oil pressure, proof-of-flow, non-freezing conditions, maximum head pressure, etc. Functional performance test procedures shall demonstrate the actual performance of safety shutoffs in a real or closely simulated condition of failure.

7. Systems may include safety devices and components that control a variety of equipment operating as a system. Interlocks may be hard-wired or installed via software. Functional performance test procedures shall demonstrate these interlocks.
 8. Inform appropriate subcontractor(s) and vendor(s) before commissioning is started as to what the test and expected results will be. Because some test results and interpretations may not become evident until the actual tests are performed, all participants should have a reasonable understanding of the requirements. The commissioning plan must address the requirements and be distributed to all participants involved with that particular system.
- J. Functional Performance Test Deficiency Report Forms: Submit sample functional performance test deficiency report forms to the Project Representative for review and approval by the Project Representative and Commissioning Authority. Include space to record the following:
1. Associated functional performance test data form number.
 2. Date of test.
 3. Name of person reporting the deficiency.
 4. Description of the observations associated with the failure of the test.
 5. Cause of the failure if apparent at the time of the test.
 6. Date and description of corrective action taken.
 7. Name and signature of person taking corrective action.
 8. Schedule for retest.
- K. King County Metro Transit Training Plan: Prepare and submit six (6) copies of a training plan to the Project Representative for review and approval by the Project Representative and Commissioning Authority.
1. Training plan shall include for each training session the following:
 - a. Dates, start and finish times, and locations.
 - b. Outline of the information to be presented.
 - c. Names and qualifications of the presenters.
 - d. List of texts and other materials required to support training.
 2. Obtain assistance from appropriate subcontractors and vendors to provide training for King County Metro Transit's operations staff.
 3. Training will be in a classroom setting with the appropriate schematics, handouts, and audio/visual training aids.
 4. Catalog training videotapes and deliver to the Project Representative with the O&M manuals.
 5. Host each training session:
 - a. Provide program overview and curriculum guidance.
 - b. Obtain signatures of attendees on a sign-in list.
 6. Equipment vendors provide training on the specifics of each system and philosophy, troubleshooting, and repair techniques as specified in the relevant sections of this specification.

7. Installation subcontractors provide training on peculiarities specific to this project and job specific experience as specified in the relevant sections of this specification.
8. Review record documents to verify accuracy.

1.05 COORDINATION WITH COMMISSIONING AUTHORITY

- A. The Commissioning Authority will witness start-up and test activities specified in this division. The Project Representative will designate witnesses and alternates for each activity.
- B. Notify the Project Representative in writing of the date, time, location, and anticipated duration of start-up and test activities as required in "Schedule" above.
- C. Provide written timely notice to Project Representative of any changes in date, time, location, or anticipated duration of start-up and test activities. For the purpose of this paragraph, written notice shall be received by Project Representative a minimum of 72 hours in advance to be considered timely notice.
- D. Developer shall reimburse King County for actual costs incurred by King County Metro Transit as the result of failure to provide timely notice, per preceding paragraph, of changes in date, time, location, or anticipated duration of start-up and test activities.
- E. Obtain the signature of designated witness on all data forms. If the witness is unavailable at the scheduled time and location of the activity, so note, and proceed per schedule without the witness.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide industry standard test equipment required for performing the tests specified herein. Instrumentation shall meet the following standards:
 1. Be of sufficient quality and accuracy to test and measure system performance within the tolerances required to determine adequate performance.
 2. Be calibrated on the manufacturer's recommended intervals with calibration tags permanently affixed to the instrument being used.
- B. For all temperature measurements including air, liquids, and surfaces of pipes and components using appropriate probes:
 1. Range: Minimum +23°F to 230°F
 - a. Type: Thermometer, Digital Electronic.
 - b. Minimum accuracy: +/- 0.5°F.
 - c. Calibration Interval: Per manufacturer instruction, not to exceed every 12 months.
- C. Air Pressure Measurement Instruments:
 1. Range: 0 to 1 inch w.c., 0 to 4 inch w.c., 0 to 10 inch w.c.
 - a. Type: Use properly leveled and zeroed manometer, Magnehelic or electronic instrument meeting accuracy requirements.

- b. Minimum accuracy for electronic devices: 2% of reading (Magnehelic or manometer), 1% of reading (electronic).
- c. Calibration Interval for electronic devices: Per manufacturer's instructions, not to exceed every 12 months.
- d. Note: Use lowest range instrument or scale.

2.02 REPORTS

- A. Installation Verification Audit: Prior to start-up, submit to the Project Representative for review and approval by the Project Representative and Commissioning Authority a report of installation verification audit activities. Identify equipment and components verified, deficiencies noted, corrective action taken, and the dates and initials of the persons making the entries.
 - 1. During construction, observe the work of the prime Developer and subcontractors to assure that all installations are being made in accordance with the intent of the contract documents.
 - 2. Before system start-up begins, conduct a final installation verification audit. The Developer shall be responsible for completion of all work, including change orders and punch list items, to the satisfaction of the Project Representative. The audit shall include, but not be limited to, a check of the following:
 - a. Piping specialties, including balance, control, and isolation valves.
 - b. Ductwork specialty items, including turning devices; balance, fire, smoke and control dampers; and access doors.
 - c. Control sensor types and locations.
 - d. Identification of piping, valves, starters, gauges, thermometers, etc.
 - e. Documentation of prestart-up tests performed, including manufacturer's factory tests.
 - f. Accessibility to equipment in 1-3 above.
- B. Start-Up Deficiency Report: Within five days following start-up of each system or equipment, submit to the Project Representative start-up deficiency report forms. Identify systems and/or equipment started up, deficiencies noted, corrective action taken, and the dates and initials of the persons making the entries.
- C. Functional Performance Test Deficiency Reports: Submit weekly functional performance tests deficiency reports to the Project Representative.
 - 1. Identify tests for which acceptable results were not obtained by test number and description, and equipment identification and location. Briefly describe observations about the performance which were associated with failure to achieve acceptable results. Identify the cause of failure if such is apparent.
 - 2. When corrections have been completed, update the functional performance test deficiency report forms. Identify corrective action taken and the dates and initials of the persons making the entries.
 - 3. Identify the schedule for retesting.

- D. **Final Commissioning Reports:** Submit six (6) copies of the draft final commissioning report to the Project Representative for review and approval by the Architect and the Commissioning Authority. The draft final commissioning report shall be submitted a minimum of two weeks prior to the Final Certificate of Occupancy date. The draft final commissioning report shall include completed commissioning functional performance test procedures for all identified systems to be commissioned. For those systems that require re-testing due to deficiencies found during initial functional testing and those tests that require seasonal conditions to complete (i.e. – heating and cooling coil capacity tests), the initial completed functional test procedure shall be included in the preliminary final commissioning report. After all re-testing and seasonal testing has been completed, submit six (6) copies of the final commissioning report to the Project Representative including the documentation for all re-testing and seasonal testing. The final commissioning report shall include the following items:
1. An executive summary including a brief description of the project, the commissioning process, and the results of the commissioning process.
 2. A list of all outstanding items that were not resolved through the commissioning process.
 3. Recommendations for system improvements that were not implemented through the commissioning process.
 4. Log, list, or matrix of all deficiencies encountered during the course of functional performance testing.
 5. All meeting notes.
 6. All installation verification audits.
 7. All startup deficiency reports.
 8. All completed functional test procedures and data forms.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 COMMISSIONING PROCEDURE

- A. **Sequence of Testing:** Commissioning shall proceed from lower to higher levels of complexity. For each discrete subsystem or system, testing at the lower level shall be completed prior to starting the next higher level of tests. In general, the order of testing, from lowest to highest is as follows:
1. System startup static tests (e.g. duct leakage tests, pipe static pressure tests).
 2. Contractor equipment startup and vendor equipment startup including unitary controls checkout.
 3. Testing, Adjusting, and Balancing (TAB).
 4. System functional performance tests (FPT).
- B. **Retesting:** Repeat, at no additional cost to King County, the complete functional test procedure for each test in which acceptable results are not achieved. Repeat tests until acceptable results are achieved. Compensate King County for direct costs incurred as

the result of tests repeated to achieve acceptable results. Fill out a new functional performance test data form for each retest.

C. Correction of Deficiencies:

1. Correct functional performance test deficiencies promptly and schedule retest.
2. Corrections during functional performance tests are generally prohibited to avoid consuming the time of personnel waiting for the test, but not involved in making the correction. Exceptions will be allowed if the cause of the failure is obvious and corrective action can be completed in less than five minutes. If corrections are made under this exception, the failure shall be noted on the functional performance test data form. A new functional performance test data form, marked "retest," shall be initiated after the correction has been made. The entire functional performance test procedure shall be repeated.

D. Owner witness: Commissioning Authority shall provide no labor or materials in the commissioning process. The only function of the Commissioning Authority shall be to observe and comment on the progress and results of commissioning.

1. Provide access to permit the Commissioning Agent to directly observe the performance of the equipment being tested.
2. Provide ladders, scaffolding, and staging as required to permit the Commissioning Agent to directly observe the performance of the equipment being tested.
3. Notify the Project Representative of commissioning schedule changes at least 48 hours in advance if a Commissioning Agent will be involved.

3.02 FUNCTIONAL COMPLETION

- A. The Commissioning Authority will review Contractor's records of completion of Commissioning requirements. Upon receiving evidence of satisfactory completion of Substantial Completion requirements listed in Section 00700, the Commissioning Authority will submit to the Project Representative a recommendation to accept Functional Completion.

3.03 EXCLUSIONS

- A. The Project Representative and Commissioning Authority are not responsible for construction means, methods, job safety, or any management function related to commissioning on the job site.
1. The Contractor shall provide all technician services requiring tools or the use of tools, to test, adjust or otherwise bring equipment into a full operational state.

END OF SECTION

SECTION 231100

FACILITY FUEL PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 09 'Painting' for painting of exterior piping, regulators, and valves.
 - 2. Division 22 Section 220519 "Meters and Gages" for pressure gages.
 - 3. Division 22 Section 220553 "Identification for Plumbing Piping and Equipment."
 - 4. Division 23 Section "Hangers and Supports" for pipe hangers, support devices, and seismic restraint of piping.

1.03 SUMMARY

- A. This section includes fuel gas piping, specialties, and accessories within the building and to the point of connection to the utility provided gas service.

1.04 PROJECT CONDITIONS

- A. Gas System Pressure: One pressure range 0.5 psig or less.
- B. Gas System Pressures: Two pressure ranges. Primary pressure is not more than 0.5psig but not more than 2.0 psig, and is reduced to secondary pressure of 0.5 psig or less.
- C. Gas System Pressures: Two pressure ranges. Primary pressure is more than 2.0 psig but not more than 5.0 psig, and is reduced to secondary pressure of more than 0.5 psig but not more than 2.0 psig.
- D. Gas System Pressures: Three pressure ranges. Primary pressure is more than 2.0 psig but not more than 5.0 psig, and is reduced to secondary pressures of more than 0.5 psig but not more than 2.0 psig, and is reduced again to pressures of 0.5 psig or less.
- E. Design values of fuel gas supplied for these systems are as follows:
 - 1. Natural Gas:
 - a. Nominal Heating Value: 1000 Btu/cu. ft.

- b. Nominal Specific Gravity: 0.6.
- 2. Liquefied Petroleum Gas:
 - a. Nominal Heating Value: 2675 Btu/cu. ft.
 - b. Nominal Specific Gravity: 1.6.

1.05 SUBMITTALS

- A. General: See Section 220500 for general requirements of Product Data, Shop Drawings, Reports and Certificates, and Operation and Maintenance data submittals.
- B. Product Data: Provide submittals of the following:
 - 1. Pipes, Fittings, and Joining Materials
 - 2. Valves
 - 3. Pressure Regulators
 - 4. Wiring Diagrams
- C. Shop Drawings: In addition to requirements set forth in Section 220500, shop drawings for piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
- D. Welding certificates.
- E. Field quality-control reports.
- F. Operation and Maintenance Data: For natural gas specialties and accessories to include in maintenance manuals specified in Division 1.

1.06 QUALITY ASSURANCE

- A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."
- C. FM Standard: Provide components listed in FM's "Fire Protection Approval Guide" if specified to be FM Approved.
- D. IAS Standard: Provide components listed in IAS's "Directory of A.G.A. and C.G.A Certified Appliances and Accessories" if specified to be IAS listed.
- E. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas

supplier. Handle flammable liquids used by installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

- A. General: Refer to Part 3 "Piping Applications" article for applications of pipe, fittings, and joining materials.
- B. Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.

2.02 PIPES, FITTINGS, AND JOINING MATERIALS

- A. Malleable-Iron Threaded Fittings: ASME B16.3, Class 230.
- B. Forged Socket-Welding Fittings: ASME B16.11, Class 2000 (Schedule 40).
- C. Unions: ASME B16.39, Class 230, malleable-iron with ground joint.
- D. Steel Welding Fittings: ASTM A 234, Schedule 40.
- E. Cast Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
- F. Threaded Joint Compound and Tape: Suitable for natural gas.
- G. Gasket Material: Thickness, material, and type suitable for natural gas.

2.03 PROTECTIVE COATING

- A. Coating for Piping: Corrosive resistant polyethylene coating.
- B. Polyethylene Encasement for Piping: ASTM A 674 polyethylene film, 0.008-inch minimum thickness, tube, or sheet.

2.04 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Strainers: Y-pattern type:
 - 1. NPS 3/4 to 2-Inch: Cast-iron body with threaded connections, stainless steel 20 mesh screen.
- C. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.05 VALVES

- A. General: Valves NPS 2 and smaller, threaded ends; valves NPS 2-1/2 and larger, flanged ends.
- B. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with

stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

- C. Gas Valves, NPS 2 and Smaller: Bronze-body ball valve, two-piece construction, rated for 125-psig natural gas and liquefied petroleum gas, ASME B16.33 and UL-listed.
 - 1. Tamperproof Feature: Include design for locking.
- D. Automatic Gas Valves: ANSI Z21.21, with mechanical operator for actuation by appliance automatic shutoff device.
- E. Electrically Operated Gas Valves: UL 429, bronze, aluminum, or cast-iron body solenoid valves; 120-V ac, 60 Hz, Class B, continuous-duty molded coil. Include NEMA ISC 6, Type 4, coil enclosure and electrically opened and closed dual coils. Valve position shall normally be closed.
- F. Earthquake Valves: FM approved or listed in IAS Directory as complying with ANSI Z21.70 and UL listed. Include mechanical operator.

2.06 PRESSURE REGULATORS

- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
 - 1. NPS 2-Inch and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2. Line Pressure Regulators: ANSI Z21.80 with 2-psig minimum, 10-psig maximum inlet pressure rating. Over pressure internal relief diaphragm assembly and vent valve.
 - 3. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory or field installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PREPARATION

- A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.
- B. Comply with ANSI Z223.1, "Prevention of Accidental Ignition" Paragraph.

3.02 SERVICE ENTRANCE PIPING

- A. Connect to fuel gas service and extend fuel gas piping into the building. Exterior fuel gas distribution system piping up to and including the service pressure regulator and service meter will be provided by gas utility.

- B. Install earthquake valve downstream of service and prior to line penetrating building wall. Install strainer upstream from each earthquake valve. Refer to Division 23 Section "Plumbing Specialties" for strainers.

3.03 PIPING APPLICATIONS

- A. General Requirements: Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated. 1/2-inch steel pipe is not allowed, use 3/4-inch where 1/2-inch is indicated.
- B. Exposed, Interior, and Exterior Fuel Gas Piping, below 2-psig: Use the following unless otherwise indicated:
 - 1. NPS 3/4 to 2-Inch: Steel pipe with threaded joints and malleable-iron threaded fittings.
 - 2. NPS 1-1/4 to 2-Inch: Steel pipe with welded joints and socket-welded fittings. Threaded joints allowed at connections to strainers, valves, and regulators.
- C. Fuel Gas Piping, 2 to 5 psig: Use the following:
 - 1. NPS 3/4 to 2-Inch: Steel pipe with welded joints and socket-welded fittings. Threaded joints allowed at connections to strainers, valves, and regulators.
- D. Containment Conduits: Steel pipe, steel welding fittings, and welded joints.

3.04 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure up to 2 psig: Gas stop or gas valve.
- B. Piping Line Valves, NPS 2-Inch and Smaller: Gas valves.

3.05 PIPING INSTALLATION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.
- B. Route interior fuel gas piping concealed above ceilings, in hollow walls and pipe spaces; and exposed in mechanical equipment spaces.
- C. Do not locate valves, regulators, strainers or any fuel gas equipment in concealed spaces.
- D. Prohibited Locations: Do not install gas piping in or through electrical rooms, air ducts, floor slabs, solid walls, clothes or trash chutes, chimneys or gas vents or elevator shafts.
- E. Underground Fuel Gas Piping Outside of Building: Provide polyethylene encasement of piping. Provide fitting to electrically isolate the below grade piping, located a minimum of 6-inches above grade.
- F. Underground Fuel Gas Piping Beneath Building: Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches outside the building, and vented to atmosphere. Terminate vents with turned-down,

reducing-elbow fittings with corrosion-resistant insect screens in large end. Provide polyethylene encasement of conduit.

- G. Drips and Sediment Traps: Install drips at points where condensate may collect. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
- H. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 10 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- I. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- J. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- K. Connect branch piping from top or side of horizontal piping.
- L. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- M. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valves.
- N. Install piping line valves upstream of line pressure regulators.
- O. Install pressure gage downstream from each line pressure regulator.
- P. Install vent piping for gas pressure regulators and gas trains, extend outside buildings, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

3.06 JOINT CONSTRUCTION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Use materials suitable for fuel gas.

3.07 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 23 Section "Hangers and Supports" for pipe hanger, support devices, and seismic restraints.
- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

Nominal Pipe Size (Inches)	Maximum Pipe Span (Feet)	Minimum Rod Diameter (Inches)
3/4	8	3/8
1	8	3/8
1-1/4	10	3/8
1-1/2	10	3/8
2	10	3/8

3.08 CONNECTIONS

- A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.
- B. Install piping adjacent to appliances to allow service and maintenance.
- C. Connect piping to gas appliances with shutoff valves, appliance pressure regulators, and unions. Install flexible connectors on connection to appliance unless indicated otherwise. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.
- D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.
- E. Electrical Connections: Provide electrical connections per manufacturer's recommendations.
 - 1. Do not use gas pipe as grounding electrode.

3.09 LABELING AND IDENTIFYING

- A. Refer to Division 23 Section "Mechanical Identification" for nameplates and signs.

3.10 PAINTING

- A. Paint exterior piping, pressure regulators, and specialty valves. Use materials and procedures in Division 9 for painting exterior ferrous metal.
 - 1. Color: Color as selected by Project Representative.

3.11 FIELD QUALITY CONTROL

- A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of the gas utility and authorities having jurisdiction.
- B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.
- C. Report test results promptly and in writing to Project Representative and authorities having jurisdiction.
- D. Verify capacities and pressure ratings of pressure regulators, valves, and specialties.
- E. Verify correct pressure settings for pressure regulators.

F. Verify that specified piping tests are complete.

3.12 ADJUSTING

A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

END OF SECTION

SECTION 231126

FACILITY LIQUEFIED PETROLEUM GAS PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes fuel gas piping, specialties, and accessories within the building and to the point of connection to the utility provided gas service.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 22 Section "Basic Mechanical Materials and Methods" for general piping materials and installation methods.
 - 2. Division 22 Section "Hangers and Supports" for pipe hangers, support devices, and seismic restraint of piping.
 - 3. Division 22 Section "Mechanical Identification" for nameplates, signs, and pipe identification.
 - 4. Division 22 Section "Meters and Gages" for pressure gages.

1.03 PROJECT CONDITIONS

- A. Gas System Pressure: One pressure range. More than 0.5 psig but not more than 2.0 psig.
- B. Gas System Pressures: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2.0 psig, and is reduced to secondary pressure of 0.5 psig or less.
- C. Gas System Pressures: Two pressure ranges. Primary pressure is more than 2.0 psig but not more than 5.0 psig, and is reduced to secondary pressure of more than 0.5 psig but not more than 2.0 psig.
- D. Gas System Pressures: Three pressure ranges: Primary pressure is more than 2.0 psig but not more than 5.0 psig, and is reduced to secondary pressures of more than 0.5 psig but not more than 2.0 psig, and is reduced again to pressures of 0.5 psig or less.
- E. Design values of fuel gas supplied for these systems are as follows:
 - 1. Liquefied Petroleum Gas:
 - a. Nominal Heating Value: 2675 Btu/cu. Ft.
 - b. Nominal Specific Gravity: 1.6.

1.04 SUBMITTALS

- A. General: See Section 230500 for general requirements of Product Data, Shop Drawings, Reports and Certificates, and Operation and Maintenance data submittals.
- B. Product Data: Provide submittals of the following:
 - 1. Valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 2. Pressure Regulators: Include pressure rating, capacity, and settings of selected models.
 - 3. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- D. Maintenance Data: For natural gas specialties and accessories to include in maintenance manuals specified in Division 1.

1.05 QUALITY ASSURANCE

- A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."
- C. FM Standard: Provide components listed in FM's "Fire Protection Approval Guide" if specified to be FM approved.
- D. IAS Standard: Provide components listed in IAS's "Directory of A.G.A. and C.G.A. Certified Appliances and Accessories" if specified to be IAS listed.
- E. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas supplier. Handle flammable liquids used by Installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

1.07 COORDINATION

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

- A. General: Refer to Part 3 "Piping Applications" Paragraph for application of pipe, fittings, and joining materials.
- B. Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.

2.02 PIPES, FITTINGS, AND JOINING MATERIALS

- A. Malleable-Iron Threaded Fittings: ASME B16.3, Class 230.
- B. Forged Socket-Welding Fittings: ASME B16.11, Class 2000 (Schedule 40).
- C. Unions: ASME B16.39, Class 230, malleable iron with ground joint.
- D. Steel Welding Fittings: ASTM A 234, Schedule 40.
- E. Cast Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
- F. Threaded Joint Compound and Tape: Suitable for natural gas.
- G. Gasket Material: Thickness, material, and type suitable for natural gas.

2.03 PROTECTIVE COATING

- A. Coating for Piping: Corrosive resistant polyethylene coating.
- B. Polyethylene Encasement for Piping: ASTM A 674 polyethylene film, 0.008-inch minimum thickness, tube or sheet.

2.04 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Strainers: Y-Pattern Type:
 - 1. NPS 3/4 to 2-Inch: Cast-iron body with threaded connections, stainless steel 20 mesh screen.
 - 2. NPS 2-1/2 and Larger: Cast-iron body with Class 125 flanged connections, stainless steel 20 mesh screen.
- C. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.05 VALVES

- A. General: Valves NPS 2 and Smaller, threaded ends; valves NPS 2-1/2 and Larger, flanged ends.
- B. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

- C. Gas Valves, NPS 2 and Smaller: Bronze-body ball valve, two-piece construction, rated for 125-psig liquefied petroleum gas, ASME B16.33 and UL-listed.
 - 1. Tamperproof Feature: Include design for locking.
- D. Automatic Gas Valves: ANSI Z21.21, with electrical operator for actuation by appliance automatic shutoff device.
- E. Electrically Operated Gas Valves: UL 429, bronze, aluminum, or cast-iron body solenoid valve; 120-V ac, 60 Hz, Class B, continuous-duty molded coil. Include NEMA ISC 6, Type 4, coil enclosure and electrically opened and closed dual coils. Valve position shall normally be closed.
- F. Earthquake Valves: FM approved or listed in IAS Directory as complying with ANSI Z21.70 and UL listed. Include mechanical operator.

2.06 PRESSURE REGULATORS

- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
 - 1. NPS 2-Inch and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2. Line Pressure Regulators: ANSI Z21.80 with 10 psig maximum inlet pressure rating. Overpressure internal relief diaphragm assembly and vent valve.
 - 3. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PREPARATION

- A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Paragraph to determine that all equipment is turned off in affected piping section.
- B. Comply with ANSI Z223.1, "Prevention of Accidental Ignition" paragraph.

3.02 SERVICE ENTRANCE PIPING

- A. Connect to fuel gas service and extend fuel gas piping into the building. Exterior fuel gas distribution system piping up to and including the service pressure regulator and service meter will be provided by gas utility.

- B. Install earthquake valve downstream of service and prior to line penetrating building wall. Install strainer upstream from each earthquake valve. Refer to Division 23 Section "Plumbing Specialties" for strainers.

3.03 PIPING APPLICATIONS

- A. General Requirements: Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated. 1/2-inch steel pipe is not allowed, use 3/4-inch where 1/2-inch is indicated.
- B. Concealed, Interior Fuel Gas Piping, below 2-psig: Use the following unless otherwise indicated:
 - 1. NPS 3/4 to 2-Inch: Steel pipe with welded joints and socket-welded fittings.
- C. Exposed, Interior and Exterior Fuel Gas Piping, below 2-psig: Use the following unless otherwise indicated:
 - 1. NPS 3/4 to 1-Inch: Steel pipe with threaded joints and malleable-iron threaded fittings.
 - 2. NPS 1-1/4 to 2-Inch: Steel pipe with welded joints and socket-welded fittings. Threaded joints allowed at connections to strainers, valves and regulators.
- D. Containment Conduits: Steel pipe, steel welding fittings, and welded joints.

3.04 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure up to 2-psig: Gas stop or gas valve.
- B. Piping Line Valves, NPS 2-Inch and Smaller: Gas valve.

3.05 PIPING INSTALLATION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.
- B. Route interior fuel gas piping concealed above ceilings, in hollow walls and pipe spaces; and exposed in mechanical equipment spaces.
- C. Do not locate valves, regulators, strainers or any fuel gas equipment in concealed spaces.
- D. Prohibited Locations: Do not install gas piping in or through electrical rooms, air ducts, floor slabs, solid walls, clothes or trash chutes, chimneys or gas vents or elevator shafts.
- E. Underground Fuel Gas Piping Outside of Building: Provide polyethylene encasement of piping. Provide fitting to electrically isolate the below grade piping, located a minimum of 6-inches above grade.
- F. Underground Fuel Gas Piping Beneath Building: Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4-inches outside building, and vented to atmosphere. Terminate vents with turned-down,

reducing-elbow fittings with corrosion-resistant insect screens in large end. Provide polyethylene encasement of conduit.

- G. Drips and Sediment Traps: Install drips at pints where condensate may collect. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 10-inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- H. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- I. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- J. Connect branch piping from top or side of horizontal piping.
- K. Install unions in pipes NPS 2 and Smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- L. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valves.
- M. Install piping line valves upstream of line pressure regulators.
- N. Install pressure gage downstream from each line pressure regulator.
- O. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

3.06 JOINT CONSTRUCTION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Use materials suitable for fuel gas.

3.07 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 23 Section "Hangers and Supports" for pipe hanger, support devices, and seismic restraints.
- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

Nominal Pipe Size (Inches)	Maximum Pipe Span (Feet)	Minimum Rod Diameter (Inches)
3/4	8	3/8
1	8	3/8
1-1/4	10	3/8
1-1/2	10	3/8
2	10	3/8

3.08 CONNECTIONS

- A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.
- B. Install piping adjacent to appliances to allow service and maintenance.
- C. Connect piping to gas appliances with shutoff valves, appliances pressure regulators, and unions. Install flexible connectors on connection to appliance unless indicated otherwise. Install valve upstream from and within 72-inches of each appliance. Install union downstream from valve.
- D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.
- E. Electrical Connections: Provide electrical connections per manufacturer's recommendations.
 - 1. Do not use gas pipe as grounding electrode.

3.09 LABELING AND IDENTIFYING

- A. Refer to Division 23 Section "Mechanical Identification" for nameplates and signs

3.10 PAINTING

- A. Paint exterior piping, pressure regulators, and specialty valves. Use materials and procedures in Division 9 for painting exterior ferrous metal.
 - 1. Color: Gray.

3.11 FIELD QUALITY CONTROL

- A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of the gas utility and authorities having jurisdiction.
- B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.
- C. Report test results promptly and in writing to Architect and authorities having jurisdiction.
- D. Verify capacities and pressure ratings of pressure regulators, valves, and specialties.
- E. Verify correct pressure settings for pressure regulators.

F. Verify that specified piping tests are complete.

3.12 ADJUSTING

A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

END OF SECTION

SECTION 233113

METAL DUCTS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes rectangular and round metal ducts, ventilating systems in pressure classes from minus 2- to plus 10-inch wg.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 8 "Louvers and Vents" for intake and relief louvers and vents connected to ducts and installed in exterior walls.
 - 2. Division 22 Section "Mechanical Vibration Controls and Seismic Restraints" for seismic restraint criteria of equipment.
 - 3. Division 22 Section "Duct Accessories" for dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
 - 4. Division 22 Section "Diffusers and Grilles."
 - 5. Division 22 Section "Testing, Adjusting, and Balancing" for air balancing and final adjusting of manual-volume dampers.

1.03 DEFINITIONS

- A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula $Btu \times in./h \times sq. ft. \times deg F$ at the temperature differences specified. Values are expressed as Btu.

1.04 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Project Representative. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.05 SUBMITTALS

- A. Product Data: For duct liner and sealing materials.
- B. Shop Drawings: Show details of the following:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 2. Duct layout indicating pressure classifications and sizes on plans.
- C. Coordination Drawings: Refer to Division 23 "Basic Materials and Methods for Coordination Drawings requirements.
- D. Welding Certificates: Copies of certificates indicating welding procedures and personnel comply with requirements in "Quality Assurance" Article.
- E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- F. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

1.06 QUALITY ASSURANCE

- A. Welding Standards: Qualify welding procedures and welding personnel to perform welding processes for this Project according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members; and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
- C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.
- D. Shop Drawings: Show details of the following:
1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 2. Duct layout indicating pressure classifications and sizes on plans.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle sealant materials according to manufacturer's written recommendations.

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

- B. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.02 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
 - 1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
 - 2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
 - 3. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
 - 4. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.03 HANGERS, SUPPORTS AND RESTRAINTS

- A. Building Attachments: Concrete inserts, mechanical-anchor fasteners, or structural-steel fasteners appropriate for building materials. Powder actuated concrete fasteners are not allowed.
 - 1. If concrete inserts cannot be used, install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Concrete inserts and mechanical-anchor fasteners shall be made of steel.
 - 2. Expanding concrete anchors shall be made of steel.
- B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Comply with SMACNA "HVAC Duct Construction Standards-Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 - 1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.
- E. Duct Seismic Restraint: Comply with SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems".

2.04 DUCT PRESSURE CLASSIFICATIONS

- A. Rectangular Duct Static-Pressure Classifications: Construct ducts to the following:
 - 1. Exhaust Ducts: 2-inch wg, negative pressure.

2.05 RECTANGULAR DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA "HVAC Duct Construction Standards--Metal and Flexible," unless indicated otherwise. Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 - 2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
 - 3. Branch Connections:
 - a. Rectangular Branch: Use 45° entry.
 - 4. Material Thickness: For SMACNA "HVAC Duct Construction Standard – Metal and Flexible," but not less than 26 gauge.
- B. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 DUCT INSTALLATION, GENERAL

- A. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.
- B. Construct and install each duct system for the specific duct pressure classification indicated.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, changes in size and shape, and connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct.
- F. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.

- I. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures, unless ductwork is intended to serve these spaces.
- J. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

3.02 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct seal class described in SMACNA "HVAC Duct Construction Standards--Metal and Flexible" corresponding to the pressure class given below.
- B. Pressure Classification:
 - 1. Below 3-inch wg: Seal Class B; all transverse joints and longitudinal seams.

3.03 HANGING, RESTRAINING, AND SUPPORTING

- A. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards--Metal and Flexible."
- B. Install duct seismic restraints as indicated in SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems."
- C. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Support vertical ducts at a maximum interval of 16 feet and at each floor.
- E. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- F. Install concrete inserts before placing concrete.
- G. Install mechanical-anchor fasteners after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

3.04 CONNECTIONS

- A. Unless indicated otherwise, connect equipment with flexible connectors according to Division 23 Section "Duct Accessories."
- B. For branch, outlet and inlet, comply with SMACNA "HVAC Duct Construction Standards--Metal and Flexible," unless indicated otherwise.

3.05 FIELD QUALITY CONTROL

- A. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.

- B. Determine leakage from entire system or section of system by relating leakage to surface area of test section.
- C. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg(both positive and negative pressures), and Leakage Classification 6 for pressure classifications from 2- to 10-inch wg.
- D. Remake leaking joints and retest until leakage is less than maximum allowable.
- E. Leakage Test: Perform tests according to SMACNA "HVAC Air Duct Leakage Test Manual."

3.06 ADJUSTING

- A. Refer to Division 23 Section "Testing, Adjusting, and Balancing" for detailed procedures.

3.07 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts, and where possible, wipe ducts with moist cloth before final acceptance to remove dust and debris.

END OF SECTION

SECTION 233300

AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Turning vanes.
 - 4. Flexible connectors.
 - 5. Screened openings.
 - 6. Duct accessory hardware.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 8 Section "Louvers and Vents" for intake and relief louvers and vents connected to ducts and installed in exterior walls.
 - 2. Division 23 Section "Metal Ducts" for ductwork, duct liner and duct sealants.
 - 3. Division 23 Section "Diffusers and Grilles."
 - 4. Division 23 Section "Testing, Adjusting, and Balancing" for final positioning of manual-volume dampers.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:
 - 1. Special fittings and manual-volume-damper installations.

- C. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

1.04 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Extruded Aluminum: ASTM B 221, Alloy 6063, Temper T6.
- C. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.02 BACKDRAFT DAMPERS

- A. Description: Suitable for horizontal or vertical installations as indicated.
- B. Counterbalance Type: Extruded aluminum with counterbalanced blades; blades begin to open at minimum 0.01 inches w.g. and be fully open at minimum 0.05 inches w.g. Designed for maximum 3500 feet per minute spot velocity and up to 4-inches w.g. back pressure.
 - 1. Frame: Minimum 0.125 inches thick extruded aluminum, braced at corners.
 - 2. Blades: Minimum 0.070 inches thick extruded aluminum. Blade seals extruded vinyl, mechanically attached.
 - 3. Bearings: Corrosion resistant, long life synthetic.
 - 4. Linkage: 1/2-inch diameter tie bar with stainless steel pivot pins; mounted on blades. Adjustable counterbalance.
- C. Top-of-Blade Hinged Type: Extruded aluminum heavy duty backdraft dampers; blades begin to open at minimum 0.12 inches w.g. and be fully open at minimum of 0.20 inches w.g. Designed for maximum 3500 feet per minute spot velocity.
 - 1. Frame: Minimum 0.125 inches thick extruded aluminum, braced at corners.
 - 2. Blades: Minimum 0.70 inches thick extruded aluminum. Blade seals extruded vinyl, mechanical attached.
 - 3. Bearings: Corrosion resistant, long life, synthetic.

4. Linkage: 1/2-inch diameter tie bar with stainless steel pivot pins; mounted on blades.

2.03 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 1. Pressure Classifications of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Steel Standard Volume Dampers: Multiple- or single-blade, opposed-blade design unless indicated otherwise, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 16 gauge thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 2. Roll-Formed Steel Blades: 16 gauge thick, galvanized, sheet steel.
 3. Blade Axles: Galvanized steel.
 4. Tie Bars and Brackets: Galvanized steel.
- C. Jackshaft: 1-inch diameter, galvanized steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 1. Length and Number of Mountings: Appropriate to connect linkage of each damper of a multiple-damper assembly.
- D. Damper Regulators: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.04 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch-wide, curved blades set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into side strips suitable for mounting in ducts.
- C. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.05 DUCT-MOUNTED ACCESS DOORS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class. 14-inch by 14-inch, unless indicated otherwise.

- B. Frame: Unless indicated differently, minimum 24-gauge thick galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include piano hinge and cam latches. Multiple cam latches used on doors greater than 12-inches in height.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch-thick, fibrous-glass.

2.06 FLEXIBLE CONNECTORS

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1. Fabricate designed to meet UL 214, NFPA 90A, airtight and waterproof.
- B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-inches wide attached to two strips of 3-inch-wide, minimum 24-gauge thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.
- C. Extra-Wide Metal-Edged Connectors: Factory fabricated with a strip of fabric 5-3/4 inches wide attached to two strips of 3-inch-wide, minimum 24-gauge thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.
- D. Transverse Flanged Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 4-3/8-inch-wide, 24-gauge thick, galvanized, sheet steel or 0.032-inch aluminum sheets formed for flanged type connection. Select metal compatible with connected ducts.
- E. Conventional, Indoor System Flexible Connector Fabric: Woven nylon/polyester blend with vinyl coating.
 1. Minimum Weight: 22 oz./sq. yd..
 2. Tensile Strength: 240 lbf/inch in the warp, and 220 lbf/inch in the filling.

2.07 SCREENED OPENINGS

- A. Screened Openings: 16-gauge steel angle frame enclosing 1/2-inch mesh, 14-gauge galvanized steel wire screen.

2.08 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
- B. Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch, zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.
- D. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.
- E. Concealed Damper Regulators: Gear operated linkage, minimum 3/8-inch diameter, steel rod, chrome plated ceiling cover, flush mount.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.
- B. Volume Dampers:
 - 1. Install volume dampers at all diffuser and grille duct connections. Place as far upstream as layout and accessibility allow.
 - 2. Install manual volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide instrument test holes where indicated.
- D. Install duct access panels for access to both sides of duct coils and air measuring units. Install duct access panels downstream from branch volume dampers, turning vanes and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.
- E. Label access doors according to Division 22 Section "Mechanical Identification."

3.02 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION

SECTION 233713

DIFFUSERS AND GRILLES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes ceiling-, floor-, sill-, and wall-mounted diffusers and grilles.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 08 for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
 - 2. Division 23 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers and grilles.
 - 3. Division 23 Section "Testing, Adjusting, and Balancing" for balancing diffusers and grilles.

1.03 DEFINITIONS

- A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, sill, or floor.

1.04 SUBMITTALS

- A. Product Data: For each model indicated, include the following:
 - 1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
 - 2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
 - 3. Schedule of diffusers and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
 - 4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

1.05 QUALITY ASSURANCE

- A. NFPA Compliance: Install diffusers and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Diffusers and grilles are scheduled on Drawings.

2.02 SOURCE QUALITY CONTROL

- A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

2.03 CEILING DIFFUSERS

- A. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
- B. Ceiling Compatibility: Provide diffusers with border styles that are compatible with ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems, which will contain each type of ceiling air diffuser.
- C. Types: Provide ceiling diffusers of type, construction, capacity, and with accessories and finishes as indicated on the drawings.

2.04 EXHAUST GRILLES

- A. Performance: Provide exhaust and return grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.
- B. Wall Compatibility: Provide grilles with border styles that are compatible with wall systems, and that are specifically manufactured to fit into wall construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of wall construction, which will contain each type of wall grille.
- C. Types: Provide exhaust and return grilles of type, construction, capacity, and with accessories and finishes as indicated.
 - 1. Exhaust Grille – Louvered
 - a. Materials: 22-gauge roll formed steel frame and blades or 0.040 minimum extruded aluminum frame and blades.
 - b. Grille Construction: 1-1/4-inch wide border, corners assembled with full penetration resistance welds. Screw holes countersunk. Blades at 35 degree

deflection at 3/4-inch spacing. Blades fixed in place, parallel to the long dimension of the grille.

- c. Finish: White, anodic acrylic paint or aluminum colored paint.
- d. Accessories: Opposed blade damper, operable from the face of the grille (OBD).

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXAMINATION

- A. Examine areas where diffusers and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install diffusers and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.
- B. Duct-Mounted Supply and Exhaust Grilles: Mount to duct branch with 16-gauge steel angle collar. Mounting screws to match grille frame. Screws shall not protrude more than 1/4-inch past angle collar.
- C. Install diffusers and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- D. Install in-line multiple linear diffusers with alignment pins for a straight continuous appearance.

3.03 ADJUSTING

- A. After installation, adjust diffusers and grilles to air patterns indicated, or as directed, before starting air balancing.

3.04 CLEANING

- A. After installation of diffusers and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers and grilles that have damaged finishes.

END OF SECTION

SECTION 238126

SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.

1.03 SUBMITTALS

- A. General: See Section 220500 for general requirements of Product Data, Shop Drawings, Reports and Certificates, and Operation and Maintenance data submittals.
 - 1. Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Product Data: Provide submittals of the following:
 - 1. Split-system air-conditioning units
 - 2. Wall- or ceiling-mounted, evaporator-fan components
 - 3. Air-cooled, compressor-condenser components
- C. Shop Drawings: Diagram power, signal, and control wiring.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- F. Warranty: Special warranty specified in this Section.
- G. LEED Submittals:
 - 1. Credit EA 4: Manufacturers' product data for refrigerants, including printed statement that refrigerants are free of HCFCs.

1.04 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- E. Units shall be designed to operate with HCFC-free refrigerants.

1.05 COORDINATION

- A. Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete."
- B. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7 Section "Roof Accessories."

1.06 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set of filters for each unit.
 - 2. Fan Belts: One set of belts for each unit.

PART 2 PRODUCTS

2.01 CONCEALED EVAPORATOR-FAN COMPONENTS

- A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 - 1. Drain Pans: Galvanized steel, with connection for drain; insulated.

- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
- D. Fan Motors: Comply with requirements in Division 23 Section "Motors."
 - 1. Special Motor Features: Multi-tapped, multispeed with internal thermal protection and permanent lubrication.
- E. Disposable Filters: 1 inch thick, in fiberboard frames.
- F. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.02 WALL-MOUNTING, EVAPORATOR-FAN COMPONENTS

- A. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.
- D. Fan: Direct drive, centrifugal fan.
- E. Fan Motors: Comply with requirements in Division 23 Section "Motors."
 - 1. Special Motor Features: Multi-tapped, multispeed with internal thermal protection and permanent lubrication.
- F. Filters: Permanent, cleanable.

2.03 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

- A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1. Compressor Type: Reciprocating.
 - 2. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - 3. Refrigerant Charge: R-410A.

- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.
- E. Fan: Aluminum-propeller type, directly connected to motor.
- F. Motor: Permanently lubricated, with integral thermal-overload protection.
- G. Low Ambient Kit: Permits operation down to 45 deg F.
- H. Mounting Base: Polyethylene.

2.04 ACCESSORIES

- A. Control equipment and sequence of operation are specified in Division 23 Sections "HVAC Instrumentation and Controls" and "Sequence of Operation."
- B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
- C. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
 1. Compressor time delay.
 2. 24-hour time control of system stop and start.
 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 4. Fan-speed selection, including auto setting.
- D. Automatic-reset timer to prevent rapid cycling of compressor.
- E. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- F. Additional Monitoring:
 1. Monitor constant and variable motor loads.
 2. Monitor variable frequency drive operation.
 3. Monitor economizer cycle.
 4. Monitor cooling load.
 5. Monitor air distribution static pressure and ventilation air volumes.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install ground-mounting, compressor-condenser components on 4-inch- thick, reinforced concrete base; 4 inches larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.
- D. Install ground-mounting, compressor-condenser components on polyethylene mounting base.
- E. Install roof-mounting compressor-condenser components on equipment supports specified in Division 22 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- F. Install seismic restraints.
- G. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch. Refer to Division 23 Section "Mechanical Vibration Controls and Seismic Restraints."
- H. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 1. Water Coil Connections: Comply with requirements in Division 23 Section "Hydronic Piping." Connect to supply and return coil with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - 2. Remote Water-Cooled Condenser Connections: Comply with requirements in Division 23 Section "Hydronic Piping." Connect to supply and return with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - 3. Steam Coil Connections: Comply with requirements in Division 23 Section "Steam and Condensate Piping." Connect to steam piping with shutoff valve and union or flange; for condensate piping, starting from the coil connection, connect with union or flange, strainer, trap, and shutoff valve.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Duct Accessories."
- D. Ground equipment according to Division 16 Section "Grounding."

- E. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and re-test until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.04 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION

SECTION 238223

UNIT VENTILATORS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes the following:
 - 1. Ceiling-mounting ventilators.
 - 2. In-line centrifugal fans.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.

1.03 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base air ratings on actual site elevations.
- B. Operating Limits: Classify according to AMCA 99.

1.04 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material gages and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
 - 2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
- C. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 1.

1.05 QUALITY ASSURANCE

- A. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. **AMCA Compliance:** Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. **NEMA Compliance:** Motors and electrical accessories shall comply with NEMA standards.
- D. **UL Standard:** Power ventilators shall comply with UL 705.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. **Deliver fans as factory-assembled unit,** to the extent allowable by shipping limitations, with protective crating and covering.
- B. **Disassemble and reassemble units,** as required for moving to final location, according to manufacturer's written instructions.
- C. **Lift and support units with manufacturer's designated lifting or supporting points.**

PART 2 PRODUCTS

2.01 CEILING-MOUNTING VENTILATORS

- A. **Description:** Centrifugal fans designed for installing in wall or for concealed in-line applications.
- B. **Housing:** Steel, lined with acoustical insulation.
- C. **Fan Wheel:** Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. **Grille:** Stainless-steel, louvered grille with flange on intake and thumbscrew attachment to fan housing.
- E. **Electrical Requirements:** Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. **Accessories:**
 - 1. **Variable-Speed Controller:** Solid-state control to reduce speed from 100 percent to less than 50 percent.
 - 2. **Manual Starter Switch:** Single-pole rocker switch assembly with cover and pilot light.
 - 3. **Time-Delay Switch:** Assembly with single-pole rocker switch, timer, and cover plate.
 - 4. **Spark resistant construction.**
 - 5. **Filter:** Washable aluminum to fit between fan and grille.

6. Isolation: Rubber-in-shear vibration isolators.
7. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.02 IN-LINE CENTRIFUGAL FANS

- A. Description: In-line, belt-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
- B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- C. Direct-Driven Units: Motor encased in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing.
- D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
- E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
- F. Accessories:
 1. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
 2. Companion Flanges: For inlet and outlet duct connections.
 3. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 4. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

2.03 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install power ventilators level and plumb.

- B. Support units using spring isolators having a static deflection of 1 inch. Vibration- and seismic-control devices are specified in Division 23 Section "Mechanical Vibration Controls and Seismic Restraints."
 - 1. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.
- C. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- D. Support suspended units from structure using threaded steel rods and spring hangers. Vibration-control devices are specified in Division 23 Section "Mechanical Vibration Controls and Seismic Restraints."
 - 1. In seismic zones, restrain support units.
- E. Install units with clearances for service and maintenance.
- F. Label units according to requirements specified in Division 22 Section "Mechanical Identification."

3.02 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

- A. Equipment Startup Checks:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 5. Verify lubrication for bearings and other moving parts.
 - 6. Verify that manual volume control dampers in connected ductwork systems are in fully open position.
 - 7. Disable automatic temperature-control operators.

- B. Starting Procedures:
 - 1. Energize motor and adjust fan to indicated rpm.
 - 2. Measure and record motor voltage and amperage.
- C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
- D. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Shut unit down and reconnect automatic temperature-control operators.
- F. Refer to Division 23 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.
- G. Replace fan and motor pulleys as required to achieve design airflow.
- H. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.04 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Lubricate bearings.

3.05 CLEANING

- A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.
- B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain power ventilators.
 - 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 - 2. Review data in maintenance manuals. Refer to Division 1 Section 01700 "Contract Closeout."
 - 3. Schedule training with Maintenance Personnel, through Project Representative, with at least seven days' advance notice.

END OF SECTION

SECTION 238239

UNIT HEATERS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational mechanical installations on a Design-Build basis. It shall be the Mechanical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes electric unit heaters and electric cabinet heaters.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections, apply to this Section.
- B. Related sections include the following:
 - 1. Division 23 Section "Motors" for fan motors.
 - 2. Division 23 Section "Mechanical Vibration Controls and Seismic Restraints" for spring hangers and seismic restraints.

1.03 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified, including weights, dimensions, minimum clearances, metal gauges, and data on features and components.
- C. Wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring.
- D. Samples of cabinet finish colors for approval.
- E. Maintenance data to include in operation and maintenance manual specified in Division 1.
- F. Field test reports from a qualified independent inspecting and testing agency indicating and interpreting test results relative to compliance with performance requirements of unit heaters.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70 for components and installation.

- B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.05 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Developer under requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 ELECTRICAL UNIT HEATERS

- A. Heating Elements: Nickel-chromium heating wire element; free from expansion noise and 60-Hz hum; embedded in magnesium oxide, insulating refractory; and sealed in high-mass steel or corrosion-resistant metallic sheath with fins no closer than 0.16 inch. Element ends are enclosed in terminal box. Fin surface temperature does not exceed 550 deg F at any point during normal operation.
- B. Heater Circuit Protection: One-time fuses in terminal box for overcurrent protection and automatic reset thermal overloads for overtemperature protection of heaters.
- C. Fan and Motor: Direct-drive propeller fan and manufacturer's standard motor. Motors sized 1 hp and less include motor overload protection.
- D. Wiring: Heaters designed for a single circuit, with elements, motor and control circuits subdivided with factory wired fuses to conform to the National Electric Code and Underwriter's Laboratory, Inc., Standard 1025. All three-phase heaters shall have balanced phases.
- E. Unit Control: Contactors and control circuit transformers where required are factory installed and wired. Only direct line supply and thermostat connections in the field are required. Two-stage operation is required on all units 25 kW and larger with use of two-stage control. Built-in fan override is provided to purge unit casing of excess heat after unit shutdown. Provide wall-thermostat. Provide control range 45°F to 90°F.
- F. Discharge Configuration: Discharge with horizontal, adjustable louvers, vertical discharge with radial louver diffuser as indicated.
- G. Optional Accessories: Include the following:
 - 1. Integral power disconnect switch.
 - 2. Mercury contactors.
 - 3. Stratification thermostat for summer fan only operation.

2.02 ELECTRICAL CABINET HEATERS

- A. Arrangement: Provide following cabinet arrangement as indicated.
 - 1. Recessed wall cabinet with front stamped louver.
- B. Casing: In general, heavy gauge minimum.
- C. Heating Elements: Guaranteed for 5 years. Non-glowing resistant wire enclosed in a steel sheath with steel plate fins attached.
- D. Heater Circuit Protection: Automatic thermal shut-off when element overheats.
- E. Fan and Motor: Blower, direct driven by a single-phase motor with impedance protection. Permanently lubed.
- F. Wiring Terminations: Match conductor materials and sizes indicated.
- G. Unit Controls: Bi-metallic snap action. Single pole integral thermostat.
- H. Optional Accessories: Include the following:
 - 1. Integral power disconnect switch.
- I. Cabinet finish color as selected by Project Representative, applied to factory-assembled units prior to shipping.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXAMINATION

- A. Examine areas to receive unit heaters and cabinet heaters for compliance with requirements for installation tolerances and other conditions affecting performance of units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install unit heaters and cabinet heaters as indicated, according to manufacturer's written instructions and NFPA 90A.

3.03 CONNECTIONS

- A. Electrical: Conform to applicable requirements of Division 16 Sections.
 - 1. Install electrical devices furnished with heaters but not specified to be factory mounted.
- B. Connect heaters and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten electrical connectors and terminals, including

grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 ADJUSTING AND CLEANING

- A. Adjust burner and other unit components for optimum heating performance and efficiency. Adjust heat distribution features, including louvers, vanes, shutters, dampers, and reflectors, to provide optimum heat distribution for objects, personnel, and spaces served.
- B. After completing system installation, inspect heaters and associated components. Repair scratches and mars of finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.05 START-UP PROCEDURES

- A. Start-up Services: Provide start-up service, as specified below.
 - 1. Start units and operate controls and safeties.
 - 2. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
 - 3. Correct deficiencies identified by tests and observations and retest until specified requirements are met.

END OF SECTION

SECTION 260126

MAINTENANCE TESTING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Test and provide written certification that the entire electrical installation complies with contract documents, code and proper system operation. Perform acceptance tests in accordance with manufacturer's recommendations, NFPA 70B and the latest edition of the International Electrical Testing Association (NETA) testing specifications NETA ATS.
- C. Testing company. The following testing shall be performed by an independent testing company:
 - 1. Service Grounding Test
 - 2. Ground Fault Protection Systems Test & Calibration
 - 3. Transformers Dry-Type
 - 4. Automatic Transfer Switch Test & Calibration
 - 5. Molded-Case Circuit Breakers
 - 6. Metering Test & Calibration
- D. Related Sections:
 - 1. 018113 Sustainable Building Requirements

1.02 SCHEDULE

- A. Perform all testing after installation.

1.03 RECEPTACLE AND DEVICE TEST

- A. Receptacle Polarity Test: Test every receptacle installed under this contract with a receptacle circuit tester. Tester shall test for open ground, reverse polarity, open hot, open neutral, hot and ground reversed. Rewire receptacles with faults and retest. Submit test report signed by electrician that performed the test.
- B. Ground-Fault Receptacle Circuit Interrupter Tests: Test each receptacle or branch circuit breaker having ground-fault circuit protection to assure that the ground-fault circuit interrupter will not operate when subjected to a ground-fault current of less than 4 milliamperes and will operate when subjected to a ground-fault current exceeding 6 milliamperes. Perform testing using an instrument specifically designed and manufactured for testing ground-fault circuit interrupters.

- C. Operational Tests: Demonstrate the operation of each switch, circuit breaker and other items of electrical control with the systems fully energized and operating. Each shall be demonstrated three times.

1.04 600 VOLT WIRING

- A. Scope: Test all electrical feeders whose operating voltage is 600 volts or less that are installed under this contract.
- B. Test for continuity of each circuit.
- C. Test for grounds in each circuit which shall consist of the physical examination of the installation to ensure that all required ground jumpers, devices, and appurtenances do exist and are mechanically firm.
- D. Perform a 500 volt megohm meter test on each circuit between the conductor and ground. The insulation resistance shall not be less than 2 megohms for circuits under 115V, 6 megohms between conductor and ground on those circuits (115V-600V) with total single conductor length of 2,500 feet and over, nor less than 8 megohms for those circuits (115V-600V) with single conductor length of less than 2,500 feet. If conductor fails test replace wiring or correct defect and retest.
- E. Perform torque test for every conductor tested and terminated in an overcurrent device or bolted type connection.

1.05 POWER SYSTEM TESTS

- A. Scope. Inspect and test entire electrical systems provided by this contract to verify equipment and controls are correctly operating.
- B. Load Balance Tests: Checks all panelboards for proper load balance between phase conductors and make adjustments as necessary to bring unbalanced phases to within 15% of average load.
- C. Motor Tests: Check all motors for proper rotation and measure actual load current. Submit tabulation of motor currents for all motors 1 HP or more after the HVAC system has been balanced.
- D. Phase Relationship Tests: Check connections to all equipment for proper phase relationship. During such check, disconnect all devices which could be damaged by the application of voltage or reversed phase sequence.
- E. Transformer Taps: Connect all transformers at "Normal" tap. After facility is completely occupied for two weeks, measure secondary voltages at all new and existing transformers. Forward a list to engineer including service switchboard voltmeter reading at the time of the test for evaluation. Reconnect taps as subsequently directed.

1.06 SERVICE GROUNDING TEST

- A. Perform fall-of-potential tests on main grounding electrode system provided by this contract per IEEE Standard No. 81. Maximum resistance to ground shall be less than 10 ohms.

- B. Confirm that the neutral is grounded only at the service equipment by removing the service neutral grounding conductor and meggering the neutral bus.

1.07 GROUND FAULT PROTECTION SYSTEMS TESTS

- A. Scope. Test all ground fault systems provided by this contract.
- B. Prior to test:
 - 1. Inspect neutral main bonding connection to assure:
 - a. Zero sequence system is grounded upstream of sensor.
 - b. Ground connection is made ahead of neutral disconnect link.
 - c. Ground strap systems are grounded through sensing device.
 - d. Verify ground electrode conductor(s) for proper size and connection.
 - 2. Inspect control power transformer to insure adequate capacity for system.
 - 3. Monitor panels (if present) shall be manually operated for:
 - a. Trip test.
 - b. No trip test.
 - c. Non-automatic reset.
 - d. Proper operation and test sequence shall be recorded.
 - 4. Ground fault device circuit nameplate identification shall be verified by device operation.
 - 5. Pickup and time delay settings.

1.08 TRANSFORMERS, DRY-TYPE

- A. Test dry-type transformers rated 150 kVA and over provided by this contract.
- B. Visual and Mechanical Inspection.
- C. Electrical Tests. Perform insulation resistance tests winding-to-winding and winding-to-ground.

1.09 MOLDED-CASE CIRCUIT BREAKERS

- A. Scope. Test all new circuit breakers 100 amps and over within new switchboards and panelboards.
- B. Inspect each breaker, operate manually, and electrically. Test shunt trips and alarm devices manually and electrically.
- C. Adjust breaker trips to settings furnished by the coordination study and verify settings of the manufacturer's rating by passing controlled current through the trip devices. Record values and report deficiencies.
- D. Circuit Breaker Electrical Tests

1.10 AUTOMATIC TRANSFER SWITCHES

- A. Scope. Test Automatic Transfer Switches provided by this contract.

- B. Visual and Mechanical Inspection
 - 1. Electrical Tests. Monitor and verify correct operation and timing.
 - C. Perform insulation resistance tests phase-to-phase and phase-to-ground with switch in both source positions.
 - D. Set and calibrate various relays and timers.
- 1.11 METERING TEST & CALIBRATION FOR METERS
- A. Scope: Test all new meters provided by this contract.
 - B. Instrument Transformers
 - C. Metering and Instrumentation

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Fluorescent lamps, high pressure sodium lamps, thermostats, and switching devices to shall comply with mercury reduction.
- C. Metering equipment shall provide measurement and verification of water and electricity use.
- D. Electrical wires and cabling shall be lead-free.
- E. Exterior fixtures shall comply with ANSI/IESNA Standard 90.1-2007.

2.02 TESTING COMPANY

- A. Retain the services of an independent testing company that is qualified to test electrical equipment, and is an approved testing company by the Washington State Department of Labor and Industries. Approved companies: Eaton Engineering Services and Systems Division (ESS), Electro-Test, Apparatus Service and Engineering Technology, Inc. (ASET), Siemens Westinghouse Technical Services.
- B. Testing company shall prepare test reports on the systems they test.

2.03 TEST EQUIPMENT

- A. The Developer shall provide all apparatus and material required for testing. The Developer shall use installation tools and test equipment which are designed for the specific task and shall use this equipment per the manufacturer's instructions. All test equipment shall have current calibration certification by a third party calibration laboratory, and shall

have a signed and dated calibration sticker affixed to the device. Calibration shall be traceable to the National Institute of Standards and Technology.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PROJECT DOCUMENTS

- A. Deliver the following project documents to testing company two weeks prior to testing:
 - 1. Division 26 Specification.
 - 2. Electrical Floor Plans showing equipment to be tested.
 - 3. Electrical One-Line Diagrams.
 - 4. Submittals of Manufacturers Data and Shop Drawings.
 - 5. Coordination Study.

3.02 TEST REPORTS

- A. The Contractor shall prepare test reports including description of project, description of equipment tested, description of test, test results, conclusions and recommendations, re-testing results and list of test equipment used and calibration date.
- B. Insert a copy of each test report in the operation and maintenance manuals.

3.03 LABELS

- A. Upon completion of the tests a label shall be attached to all serviced devices with date serviced and the testing company.

END OF SECTION

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes general requirements for all Division 26 work and is supplemental and in addition to the requirements of Division 1.
 - 1. It is the intention of this Division of the Specifications to establish minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's (EC's) responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment, materials, devices and necessary appurtenances specified in Division 26 work to provide a complete electrical system. Connect equipment and devices furnished and installed under other Divisions of this specification under this Division.
 - 2. The EC shall provide all materials, appliances and apparatus not specifically mentioned herein, but which are necessary to make a complete, fully operational installation of all electrical systems described herein.
 - 3. The EC shall provide all work to comply with the Electrical Design Criteria and these performance specifications.
- B. Workmanship shall be of the best quality and none but competent and experienced electricians shall be employed and shall be under the supervision of a competent and experienced foreman.
- C. See Division 0 for apprenticeship program requirements.
- D. See Division 1 for sequence of work.
- E. Related Sections:
 - 1. 018113 Sustainable Building Requirements

1.02 DESIGN-BUILD RESPONSIBILITY

- A. The EC shall become the engineer of record as required by the Authorities Having Jurisdiction (AHJ's). It shall be the EC's responsibility to design and provide complete drawings, and load calculations as required to obtain all necessary approvals and permits, as well as to provide accurate and useful record documents. The EC shall confirm all special local code requirements, including requirements for engineered stamped documents (signed and dated PE stamp on drawings and specifications if required by the code authority), prior to permit application.

1.03 WORK IN OTHER DIVISIONS

- A. See all other specification sections for other work which includes but is not limited to:
 - 1. Temporary Power

2. Cutting and Patching
3. Door Hardware
4. Painting, Refinishing and Finishes
5. Equipment Wiring
6. Mechanical Equipment
7. Fire Protection

1.04 CODES, PERMITS, INSPECTION FEES

- A. The following codes and standards are referenced in the Division 26 specifications. Perform all work and provide materials and equipment in accordance with the latest referenced codes and standards of the following organizations:
 1. American National Standards Institute (ANSI)
 2. National Electrical Manufacturer's Association (NEMA)
 3. National Fire Protection Association (NFPA)
 4. Underwriter's Laboratories (UL)
 5. Washington Administrative Code (WAC)
- B. Install the electrical systems based on the following:
 - NFPA 70 National Electrical Code as adopted and amended by the Local Jurisdiction.
 - IBC International Building Code as adopted and amended by the Local Jurisdiction.
 - WACEC Washington All Cities Electrical Code
- C. The referenced codes establish a minimum level of requirements and are understood to be the minimum requirement only. Where provision of the various codes conflict with each other, the more stringent provision shall govern. If any conflict occurs between referenced codes and this specification, the codes are to govern.
- D. Obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein.

1.05 DESIGN COORDINATION

- A. The EC shall obtain and become familiar with all aspects of the Architectural construction drawings as well as the construction drawings of the other disciplines when they become available. The EC shall schedule and/or attend meetings with the Architect, Developer and other trades as required to determine and coordinate design requirements in a timely manner. Special coordination effort can be anticipated related to the following:
 1. Elevator Equipment
 2. Mechanical Equipment
 3. Puget Sound Energy Power Service
 4. Telephone Service
 5. Fire Alarm System
 6. Electric Power Generation Equipment
 7. Battery Inverter Unit

- 8. Power Feeder Routing
- 9. Underground Power and Communication Routing

- B. Coordinate work with that of the other Contractors and/or other trades doing work on the project. Examine all specifications of other trades for construction details and coordination. Make every reasonable effort to provide timely notice of work affecting other trades to prevent conflicts or interference as to space requirements, dimensions, openings, block-outs, sleeving or other matters which will cause delays or necessitate work-around methods.
 - 1. Obtain submittals and shop drawings of all equipment with electrical connections furnished under other divisions of the specification. Provide all wiring in accordance with specific equipment requirements.
- C. Furnish, install and place in satisfactory condition all raceways, boxes, conductors and connections and all other materials required for the electrical systems noted in the contract documents to be complete, fully operational and fully tested upon completion of the project.
- D. Provide inserts or sleeves for outlet boxes, conductors, cables and/or raceways as required. Coordinate the installation thereof with other trades.

1.06 WARRANTY

- A. Refer to General Terms and Conditions of the Contract.
- B. All materials, equipment and systems furnished that include provisions for storing, displaying, reporting, interfacing, inputting, or functioning using data specified information shall be warranted to perform properly in all respects. Any interfaces to other new or existing materials, equipment, or systems shall be warranted to function properly.

1.07 SUBMITTALS AND SHOP DRAWINGS

- A. Submittals and Shop Drawings: Schedule so as not to delay construction schedule and no later than 60 days after Notice to Proceed, submit common brochure(s) with index and divider tabs by specification section (include paragraph numbers to indicate specification compliance), containing all required catalog cuts. Allow two weeks for review for each submittal and re-submittal by Owner. Incomplete submittals and shop drawings which do not comply with these requirements will be returned for correction, revision and re-submittal. See General Terms and Conditions for format, quantity, etc.
- B. Submit in a three-ring binder with hardboard covers. Submittals shall show:
 - 1. Indicate listing by UL or other approved testing agency.
 - 2. Highlight with yellow or blue marker adequate information to demonstrate materials being submitted fully comply with contract documents.
 - 3. Review and check all material prior to submittal and stamp "Reviewed and Approved".
- C. Shop drawings shall show:
 - 1. Ratings of items and systems.

2. How the components of an item or system are assembled, interconnected, function together and how they will be installed on the project.
3. Coordinate with other division shop drawings and submittals. Identify interface points and indicate method of connection.

D. The Developer agrees:

1. Submittals and shop drawings processed by the King County Project Representative are not change orders.
2. The purpose of submittals and shop drawings by the Developer is to demonstrate to King County that the Developer understands the design concept.
3. Submittals demonstrate equipment and material Developer intends to furnish and install and indicate detailing fabrication and installation methods Developer intends to use.
4. To accept all responsibility for assuring that all materials furnished under this Division of the specifications meet, in full, all requirements of the contract documents.

E. The King County review is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Corrections or comments made during this review do not relieve Developer from compliance with the requirements of the drawings and specifications. Developer is responsible for: Dimensions that shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; performing his work in a safe and satisfactory manner.

F. Submittals and shop drawings are required per the submittals schedule at the end of this Section.

1.08 ELECTRICAL EQUIPMENT OPERATION AND MAINTENANCE (O&M) MANUALS

- A. Provide six (6) sets of O&M manuals for all equipment furnished under Division 26 of the specifications. Deliver final bound corrected copies prior to scheduled instruction periods. Obtain a receipt for the manuals and forward a copy of the receipt to King County with the Job Completion Form.
- B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
- C. These O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. Present and arrange information in a logical manner for efficient use by the County's operating personnel. The information provided shall include but not be limited to the following:
 1. Equipment manufacturer, make, model number, size, nameplate data, etc.
 2. Description of system configuration and operation including component identification and interrelations. A master control schematic drawings(s) may be required for this purpose.
 3. Dimensional and performance data for specific unit provided as appropriate.
 4. Manufacturer's recommended operation instructions.
 5. Manufacturer's recommended lubrication and servicing data including frequency.

6. Complete parts list including reordering information, recommended spares and anticipated useful life (if appropriate). Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier not acceptable.
 7. Shop drawings.
 8. Wiring diagrams.
 9. Signal equipment submittals shall contain step-by-step circuit description information designed to acquaint maintenance personnel with equipment operation in each mode of operation.
 10. A complete list of local (nearest) manufacturer representative and distributor contacts for each type of equipment and manufacturer. Include name, company, address, phone, fax, e-mail address, and web site.
- D. Furnish complete wiring diagrams for each system for the specific system installed under the contract. "Typical" line diagrams will not be acceptable unless revised to indicate the exact field installation.
- E. Group the information contained in the manuals in an orderly arrangement by specification index. Provide a typewritten index and divider sheets between categories with identifying tabs. Bind the completed manuals with hard board covers not exceeding 5" thick. (Provide two or more volumes if required.) Signal and communication systems shall be in separate volumes. Imprint the covers with the name of the job, Owner, Architect, Electrical Engineer, Developer and year of completion. Imprint the back edge with the name of the job, Owner and year of completion. Hard board covers and literature contained may be held together with screw post binding.

1.09 INSTRUCTION PERIODS

- A. After Substantial Completion of the work and after the O&M manuals have been delivered to King County and after all tests and final inspection of the work by the Authorities Having Jurisdiction, demonstrate the electrical systems and instruct the County's designated operating and maintenance personnel in the operation and maintenance of the various electrical systems. The Developer shall arrange scheduled instruction periods for King County personnel. The Developer's representatives shall be superintendents or foremen knowledgeable in each system and supplier's representatives when so specified. When more than one training session is specified, the second session shall be as agreed to by King County's maintenance supervisor.
- B. Include in each instruction session an overview of the system, presentation of information in maintenance manuals with appropriate references to drawings. Conduct tours of the building areas with explanations of maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures and adjustment locations.
- C. Include the following scheduled instruction periods: 1st Session 2nd Session
- | | | |
|-------------------------------|---------|---------|
| 1. Power Distribution System | 4 hours | 4 hours |
| 2. Lighting Control System | 4 hours | 4 hours |
| 3. Power Generation Equipment | 4 hours | 4 hours |

- D. Factory trained suppliers representatives shall provide instruction for lighting control/dimming and power generation equipment.
- E. Provide one professionally produced video of each training session in DVD format. Furnish two copies to the County.

1.10 RECORD DRAWINGS

- A. Continually record the actual electrical system(s) installation on a set of record drawings kept readily available at the project during construction. These record drawings shall be used for this purpose alone.
 - 1. Mark record drawings with red erasable pencil. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown.
 - 2. Accurately locate with exact dimensions all underground and underslab raceways and stub-outs.
 - 3. Note changes of directions and locations, by dimensions and elevations, as utilities are actually installed.
 - 4. Include addenda items and revisions made during construction.
 - 5. Erase conditions not constructed or "X-out" and annotate "not constructed" to clearly convey the actual "as constructed" condition.
 - 6. Organize record drawings sheets in manageable sets, bind and print suitable titles, dates and other identification on the cover of each set.
- B. Transmit the record drawing set to the King County Project Representative at the completion of the work. Final payment to the Developer will not be authorized until these record drawings have been submitted to and accepted by the King County Project Representative.
- C. Transfer the changes marked up on the record prints into AutoCAD Release 2007 (or higher) at the completion of the work. Provide two (2) sets of prints, one set of fixed line reproducible drawings and one set of AutoCAD 2012 drawing files on CD ROM. Transmit drawings, CAD files and the record drawing mark-ups to the King County Project Representative. Final payment to the Developer will not be authorized until these documents have been submitted to and accepted by the King County Project Representative.

1.11 FINAL ACCEPTANCE REQUEST

- A. Submit to Developer a Job Completion Form (form attached in this section) properly filled out.

1.12 ABBREVIATIONS AND DEFINITIONS

- A. When the following abbreviations and definitions are used in relation to the work for Division 26 they shall have the following meanings:

Item	Meaning
AHJ	Authority Having Jurisdiction.
Boxes	Outlet, Junction or Pull Boxes.

Code	All applicable codes currently enforced at project location.
Compression	Compressed using a leverage powered (hydraulic or equivalent crimping tool).
Connection	All materials and labor required for equipment to be fully operational.
Exterior Location	Outside of or penetrating the outer surfaces of the building weather protective membrane.
Fully Operational	Tested, approved, and operating to the satisfaction of the AHJ, manufacturer and contract documents.
Furnish	Deliver to the jobsite
Install	To enter permanently into the project and make fully operational.
kcmil	Thousand circular mils (formerly MCM).
Mfr.	Manufacturer.
NEC	National Electrical Code, NFPA #70.
Noted	Shown or specified in the contract documents.
Provide	Furnish and install.
Required	As required by code, King County, AHJ, contract documents, or manufacturer for the particular installation to be fully operational.
Shown	As indicated on the drawings or details.
Wiring	Raceway, conductors and connections.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization.
- B. All materials to be new, free from defects and not less than quality herein specified. Materials shall be designated to insure satisfactory operation and operational life in the environmental conditions that will prevail where they are being installed.
- C. Each type of materials furnished shall be of the same make, be standard products of manufacturers regularly engaged in production of such materials and be the manufacturer's latest standard design.
- D. All materials, equipment and systems furnished that include provisions for storing, displaying, reporting, interfacing, inputting, or functioning using date specific information shall perform properly in all respects.
- E. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- F. Electrical wires and cabling shall be lead-free.

2.02 NAMEPLATES

- A. Nameplates shall conform to Section 260553.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Handle all equipment carefully to prevent damage, breakage, denting, and scoring of finishes. Do not install damaged equipment.
- B. Store products subject to damage by the elements above ground, undercover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instruction.

3.02 CUTTING BUILDING CONSTRUCTION

- A. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills or concrete saws except where space limitations prevent the use of such tools.
- B. All construction materials damaged or cut into during the installation of this work must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

3.03 PAINTING

- A. Items furnished under this Division that are scratched or marred in shipment or installation shall be refinished with touchup paint selected to match installed equipment finish.

3.04 EQUIPMENT CONNECTION

- A. For equipment furnished under this or other Divisions of the specifications, or by the County, provide complete all electrical connections necessary to serve such equipment and provide required control connections to all equipment so that the equipment is fully operational upon completion of the project. Provide disconnect switches as required by code.

3.05 HOUSEKEEPING PADS

- A. Provide steel reinforced concrete housekeeping pad under each floor-mounted switchboard, transformer, motor control center, generator and/or other free standing electrical equipment. Size 4" greater (horizontal minimum) than base of equipment mounted thereon. Minimum height 3-1/2". Use 3000-psi (20.7-Mpa), 28-day compressive strength concrete and reinforcement as specified in Division 3 Section 033000 "Cast-in-Place Concrete". Chamfer edges and finish smooth with all blockouts square and plumb.

- B. When housekeeping pad is poured on previously poured concrete or is for engine or motor driven equipment, the pad shall be reinforced (4# rebar, 12" o.c., both ways) and the rebar shall be tied to the existing floor via #4 rebar epoxy grouted into the existing concrete on 12" centers or other acceptable means. The existing slab shall be thoroughly cleaned and prepared for the pad just before the pour.

3.06 TESTING AND DEMONSTRATION

- A. Demonstrate that all electrical equipment operates as specified and in accordance with manufacturer's instructions. Provide all instruments, manufacturer's operating instructions and personnel required to conduct the tests. Repair or replace any electrical equipment that fails to operate as specified and or in accordance with manufacturer's requirements.

ELECTRICAL JOB COMPLETION FORM

PROJECT NAME: King County DOT Metro Transit Div – South Kirkland TOD Garage
PROJECT LOCATION: _____
DATE: _____

A. Electrical Inspectors Final Acceptance (Copy of certificate attached.)

B.

Name	Agency	Date
Fire Marshal's Final Acceptance of Fire Alarm System (Copy of certificate attached.)		

C.

Name	Agency	Date
Record Drawings Attached	Transmitted previously to _____	_____

D.

O & M Manuals Attached	Transmitted previously to _____	_____
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E.

Test Reports Attached	Transmitted previously to _____	_____
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F. The work is complete in accordance with contract documents
at _____ on _____

Supervisor of Electrical Work Time Date

Contractors Rep. Signature Date

SUBMITTAL LIST King County Metro Division — South Kirkland TOD Garage

SECTION	DESCRIPTION	SUBMIT RECEIVE DATE	STATUS
015000	TEMPORARY FACILITIES AND CONTROLS		
260126	MAINTENANCE TESTING OF ELECTRICAL SYSTEMS		
260500	COMMON WORK RESULTS FOR ELECTRICAL		
260510	ELECTRICAL SITE WORK		
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES		
260526	GROUNDING		
260533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS		
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS		
260923	LIGHTING CONTROL DEVICES		
261216	DRY-TYPE MEDIUM VOLTAGE TRANSFORMERS		
262400	SWITCHBOARDS AND PANELBOARDS		
262726	WIRING DEVICES		
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS		
262913	ENCLOSED CONTROLLERS		
263000	FACILITY ELECTRICAL POWER GENERATING AND STORING EQUIPMENT		
263300	BATTERY EQUIPMENT		
263600	TRANSFER SWITCHES		
264313	TRANSIENT VOLTAGE SUPPRESSION FOR LOW VOLTAGE ELECTRICAL POWER CIRCUITS		
265000	LIGHTING		
273000	VOICE COMMUNICATIONS		
283100	FIRE DETECTION AND ALARM		
337173	ELECTRICAL UTILITY SERVICES		

END OF SECTION

SECTION 260510

ELECTRICAL SITE WORK

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide all excavation, trenching, backfill and surface restoration required for the electrical work.
- C. Provide complete, the support structure, consisting of pullboxes, manholes and reinforced concrete encased duct bank, for power and communication cable systems. Provide innerduct for telecommunications conduits.
- D. See Civil specification sections for excavation, patching and surface refinishing requirements.
- E. See Section 260533 for various raceway materials not specified in this section.
- F. Related Section:
 - 1. 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 CONCRETE

- A. Concrete shall be Class 5, manufactured with 3/4 inch aggregate and Type 1 cement.

2.03 ASPHALT

- A. Asphalt shall be Class B, manufactured with MC-250 asphalt.

2.04 CRUSHED ROCK

- A. Crushed rock shall be 1 1/4" minus unless smaller is required for bedding material.

2.05 SAND

- A. Sand shall be clean and washed building sand.

2.06 TOPSOIL

- A. Topsoil shall be equal in quality to that removed.

2.07 SOD

- A. New sod shall be mature, densely rooted grass free of weeds and objectionable grasses.

2.08 PLANTS

- A. Plants shall be obtained from a commercial nursery and be similar to those replaced.

2.09 CONCRETE ENCASED DUCT BANK

- A. Type EB or Schedule 40 rigid polyvinyl chloride (PVC) conduit for straight sections. Rigid Galvanized Steel (RGS) conduit for bends.
- B. Concrete: Comply with other applicable specification sections, 3000 psi strength minimum. Concrete shall be dyed red.
- C. Duct supports (racks to hold duct during concrete placement): Plastic materials designed to maintain spacing requirements shown.

2.10 STEEL REINFORCED CONCRETE ENCASED DUCT BANK

- A. Specify conduit materials other than PVC.
- B. Match concrete encased duct bank with the addition of reinforcing. Reinforcing deformed steel bar shall comply with other applicable specification sections.

2.11 DIRECT BURIED DUCT

- A. Schedule 40 rigid polyvinyl chloride (PVC) conduit.

2.12 MANHOLES AND PULLBOXES

- A. Manholes and pullboxes shall be precast reinforced concrete structures with knockouts at walls for duct entries. Manufactured by Utility Vault Company or Pacific International Pipe and Engineering, Inc. (PIPE).
- B. Furnish each handhole with pulling eyes and framing channels.
- C. Furnish communication system manholes with support rack on the walls as follows:
 1. On each side wall, four (4) vertical racking strips 30" long.
 2. On each end wall, one (1) vertical racking strip 30" long.

3. Each racking strip shall be clamped at two locations and shall carry three (3) cable support bars.
- D. Furnish pullboxes with two cable support bars on each side directly mounted to framing channels on each side.
- E. All diamond plate doors shall have a design loading per AASHO-H20. Manhole covers in paved areas shall be raised to allow a finish paving coat on top of the manhole.
- F. Each cover and door shall be marked with raised or depressed lettering at least 1" high as follows:
 1. Electrical Systems: "ELECTRIC"
 2. Communication Systems: "COMMUNICATION"
- G. Handhole shall be sized per the following:
 1. Pullbox 36"x36"x36"H inside dimensions. Utility Vault or PIPE. Provide diamond plate door nominally 30" by 30" minimum inside opening.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 EXISTING UTILITIES

- A. The existing utilities shown on the contract drawings have been plotted from available records. No guarantee is made to the accuracy of the locations indicated, and is shown for whatever benefit the Contractor may derive therefrom.
- B. Contact all serving utilities and have them locate their lines prior to commencing work. Forty-eight (48) hours prior to commencing work telephone "Call Before You Dig" at 1-800-424-5555.

3.02 TRENCHING

- A. Trenching shall be to depths as required by code, the particular installation, or as shown on the drawings. Trench width and length as required by the installation or as shown.
- B. Trench bottom shall be free of debris and graded smooth. Where trench bottom is rock, or rocky, or contains debris larger than 1", or material with sharp edges, Contractor shall over excavate 6" and fill with 6" of sand.
- C. Provide 1'-0" minimum separation between new electrical utilities and other utilities, except gas lines shall be 1'-0" both vertical and horizontal and shall be 3'-0" (horizontal) for all water service lines.

3.03 EXCAVATIONS

- A. Excavation bottom shall be free of debris and graded smooth. Where bottom is rock, or rocky, or contains debris larger than 1", or material with sharp edges, over excavate 6"

and fill with 6" sand. Minimum cover for all electrical conduit installed in earth is 24 inches; the incoming electrical service conduits may be required to be deeper (consult with PSE).

- B. Conform to utility requirements for excavation and vault installation.

3.04 DEWATERING

- A. Provide, operate and maintain all pumps or other dewatering equipment required for control of water in trenches and excavations for electrical site work during the entire construction period.

3.05 SHORING

- A. Provide as required by trenching and excavating to secure site work.

3.06 BACKFILL, BEDDING AND COMPACTION

- A. Backfill around raceways per 260533.
- B. Backfill around vaults and handholes to be free of debris larger than 1-3/4" in all directions to 1'-0" from vault.
- C. Provide 0'-6" of pea gravel or sand bedding for all vaults, and any handholes larger than 3'-0" x 3'-0". For handholes smaller than 3'-0" x 3'-0" provide 0'-3" pea gravel or sand.
- D. All other backfill shall be free of debris larger than 6" in diameter.
- E. Place all backfill material so as to obtain a minimum degree of compaction of 95 percent of the maximum density at optimum moisture content.
- F. Broken pavement, concrete, sod, roots and debris shall not be used for backfill.

3.07 SURFACE REFINISHING

- A. Refinish every disturbed surface to its' original condition.

3.08 DUCT BANK

- A. Note backfill and surface restoration requirements in Section 310000 – Earthwork.
- B. Each end of each duct shall be belled at manholes and pullboxes.
- C. All bends located between handholes shall be 10' radius minimum. All offsets in straight runs shall begin and end with a 10 degree maximum change in direction. All bends midway in service entrance runs shall meet the requirement for runs between handholes. Vertical bends at power pole feeds and at building service entrances (thru floor) shall be permitted to be an RGS or IMC factory ell with PVC jacket with radius bends conforming to the following table:

Duct Size	Power Systems	Communication Systems
2"	30"	48"
3"	36"	48"
4"	48"	60"
5"	60"	60"

Where long cable runs are involved, sidewall pressures may require larger radius bends. All duct exposed above grade or above finished floor shall be RGS or IMC.

- D. All duct bank shall be buried 36" minimum below proposed finish grade.
- E. After duct bank is complete, clean each duct at least twice with a brush. Pull brush the same direction each time. Pull downhill with slope of duct.
- F. Leave a nylon cord, at least 300# test, in each unused duct.
- G. Provide marker tape over all underground duct. See 260533 for materials. Marker tape shall be 18" above top of duct bank. Use a detectable tape: Magnatec By Thor Enterprises, Inc.

3.09 HANDHOLES

- A. Provide one ground rod in each handhole.
- B. Pack and smooth non-shrink grout at all rough edges around duct entrances.
- C. Remove loose dirt and debris after installation.

3.10 COMMUNICATION SYSTEMS

- A. All communication systems support structure shall be steel reinforced concrete encased duct bank. Provide #1 rebar in each corner of the duct bank and hoop ties every 24" along the length of the duct bank.

3.11 INNERDUCT

- A. Place four 1" innerducts in each 4" conduit. Furnish a pull cord in each run of innerduct. Allow at least 3 feet extension beyond each vault entrance.

END OF SECTION

SECTION 260519

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Section Includes:
 - 1. Building wire and cable.
 - 2. Remote control and signal circuits.
 - 3. Splices, connectors, and terminations.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM).
- B. National Electrical Manufacturers Association (NEMA).
- C. Underwriter's Laboratories, Inc. (UL).
- D. Related Sections:
 - 1. 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 WIRE AND CABLE

- A. General
 - 1. Copper conductor, single insulated wire for all cables.
 - 2. ASTM B1 solid conductors; ASTM B8 for stranded conductors.
 - 3. 600 volt insulation class, 90°C maximum operating temperature for dry and wet locations.
- B. Thermoplastic Insulated Wires and Cables
 - 1. Type THHN/ THWN, UL 83 listed, comply with NEMA WC70.

C. Rubber Insulated Wires and Cables

1. Type XHHW-2, UL 44 listed, comply with NEMA WC70.
2. Type USE-2, UL 44 listed, comply with NEMA WC70.

2.03 REMOTE CONTROL AND SIGNAL CIRCUITS

A. Class 1

1. Copper conductor, single insulated wire.
2. Insulation type THHN/ THWN (90°C), 600 volt insulation class.

B. Classes 2 and 3

1. Copper conductor, multiple twisted conductors covered with an overall non-metallic jacket.
2. 300 volt XLPE insulation rated 105°C.

2.04 SPLICES, CONNECTORS, AND TERMINALS

A. Splices

1. Electrical Tape: 7 mil thick, PVC backing with flexibility and adhesion at 0°F.
2. Pre-Stretched Tubing: EPR pre-stretched tubular rubber sleeve suitable for insulation of voltages up to 600 volts. 3M PST series or equivalent.
3. Heat Shrink Tubing: Thermally stabilized cross-linked polyolefin with 3 to 1 expansion and internal adhesive sealant. Thomas & Betts Shrink-Kon or equivalent.
4. Resin Filled Insulators: Plastic mold body with pourable insulating and sealing compound. 3M Scotchcast 82 or 90 series or equivalent.

B. Connectors

1. No. 10 AWG and Smaller: Pre-insulated "twist-on" type with integral spring and insulated housing per UL 486C. Manufacturers: Ideal, Thomas & Betts, or 3M.
2. No 8 AWG and Larger: Bolt or compression set type per UL 486C. Provide two hole compression set connectors for ground bus applications. Manufacturers: Thomas & Betts or O.Z. Gedney.

C. Terminals

1. Stranded Conductors #10 and Smaller: Comply with UL 486A.
2. Heavy wall thickness copper, tin plated with nylon insulation.
3. Thomas & Betts Sta-Kon Terminals.
4. Cable ties - nylon locking type. Thomas & Betts Ty-Rap.

2.05 TERMINATIONS

- A. Compression set, bolted, or screw type lug or direct to bolted or screw type terminal.

2.06 PLASTIC CABLE TIES

- A. Nylon or approved locking type.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 WIRE AND CABLE

A. Sizing

1. Use stranded conductors for all wire sizes.
2. Minimum power and lighting branch circuit requirement of #12 AWG.
3. Oversize neutral conductors, for possible non-linear loads, for receptacle circuits using common neutrals.

B. Color Coding

1. Color code wire in accordance with the coding shown below:

	208Y/120V	480Y/277V
A Phase (Left bus in panel):	Black	Brown
B Phase (Center bus in panel)	Red	Orange
C Phase (Right bus in panel)	Blue	Yellow
Neutral	White	Gray
Equipment Ground	Green	Green
Control Circuits	All Yellow	

2. If #8 and larger conductors cannot be purchased with the correct insulation color, color code the conductors with wire and cable markers of the appropriate color. Completely encircle the conductor with color coding tape for a minimum length of 6 inches at all accessible locations.
3. In the event that separate neutrals are specified with each phase conductor, provide a white neutral conductor with a tracer of the same color as the corresponding phase conductor.

C. Installation

1. Utilize type THHN/THWN wire for all power, lighting circuits except where the ambient temperature is below 0°C, use Type XHHW installation.
2. Install all wiring in a raceway system.
3. Install wire only after building interior has been protected from the weather.
4. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
5. Neatly train and lace wiring inside boxes, equipment and panelboards.
6. Provide conductor vertical supporting device as required by NEC 300-19.
7. Conductors from one system shall not be intermixed in the same raceway as another system unless shown otherwise. Examples of circuits not to be intermixed are 480Y/277 with 208Y/120 volt circuits, emergency power, line voltage circuits with low voltage wiring, etc.

3.02 REMOTE CONTROL & SIGNAL CIRCUITS

- A. Sizing - #16 AWG minimum.

B. Installation:

1. Install cables in conduit.
2. Use suitable cable fittings and connectors.

3.03 SPLICES, CONNECTORS & TERMINALS

A. Splices

1. Splice wires and cables only in accessible locations such as within junction boxes.
2. Make splices to carry full capacity of conductors with no perceptible temperature rise.
3. Make below-grade splices in manholes and handholes watertight with pre-stretched or heat shrinkable insulating tubing, or resin-filled insulator.
4. Generally, new wiring shall be continuous from point to point. Splices shall be made only where existing field conditions dictate the need. Splicing shall not be used as a convenience factor merely to extend the length of an existing conductor or to extend the length of a conductor that the Contractor has cut too short.

B. Connectors

1. Except where equipment is furnished with bolted or screw type lug, use compression set pressure connectors with insulating covers.
2. Use bolt or compression-set type with application of insulating tape, pre-stretched or heat shrinkable insulating tubing for splices and taps of #8 AWG copper conductors and larger.
3. Use pre-insulated "twist-on" connectors with integral spring for splices and taps of #10 AWG copper conductors and smaller.

C. Terminals

1. Insulate ends of spare conductors with electrical tape and identify spare circuit number where appropriate.
2. Eye type crimped terminal for removable screw type terminal. Forked torque terminal when screw terminal cannot be removed.
3. Cable ties: neatly bundle conductors and cables together for support. Size cable ties sufficiently to accommodate the multiple cables being supported.

END OF SECTION

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Grounding systems shall be provided for service neutral 60-hertz ground and for equipment grounds and bonding as required by code.
- C. Related Section:
 - 1. 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 GROUNDING CONDUCTORS AND CONNECTORS

- A. Copper only, sized per code. Bare or green insulated in sizes #10 AWG or larger. Green insulated for size #12 AWG.

2.03 GROUND RODS

- A. 3/4" x 10'-0"-copper clad steel.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GROUNDING, GENERAL

- A. Provide all grounding for electrical systems and equipment as required by Codes and as specified herein.
- B. Provide concrete-encased grounding electrode (UFER) sized per Code.
- C. Bond to building steel per NEC requirements.

3.02 GROUND RODS

- A. Provide as shown and/or required. Connect the grounding conductor to each rod.

3.03 SIZE OF GROUND WIRE

- A. As required by National Electrical Code.

3.04 GROUND CONNECTION OF WATER PIPING

- A. Metal internal piping shall be grounded, as a part of this Contract.

3.05 CONNECTION TO THE POWER GROUND BUS

- A. Provide connections in accordance with the codes, including:
 1. Raceway system
 2. Switchboard
 3. Service neutral
 4. "Separately derived service" (transformers and emergency generator)
 5. Electrically operated equipment and devices
 6. Ground automatic transfer switches as separately derived systems, bonding the neutral to the ground, since the transfer switches are 4-pole.
- B. No device or equipment shall be connected for electrical service which has a neutral conductor connected to a grounding conductor or to the frame within the device or equipment.
- C. Method of Connection
 1. Make all ground connections and ground cable splice by thermal welding or copper compression set type connectors U.L. listed for grounding purposes. Grounding lugs, where provided as standard manufacturer's items on equipment furnished, may be used.
 2. The contractor shall provide a ground rod in each handhole. When associated with light poles, connect this ground to the ground lug in the light pole. The light pole foundation shall also be connected to the ground system; a #4 bare copper ground conductor shall be exothermically connected to the rebar in the pole foundation with enough conductor extending up the center of the foundation to provide connection to the grounding lug in the pole handhole. The ground rod shall extend 3 inches above the bottom of the handhole, connection at the ground rod shall be made with a bolted connector.
 3. A ground wire sized per code shall be placed in each conduit installed under this contract.
 4. All handholes with metal lids associated with this contract shall be provided with grounding straps for the lid and rim of handholes with metal covers. This ground strap shall be connected to the ground rod or ground system within the handholes.

3.06 EXPANSION FITTINGS

- A. In conduit runs requiring an expansion fitting, a bonding jumper shall be installed around the fitting to maintain continuous ground continuity.

3.07 TESTING

- A. Conform to Section 260126.

3.08 GROUND CABLE CROSSING EXPANSION JOINTS

- A. Ground cables crossing expansion joints or similar separations in structures or paved areas shall be protected from damage by means of suitable approved devices or methods of installation which will provide the necessary slack in the cable across the joint to permit movement. Stranded or other approved flexible copper run or jumper shall be used.

3.09 RACEWAY BUSHINGS

- A. Provide insulated grounding bushing on service and feeder raceways at panelboards and switchboards. Provide ground conductor sized per code to ground bus.

END OF SECTION

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Section includes raceways, fittings, boxes, enclosures and cabinets for electrical and telephone wiring.

1.02 REFERENCE DOCUMENTS

- A. American National Standards Institute (ANSI).
- B. National Electrical Manufacturers Association (NEMA).
- C. Underwriters Laboratories, Inc. (UL).
- D. National Fire Protection Association (NFPA).

1.03 RELATED SECTIONS:

- A. 018113 Sustainable Building Requirements

1.04 SUBMITTALS

- A. Make submittals in accordance with Section 260500. Submit product data only for surface raceways and fittings, wireways, enclosures and cabinets.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 RIGID METAL CONDUIT (RMC)

- A. Rigid Steel Conduit: ANSI C80.1, UL 6.
- B. Intermediate Metal Conduit: ANSI C80.6, UL 1242.

- C. Fittings: NEMA FB1, UL 514B, galvanized malleable iron or non-corrosive alloy threaded fittings. Erickson and watertight split couplings are permitted. Set screw and running thread fittings are not permitted.
- D. Conduit Bodies and Fittings Manufacturers: American Electric; Bridgeport, Construction Materials Group, Crouse-Hinds; Div. of Cooper Industries, Emerson Electric Co.; Killark Electric Manufacturing Co.; Lamson & Sessions; Carlon Electrical Products; O-Z/Gedney; Unit of General Signal, Scott Fetzer Co.; Adalet-PLM; Spring City Electrical Manufacturing Co., Link Seal.
- E. Plastic Coated Rigid Steel Intermediate Metal Conduit: NEMA RN1.

2.03 ELECTRIC METALLIC TUBING (EMT)

- A. Hot dip galvanized, electrogalvanized or sherardized, steel tubing, ANSI C80.3, UL 797.
- B. Fittings: NEMA FB1 UL 514B, steel or malleable iron, compression type only. Set screw, indentor, drive-on, die cast or pressure cast fittings-not permitted.
- C. Conduit Bodies and Fittings Manufacturers: American Electric; Bridgeport, Construction Materials Group, Crouse-Hinds; Div. of Cooper Industries, Emerson Electric Co.; Killark Electric Manufacturing Co., Lamson & Sessions; Carlon Electrical Products; O-Z/Gedney; Unit of General Signal, Scott Fetzer Co.; Adalet-PLM, Spring City Electrical Manufacturing Co., Link Seal.

2.04 FLEXIBLE METAL CONDUIT (FMC)

- A. Liquidtight Flexible Metal Conduit. (LFMC), UL 360, PVC weatherproof cover over flexible steel conduit. Fittings: galvanized or zinc coated.
- B. FMC shall not be used.

2.05 RIGID NON-METALLIC CONDUIT (RNC)

- A. Schedule 40 and 80: UL 651.
- B. Fittings: NEMA TC3.

2.06 EXPANSION FITTINGS

- A. Malleable iron, hot dip galvanized allowing 4"(100mm) (+/- 2" (50mm)) conduit movement. OZ/Gedney AX Series or equivalent by manufacturer listed in 2.1.D.

2.07 RACEWAY PENETRATION SEALS

- A. Thruwall and Floor Seals: New construction - OZ/Gedney FSK Series.

2.08 RACEWAY SEAL FITTINGS

- A. For one through four conductors: OZ/Gedney CSB Series.
- B. For greater than four conductors: OZ/Gedney EYA Series with sealing compound.

- C. Low temperature or hazardous locations: OZ/Gedney EYA Series with sealing compound.

2.09 METAL WIREWAYS

- A. Material: Sheet metal, size and shape as indicated. Manufacturer's standard finish. UL 870.
- B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Manufacturer: Hoffman Engineering Co., Keystone/Rees, Inc., Square D Co., Circle AW or equivalent.
- D. Wireway Covers: Hinged type.

2.10 ENCLOSURES AND CABINETS

- A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

2.11 OUTLET JUNCTION AND PULL BOXES

- A. Interior Wiring:
 - 1. Outlet and Pull Boxes. Pressed steel, zinc coated with plaster ring where applicable. NEMA OS1, UL 514A.
 - 2. Large Junction and Pull Boxes. Fabricated sheet steel, zinc coated or baked enamel finish, with return flange and screw retained cover.
 - 3. Concrete and Masonry. Specifically designed boxes for casting in concrete or mounting in masonry walls for that purpose.
 - 4. Mounting. Provide boxes with fan side box support Caddy J1A series or Caddy quick mount H series.
 - 5. Boxes in slabs on grade or top floor/roof: Cast or malleable iron or cast of corrosion resistant alloy, complete with conduit hubs, compatible with raceway to which it is connected. NEMA FB1.
- B. Exterior Wiring:
 - 1. Above Grade:
 - a. Outlet and junction boxes: Cast or malleable iron or cast of corrosion resistant alloy, complete with conduit hubs, compatible with raceway to which it is connected. NEMA FB1.

- b. Pull boxes: Fabricated steel and hot dipped galvanized complete with malleable iron hubs.
 - c. All boxes labeled for damp (NEMA 3R) or wet (NEMA 4) locations as applicable. This includes boxes in the open parking garage areas.
2. Below Grade:
- a. Where exposed to earth: Constructed of precast concrete with size, configuration, cover, grates and reinforcing as required by the particular installation. Manufacturer: Utility Vault or Renton Concrete Products or approved equivalent.

2.12 SOUND ISOLATION PADS

- A. Polybutene putty sheet caulking with inert fillers. Lowry's outlet box pads (available from Harry A. Lowry & Associates, 11176 Penrose St., Sun Valley, CA 91352, phone (818) 768-4661), Kinetics Fire Rated outlet pad, or equivalent.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 WIRING METHODS

- A. Interior: Use the following wiring methods:
 - 1. Exposed: Rigid Steel Conduit (RGS) or Intermediate Metal Conduit (IMC) only where exposed.
 - 2. Exposed Subject to Damage (i.e. from vehicles, carts and moving pallets including stubups in concrete): Rigid Steel Conduit (RGS).
 - 3. Concealed: Electric Metallic Tubing
 - 4. Connection to Vibrating Equipment (including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): Liquidtight Flexible Metal Conduit with 90 degree loop, maximum 6 feet long.
 - 5. Boxes in Exposed Areas (even if recessed in walls that are in exposed areas, including in columns or walls that are exposed to outdoor temperatures): Cast or malleable iron or cast of corrosion resistant alloy. No pressed metal boxes.
 - 6. Minimum Size: 3/4" trade size minimum.
- B. Exterior: Use the following wiring methods:
 - 1. Exposed: Rigid Steel Conduit or Intermediate Metal Conduit.
 - 2. Concealed: Rigid Steel Conduit, Intermediate Metal Conduit.
 - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): Liquidtight Flexible Metal Conduit.
 - 4. Boxes and Enclosures: NEMA 250, NEMA type 3R or type 4.
 - 5. Minimum Conduit Size: 3/4" trade size minimum.
- C. Raceway Embedded in Slabs
 - 1. Install in middle third of slab thickness and leave at least 1-inch (25-mm) concrete cover. Coordinate with structural prior to bid.

2. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
3. Protect stub-ups from damage where conduits rise through floor slabs. Transition from nonmetallic conduit to rigid steel conduit, or IMC before rising above floor.
4. Minimum Size: 1" trade size minimum.

D. Raceways Underground

1. Rigid Nonmetallic Conduit, Schedule 40 except use plastic coated GRS in all paved areas.
2. Arrange and slope raceways entering building to drain away from building.
3. Provide marker tape over underground raceways. Marker tape to read "Caution - Electric Line Buried Below". Install 1'-0" below grade. Use a detectable tape: Magnetic By Thor Enterprises, Inc.
4. Install underground raceways a minimum of 24" below final grade (36" on public property).
5. Provide backfill around underground raceways. Use 3/4" minus material 6" above and below rigid steel conduit and intermediate metal conduit. Use clean sand 6" above and below PVC raceways. Backfill above 6" free of debris or rocks greater than 1" in diameter. Space raceways 7-1/2" minimum between centers and 3" minimum between raceways.
6. Anchor raceways encased in concrete to prevent floating during pour.
7. Minimum Size: 1" trade size minimum.

3.02 INSTALLATION

- A. Provide raceways concealed in construction, where practical.
- B. Install raceways level and square and at proper elevations. Provide not less than 6'-6" headroom. Do not block access to light fixtures, junction boxes, valves, mechanical equipment or prevent removal of ceiling panels, etc.
- C. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box.
- D. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength.
- E. All raceways shall be a trade size of 3/4" minimum. Size raceways per NFPA 70 Appendix C, but with a 3/4" minimum. Size raceways for signal and communications systems per the shop drawings, but 3/4" minimum.
- F. Maintain 12" minimum clearance to high temperature (greater than 90° C) surfaces.
- G. The front of wireways shall be completely accessible, as they shall not be used as a raceway through walls.

3.03 RIGID METAL AND INTERMEDIATE METAL CONDUIT

- A. All connections watertight. May be used as specified in 3.02 above.

- B. Provide plastic coated rigid steel or IMC conduit for all exposed exterior raceways.

3.04 RIGID NONMETALLIC CONDUIT

- A. May be used as specified in 3.02 above. Exception: Use rigid steel for elbows, penetrations through floors and walls and stub ups.

3.05 RACEWAY PENETRATION SEALS

- A. Exterior wall surfaces above grade: Provide watertight seal around all raceways. For concrete construction above ground level, cast raceway in wall or core drill wall and hard pack with a mixture of equal parts of sand and cement.
- B. Exterior surfaces below grade: Provide watertight seal around all raceways. Cast raceway into wall (or floor) or use manufactured seal assembly.
- C. Fire rated construction: Seal penetrations to maintain fire rating of construction penetrated. Seal with UL Listed sealant.

3.06 RACEWAYS SEALING FITTINGS

- A. Provide watertight seal in the interior of all raceways which pass through, ground floor slab or through outside walls of the building above or below grade. Seal on the end inside the building, using raceway sealing fittings manufactured for the purpose. Locate fittings at suitable accessible locations. For concealed raceways install each fitting in a flush steel box with a blank coverplate to match finish of adjacent plates or surfaces. Exception: Sealing fittings are not required on raceways through the floor slab when the raceway does not extend beyond the building footprint.

3.07 HANGERS FOR RACEWAYS

- A. Raceways 1" and larger: Provide lay-in pipe hangers on 3/8" or larger all threaded rods attached to metal ceiling inserts or to structural members at not greater than 10'-0" on center and within 12" of each change in direction.
- B. When more than two raceways will use the same routing, group together on a channel trapeze support system supported by 1/2" (minimum) threaded rods attached to metal ceiling inserts or structural members. Size supports for multiple raceways for 25% future capacity.

3.08 EXPANSION FITTINGS

- A. Provide expansion fittings for raceways crossing expansion joints, building separation walls, and seismic joints. Provide bonding jumper.

3.09 CABLE SUPPORTS

- A. Provide cable support for vertical cable runs as required by NFPA 70.

3.10 STUB-UP CONNECTIONS

- A. Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; sealtite may be used 6

inches above the floor. For future equipment connections install threaded plugs flush with floor.

3.11 OUTLET AND JUNCTION BOXES

- A. Firmly anchor boxes directly or with concealed bracing to building studs or joists. Boxes must be so attached that they will not "rock" or "shift" when devices are operated.
- B. Flush Mounting: Install front edge (box or plaster ring) even with the finished surface of the wall or ceiling, except for those mounted above accessible ceilings or where drawings indicate surface mounting is permitted.
- C. When boxes are installed in fire resistive walls and partitions provide 24" horizontal separation between boxes on opposite sides of a wall in accordance with UBC 709.7 Membrane Penetrations.

3.12 ELECTRICAL OUTLETS

- A. General: Check and verify outlet locations indicated on Architectural drawings, door swings, installation details and layouts of suspended ceilings and locations of all plumbing, heating and ventilating equipment.

3.13 CONNECTION TO EQUIPMENT

- A. Provide outlet boxes of sizes and at locations necessary to serve equipment furnished under this or other Divisions and provide final connections to all equipment.

3.14 BLANK COVERS

- A. Provide blank covers or plates to match coverplates specified in Section 262726 over all boxes that do not contain devices or are not covered by equipment.

3.15 DEVICE BOXES CONTAINING EMERGENCY AND NORMAL DEVICES

- A. Permitted only with steel barrier manufactured especially for the purpose of dividing the box into two completely separate compartments.

3.16 DEVICE BOXES CONTAINING MULTIPLE DEVICES AND WIRING RATED OVER 150 VOLTS TO GROUND AND OVER 300 VOLTS BETWEEN CONDUCTORS

- A. Permitted only with steel barrier manufactured especially for the purpose of dividing the box into separate compartments for each device having exposed live parts.

3.17 JUNCTION OR PULL BOXES

- A. Pull and junction boxes: Install as necessary to facilitate pulling of wire and to limit the number of bends within code requirements.
- B. Permanently accessible.
- C. Do not intermix conductors from one system in same junction box or pull box as another system.

3.18 BOXES IN EARTH

- A. Provide for all wire splices and as required to pull conductors. Set boxes (handholes) smaller than 3' x 3' in place on a 3" sand or pea gravel bed. Set larger boxes with a 6" bed.
- B. Set boxes so that coverplates match the slope of, and are flush with the final surface grade.

3.19 COLOR CODING

- A. Color Code all junction boxes installed in accessible ceiling spaces and exposed in unfinished areas using spray paint on the box and entire cover in the following manner:

480 Power	Brown	Telephone	Black
277V Lighting	Yellow		
120/208V	Unpainted		
Emergency Power	Orange		
Fire Alarm	Red		

- B. Use black felt tip marker following painting to indicate the circuit numbers in 1" high letters contained within.

END OF SECTION

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Section Includes:
 - 1. Engraved Plastic Laminate Nameplates
 - 2. Wire and Cable Markers
 - 3. Posted Drawings and Operating Procedures
 - 4. Safety Signs
 - 5. Lighting Identification

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - ANSI A13.1 Operational and Warning signs.
 - ANSI C136-15-1986 High Intensity Discharge and Low Pressure Sodium Lamps in Luminaires - Field Identification.
- B. Occupational Safety and Health Administration (OSHA). 29 CFR - Labor Chapter XVII Part 1910-145 "Occupational and Safety Health Standards" 2005.

1.03 RELATED SECTIONS:

- A. 018113 Sustainable Design Requirements

1.04 SUBMITTALS

- A. Make submittals in accordance with Section 260500 Common Work Results for Electrical.
- B. Submit a complete nameplate schedule to indicate nameplate size, lettering size and color.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.

- B. Electrical wires and cabling shall be lead-free.

2.02 ENGRAVED PLASTIC LAMINATE NAMEPLATES

- A. Materials: Three-layer laminated plastic nameplate. Lettering height for panel or equipment identifier is 1/2". Remaining lines are 3/8" high with 1/8" spacing between lines.
 - 1. Normal System: White letters on black background.
 - 2. Emergency System: White letters on orange background per WAC 296-46B-700.
 - 3. Comply with ANSI 13.1.

- B. Panelboard Nameplates

- 1. Provide engraved plastic nameplate for each new panelboard with panelboard name, and voltage, phase and wire.

Example:

Panel E3 208Y/120V,3PH 4W

- C. Transfer Switches

- 1. Provide phenolic nameplate for each new automatic and manual transfer switch with the following information:
 - Line1: Transfer switch name (i.e., ATS...)
 - Line 2: Branch of Emergency system (Emergency, Legally Required Standby, Optional Standby)
 - Line 3: Normal source feed
 - Line 4: Emergency source feed

- D. Disconnects, Starters, Combination Starters and Other Devices

- 1. Provide phenolic nameplate for each device with the following information:
 - Line 1: Load served
 - Line 2: Panelboard and circuit number from which device is fed
 - Line 3: Fuse size or breaker size as applicable

- E. Main Service Project Nameplate

- 1. At Main Service Distribution Switchboard, provide engraved nameplate on switchgear front with the following information:
 - a. Panel Name: 1/2" lettering label panel name PA as "MAIN PANEL" as well.
 - b. Project Name: (1/2" lettering, all other 3/8").
 - c. Electrical Consultant (CB Engineers).
 - d. Electrical Contractor.
 - e. Year of Manufacturer.

2.03 WIRE AND CABLE MARKERS

- A. Every conductor and every cable shall be tagged.

- B. Tags for conductors shall be as follows:
 - 1. Sleeve-type, legible, permanently coded, yellow PVC or heat-shrink polyolefin tubing, appropriately sized for the wire to which it is being applied. Sleeves shall be by Brady, Tyco, T&B, or approved equal.
 - 2. Labeling shall be machine-printed.
- C. Tags for cable shall be embossed metal or machine-printed plastic type manufactured by T&B, Brady, Tyco, or Project Representative-approved equal.

2.04 POSTED DRAWINGS AND OPERATING INSTRUCTIONS

- A. Print electrical riser diagrams on 20 lb. bond paper. Blue print paper is not acceptable. Reduce drawings to approximately 1/2 size using Xerox reduction process. Contact Project Representative to obtain updated original plans for printing.
- B. Mounting Frames: Extruded aluminum, 4 point screw mount with 1/8" clear plexiglass cover.
- C. Operating Instructions: Printed in all capital letters of 12 pt. size minimum.

2.05 SAFETY SIGNS

- A. Comply with 29 CFR, Chapter XVII, Part 1910.145.
- B. Engraved Plastic Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
- C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch (6.4-mm) grommets in corners for mounting.
- D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1mm) galvanized-steel backing; and with colors, legend, and size required for the application. 1/4-inch (6.4-mm) grommets in corners for mounting.
- E. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

2.06 HID LIGHTING FIXTURES

- A. All "HID" lighting fixtures shall be identified, as required by ANSI C136-15, no alternate method will be accepted. Per the ANSI standard, the Markers for HPS fixtures shall have 2-inch black letters on a 3-inch square gold-yellow background, and markers for Metal Halide fixtures shall be 2-inch black letters on a 3-inch square red background.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 ENGRAVED PLASTIC LAMINATE NAMEPLATES

- A. Provide nameplates secured to the front outside surface of equipment for the following:
 - 1. Equipment identification labels including, but not limited to: panelboards, disconnect switches, motor starters, transformers, fixed equipment, light fixtures, and transfer switches.
 - 2. Special equipment outlet labels. (1/4" letters).
- B. Secure nameplate to equipment front using screws. Adhesive is unacceptable.

3.02 WIRE AND CABLE IDENTIFICATION

- A. Provide wire markers for control wiring as indicated on schematic and interconnection diagrams or equipment manufacturer's Shop Drawings.
- B. Provide identification labels with the following information in accordance with NEC 210.4(d). Conductors of power systems in this building are identified as follows:

	<u>208Y/120V</u>	<u>480Y/277V</u>
A Phase (left bus in panel):	Black	Brown
B Phase (center bus in panel):	Red	Orange
C Phase (right bus in panel):	Blue	Yellow
Neutral:	White	Gray
Equipment Ground:	Green	Green

- 1. 2.0 Mil, White Polyester, Permanent Adhesive Material. Peel-off self sticking type.
- 2. Lettering: Black #10 font Arial on white opaque background.
- 3. In electrical rooms and closets, maintenance/storage rooms, and other similar areas, post decal on front of panel, MCC, and /or switchboard.
- 4. In finished areas, where panel may be painted at a later time, post decal behind circuit breaker doors or behind dead front door where decal can be easily seen when circuits are being added.

3.03 RACEWAY AND JUNCTION BOX COLOR CODING (IDENTIFICATION)

- A. Conduit Identification:
 - 1. In accessible ceiling spaces and exposed in unfinished areas, using an indelible marking pen, label all conduits 1" larger with panel and circuit numbers of conductors routed through the conduit. Label conduit at all wall penetrations and connections to all panels, junction boxes, and equipment served.

3.04 WARNING SIGNS

- A. General: Provide warning signs where there is hazardous exposure or danger associated with access to or operation of electrical facilities. Provide text of sufficient clarity

and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with ANSI A13.1 standard color and design.

- B. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical systems, provide tags of plasticized card stock, either pre-printed or hand printed to convey the message; example: "DO NOT OPEN THIS SWITCH WHEN BREAKER IS CLOSED."

3.05 POSTED DRAWINGS AND OPERATING INSTRUCTIONS

- A. Mount drawings and operating procedures on the wall immediately adjacent to the main piece of equipment for which the instructions apply. If sufficient wall space is not available, mount directly to one of the sheet metal panels of the equipment.

END OF SECTION

SECTION 260923

LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide U.L. listed lighting control equipment.

1.02 RELATED SECTIONS:

- A. 018113 Sustainable Building Requirements.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 PHOTOELECTRIC CONTROL

- A. Remote Photoelectric Control Device: Fisher Pierce twist-lock N7700 Series instant response model #N7790B with Fisher Pierce S476 twist-lock receptacle model #S47673.

2.03 TIME CLOCK

- A. Time Controls: 7-day dial with carry-over, Intermatic T51000BC series or approved equal. Provide additional Intermatic 156I2548A trippers as required.

2.04 LIGHTING CONTACTORS AND CONTROL RELAYS

- A. Contactors: Multipole, mechanically or electrically held as shown, rated for 480V operation. Contact rating 20A minimum or as required, with coil clearing contacts. Square D Class 8903.
- B. Control relays: Rated 600V, 20A contacts. Square D Class 8501 XMO series.
- C. NEMA 1 enclosures and 120V coils.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PHOTO CONTROL

- A. Provide roof mounted (unless required otherwise) support stand. Orient light sensor in northerly direction.

3.02 LIGHTING CONTROLS

- A. Install control equipment with required wiring to achieve lighting control needed. Outdoor lights off during daylight hours.
- B. Interior lighting zones shall be programmed per the King County's requirements. Meet with King County to determine interior lighting scheduling requirements prior to programming.

END OF SECTION

SECTION 261216

DRY-TYPE MEDIUM-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide dry-type transformers complete and fully operational. Transformers shall be UL listed and comply with NEMA Standard ST-20 and NEMA TP-1-2002.

1.02 RELATED SECTIONS:

- A. 018113 Sustainable Building Requirements

1.03 SHOP DRAWINGS

- A. Prepare and submit for review prior to manufacture. Include dimensioned front plan and section views, wiring and connection diagrams and bolting template. Developer shall indicate mounting methods and connection lugs required on the drawings.
- B. Submit transformer efficiencies showing compliance.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 MANUFACTURER

- A. Specially constructed units with core and coil assembly mounted on rubber vibration and sound isolation pads as manufactured by Tierney, Square D, Acme, Eaton, Hevi-Duty, General Electric, or Hammond.

2.03 ENCLOSURE

- A. Steel panel enclosure over core, coil and terminal chamber with louvered openings for convection cooling. Cooling and terminal access shall be possible with both sides and rear of enclosure obstructed. Maximum surface temperature: 35 degrees centigrade.

- B. Weatherproof enclosure when located outdoors.

2.04 WINDINGS

- A. Separate primary and secondary. Windings shall have Class H insulation and shall be rated for continuous operation at rated KVA with temperature rise of not over 150 degrees C above a 40 degree C ambient, with a maximum hot spot temperature of 220 degrees C. Windings and core and coil assembly shall be treated and built to resist the effects of dirt and moisture.
- B. Core and coil mounted on rubber isolation mounting pads.
- C. Isolating type with grounded electrostatic shield where noted and when serving computer systems. Where noted include primary surge suppression and secondary filters similar to Square D Class 7450-FIL.

2.05 PRIMARY TAPS

- A. Full capacity taps, minimum of two 2-1/2 percent above and four 2-1/2 percent below normal (rated) primary voltage.

2.06 CAPACITY

- A. Continuous rating.
- B. Provide K-factor rated transformers, if required.

2.07 CONNECTIONS

- A. Three-phase transformers shall have a 480 volt delta connected primary and 208Y/120 volt, three phase, four wire secondary. Provisions for external connections shall be made by means of a terminal board employing lugs conforming with Section 260519 which are compatible with the external conductors installed. All connections shall be accessible from front and top of cabinet.

2.08 NOISE LEVEL

- A. Noise level shall not exceed 45 db for sizes less than 51 KVA, 50 db for 51-150 KVA, 55 db for 151-300 KVA and 60 db for greater than 300 KVA as measured in accordance with NEMA ST20 requirements.

2.09 VIBRATION ISOLATORS

- A. McDougal Control Co.
 1. Rubber pad isolator: Model WMNK.

2.10 NAMEPLATES

- A. Provide permanently attached engraved nameplates per Section 260553 for each transformer. For each transformer include name (3/8" letters), voltage, phase and kVA rating, source of power, and output service.

Example: T1-30 kVA
480V - 208Y/120V, 3 ϕ , 4W
Source: PANEL DP
Serves: PANEL P3

- B. Nameplate color shall be: Normal System - white on blue; Emergency System - white on orange per WAC 296-46B-700.

2.11 EFFICIENCY

- A. Transformers shall comply with minimum efficiencies as set forth in NEMA TP-1-2002.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 MOUNTING

- A. Attach to the building structure via vibration isolators to prevent overturning or sway on ceiling hanger in compliance with the IBC. All attachment nuts to have split and flat washer. Mount on floor, wall or suspended from ceiling as required.
 - 1. Enclosures designed for floor mounting, where suspended from ceiling, shall be suspended via trapeze constructed of two (minimum) horizontal structural channels hung via 1/2" steel threaded rods attached to structural members or inserts in structural slab. Each rod to contain rubber isolator ceiling hanger. Channel, rod, ceiling hanger and inserts shall be sized for not less than 400% load safety factor. Locking type nuts shall be used in assembly.
 - 2. Secure wall mounted types via rubber-in-shear isolators sized to give 400% safety factor.
 - 3. Secure floor mounted types via rubber pad isolators sized to give 400% safety factor.

3.02 CONNECTIONS

- A. 208Y/120 volt three-phase secondary transformers shall be considered "grounded neutral separately derived systems" and neutral shall be grounded per code accordingly.
- B. Transformer raceway connections shall be waterproof flexible metal conduit (seallite or liquid tight flexible metal conduit) as specified in Section 260533.
- C. Voltage Tap Connections: Connect all transformers at "normal" tap. After facility is completely energized, measure secondary voltages at all transformers and service switchboard. Include copy in O&M Manual.

END OF SECTION

SECTION 262400

SWITCHBOARDS AND PANELBOARDS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide both service entrance distribution class panelboards with separate current transformer cabinet and utility metering enclosure as well as branch circuit panelboards.

1.02 RELATED DOCUMENTS

- A. Dead front type, conforming to U.L. 67 and NEMA PB 1.1.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SHOP DRAWINGS

- A. Submit for review prior to manufacture. Include complete description, front view, dimensions, device sizes and layout, and ground bus(es). Panel breaker configuration shall exactly match that given on panel schedules that are included with the contract drawing and specification set.

1.05 COORDINATION STUDY

- A. Manufacturer to perform a short circuit study. Rate all equipment provided for available short circuit current. Fault current levels at the supply side of the source shall be gotten from the utility and are the designer's responsibility.
- B. Manufacturer to prepare coordination study, which includes an analysis of the breakers on the emergency generator. Study to indicate components of all equipment provided are selectively coordinated for all levels of short circuit current. Submit settings and trip curves of all components to King County and include in O & M manual.
- C. The manufacturer shall include in the bid a 100% selectively coordinated systems as required by the NEC, to include:
 - 1. Emergency Systems per NEC 700.27
 - 2. Legally Standby Systems per NEC 701.18
 - 3. Elevator overcurrent protective devices per NEC 620.62

1.06 ARC FLASH STUDY

- A. Manufacturer to prepare arc flash study for new equipment that is being provided in this contract using IEEE 1584 calculation method for all switchboards and panelboards being provided in this contract. Study and label to indicate incident energy, flash hazard boundary, equipment name, study date, and recommended category of personnel protective equipment (PPE). This information shall be provided on a pre-printed label on each panel and switchboard.

1.07 CALCULATIONS

- A. These calculations (Short Circuit, Coordination, and Arc Flash), shall be performed on SKM software and the electronic files used to perform/complete these calculations as specified shall be delivered to King County.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 MANUFACTURER

- A. Square D or GE.

2.03 PANELBOARD TYPE

- A. Rated at proper voltage and current, bus bars of copper 3-phase, 4-wire, 100 percent neutral. Provide 200 percent neutral bars in all panels on the secondary of K-13 rated transformers. Multiple lugs where conductors in parallel or "feed through" or double lugs are shown.
- B. Bolted busbar to busbar connections. Conductor connectors to conform with Section 260519, bolted to busbars using Grade 5 bolts, belleville and flat washers.
- C. Separate ground bus bonded to panelboard cabinet.
- D. Isolated ground bus insulated from cabinet when noted.
- E. Service entrance label for service entrance equipment.

2.04 CIRCUIT BREAKERS AND FUSED SWITCHES

- A. U.L. interrupting rating labeled. Minimum rating as follows:

208Y/120V Panelboards	10,000 AIC symmetrical
480Y/277V Panelboards	30,000 AIC symmetrical

- B. Circuit breakers: Conform with UL 489, labeled for 75°C conductors. Mount per panel schedules. Pre-threaded, bolt on type. Common trip on multiple pole breakers. Labeled 'SWD' when utilized for switching loads.
- C. Spares and spaces: Complete for future circuits. Where "Space" is indicated, provide space, bussing, device mounting hardware and steel knockouts in dead front.

2.05 SERVICE DISTRIBUTION EQUIPMENT

A. Main Distribution Panel

- 1. Ampere rating as designed at 480Y/277V. 3 Ph, 4 W and Braced for 65 kA. Fully Rate Panel, no series ratings.
- 2. Distribution Class Panelboard with Service entrance rating. Lighting and Branch Circuit Panel class equipment is not acceptable. Provide neutral-ground bond only in this panel at 480V.
- 3. Equip with Main Circuit Breaker that has residual ground fault protection. Set per coordination study requirements.
- 4. Wall Mount.
- 5. Door in Door construction with lock sets keyed alike on both. Doors to be contained by a single operating handle with no additional tie down screws or similar forms of retainers being acceptable.
- 6. Provide integral CT compartment per Puget Sound Energy requirements.

B. Revenue Meter Cabinet:

- 1. Remote PSE meter -- Provide meter base per Puget Sound Energy requirements as stated in Customer Service Requirements publication. Mount meter base outside.
- 2. Power Monitor
 - a. In a self contained enclosure, mount a digital power monitor for voltage, amperage, power factor, kW demand, kVAR demand by phase. Square D Series 650 or equal. Provide associated donut current transformers to be mounted around incoming service entrance conductors.

2.06 CABINET AND FRONTS

- A. Flush or surface, as noted. Tight closing doors without play, when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim, same height. Where remote controlled switch or contactor is mounted in panelboard, mount on same frame as panelboard interior, with dedicated access door and key lock
- B. Fronts: Door-in-door type such that breaker handles can be accessed by opening the inner door and panel wiring can be accessed by opening the outer door, hinged at right side. Panels shall be lockable with two identical keys provided for each panel. All panel shall be keyed alike.
- C. Finish: Factory prime coat for cabinets located in finished areas. When located in unfinished areas, factory standard lacquer or enamel finish, gray or blue-gray color, over prime coat.

2.07 NAMEPLATES

- A. Engraved nameplates per Section 260553 permanently attached to panelboard front. Include panel name in ½-inch-sized letters; fed from; area served, voltage, phase and wire in 3/8 inch sized letters.
- B. Nameplate color:
 - 1. Normal system - white letters on blue.
 - 2. Emergency system - white letters on orange per WAC 296-46B-700.

2.08 SYSTEM OF NUMBERING AND BUS ARRANGEMENT

- A. Panelboards rated for 400 or 600 amps shall accept 225 amp frame circuit breakers.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 MOUNTING

- A. Firmly anchor cabinets directly or with concealed bracing to building structure, level, 6'-6" above finished floor unless otherwise required. When not located directly on wall, provide support frame of formed steel channel anchored to floor and ceiling structure.

3.02 WIRING

- A. Conform to applicable sections of these specifications and NEMA PB 1.1. Conductors and terminations per Section 260519. Coverplates in open knockouts.

3.03 CIRCUIT INDEX AND LABELS

- A. Typed circuit index with odd circuits on left, even circuits on right, listing each circuit by number with complete load designation, (i.e., Receptacle room ____, lights room ____, etc.). Room names/numbers per actual room identification assigned by owner at project completion. Mount inside door with transparent protective cover. Provide number labels on circuit breakers to match index.

3.04 WORK CLEARANCE

- A. Verify space available with equipment sizes and code required working clearances prior to submitting shop drawings.

3.05 GROUNDING

- A. Provide per Section 260526.

3.06 CABINET PAINTING

- A. Cabinets furnished prime painted: Field paint to match wall color. (See Division 09 Painting).

3.07 DEDICATED SPACE

- A. Locate in dedicated spaces. Coordinate project construction so piping, ducts, etc. are routed around dedicated spaces above and in front of panelboards per code.

END OF SECTION

SECTION 262726

WIRING DEVICES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This section includes switches, receptacles, dimmers, device plates and multi-outlet assemblies.

1.02 REFERENCES

- A. National Electrical Manufacturers Association (NEMA).
- B. Underwriters Laboratories (UL).

1.03 RELATED SECTIONS

- A. The following related section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements.

1.04 SUBMITTALS

- A. Submit product data for each device utilized in the project.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 MANUFACTURER

- A. Subject to compliance with requirements, provide products by one of the manufacturers listed in the following paragraphs. All devices utilized on the project shall be from the same manufacturer.

2.03 RECEPTACLES

- A. Specification Grade: Federal Specification WC-596F, back and side wired, duplex NEMA 5-15R configuration (15 amp, 120V), nylon face, unless shown otherwise. Arrow Hart 5262-GRY, Bryant 5262-GRY, Eagle 5262GY, Hubbell 5262-GRY, Leviton 5262-GY, or Pass & Seymour 5262-GRY.

- B. Ground Fault Circuit Interrupter (GFCI) Receptacle: Specification Grade, NEMA 5-15R configuration, duplex receptacle with 4-6 milliamps leakage current trip level. Feed through type to protect downstream receptacles on the same circuit. Arrow Hart GF-5242-GRY, Eagle GF15G, Hubbell GF-5252-GRY, Leviton 6599-GRY, or Pass & Seymour 1591-SGRY.
- C. Provide 20 amp specification grade devices where indicated or where connected to dedicated 20 amp circuits. Device shall be of the same manufacturer of the 15 amp devices.
- D. Provide 50 NEMA Type 5-30 receptacles with weatherproof covers (if required) for electric car battery charging system.

2.04 SWITCHES

- A. Specification Grade, Federal Specification WS-896, back and side wired, rated 277 volt, 20 amp. Single pole, double pole, keyed, 3- way, pilot light, locking type as required or as noted. Arrow Hart 1221-GRY, Bryant 4901-GRY, Eagle 2221GRY, Hubbell 1221-GRY, Leviton 1221-GRY, or Pass & Seymour 20AC1-GRY.
- B. Interchangeable type rated same as above.
- C. Switches with integral occupancy sensors -- 180 degree coverage, 120/277 volt dual rating, isolated dual relays, digital time delay from 30 seconds to 30 minutes, adjustable sensitivity from 20% to 100%, built-in light level sensor from 10 to 150 foot-candles on secondary relay, Fresnel lens. Wattstopper, Leviton, Pass & Seymour, Hubbell.

2.05 DEVICE PLATES

- A. Configuration: Single and combination type to match corresponding wiring devices.
- B. Attachment Screws: Metal with head color to match plate finish.
- C. Interior Recessed Boxes: Stainless steel Type 430 with satin finish.
- D. Interior Surface Boxes: Pressed raised steel to match size of outlet box. Pressed raised steel boxes are not to be used for surface mounting. Use only when concealed. Use cast box for surface mounted applications.
- E. Exterior: Weatherproof hinged cover, Bell RCV1-GFR, Pass & Seymour 4512, Hubbell WP26 for vertical GFCI. For other receptacles provide cover to match receptacle.
- F. Identification: Device plates shall be provided with engraved laminated phenolic nameplates with 1/8 inch white characters on black background. Nameplates for switches shall identify panel and circuit number and area served. Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single phase.

2.06 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
 1. Cord: Rubber-insulated, stranded-copper conductors, with type SOW-A jacket. Green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.

2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 MOUNTING

- A. Rigidly fasten (without play) outlet boxes and devices at proper position with wall to bring receptacle flush with plate or switch handle the proper distance through plate. Align devices and plates plumb.
- B. Mount electric car battery charging system outlets 36 inches above finished floor.

3.02 RECEPTACLES

- A. Provide 15 amp receptacles in all locations except provide 20 amp receptacles on dedicated 20 amp circuits.
- B. Provide weatherproof, GFCI receptacle for all outdoor receptacles and other locations shown on the drawings.

3.03 ORIENTATION

- A. Set switches with handle operating vertically, up position "ON". Set receptacles vertically with ground pin up or when construction requires horizontal mounting ground pin left.

3.04 DEVICE PLATES

- A. Provide for wiring devices, telephone and signal outlets. Plate to cover cutout for device outlet box.

END OF SECTION

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This section includes separately mounted switches and circuit breakers.
- C. Provide all disconnects required by code for equipment furnished under this and other Divisions of these specifications unless disconnects are integral with equipment and acceptable to the authority having jurisdiction.

1.02 RELATED DOCUMENTS

- A. See Section 262400 for Arc Flash study requirements.
- B. Section 018113 Sustainable Building Requirements

1.03 REFERENCES

- A. National Electrical Manufacturers Association (NEMA)
- B. Underwriters Laboratories (UL)

1.04 SUBMITTALS

- A. Make submittals in accordance with Section 260500. Submit product data for disconnect switches, fused disconnect switches, enclosed circuit breakers and accessories specified in this section.

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following (same manufacturer for all products):
 - 1. GE
 - 2. Square D

2.03 DISCONNECT SWITCHES

- A. NON-FUSED: Heavy duty, quick make, quick break, single throw, horsepower rated with poles to open all ungrounded conductors. AIC rating same as upstream protective device with 10,000 AIC minimum. NEMA KS1. Toggle switches that are Heavy Duty motor rated toggle switches with padlocking provisions are acceptable for circuits rated 20 amps or less.
- B. FUSED: As specified above with addition of fuse clips to accept only Class R fuses. Service entrance labeled for service disconnect switches.
- C. OPERATING HANDLE: Lockable in off position. Interlocked with cover to prevent opening when switch is closed. (Interlock to include defeating mechanism).

2.04 ENCLOSED CIRCUIT BREAKERS

- A. Enclosed, Molded-Case Circuit Breaker: NEMA AB 1, with lockable handle.
- B. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting rating to meet available fault current.
- C. Application Listing: Appropriate for application, including switching fluorescent lighting loads or heating, air-conditioning, and refrigerating equipment.
- D. Manufacture same as Panelboards Section 262400.
- E. Current-Limiting Trips: Let-through ratings less than NEMA FU 1, Class RK-5.
- F. Molded Case Switch: Provide molded case circuit breaker without trip units where required.
- G. Accessories: Provide shunt trip, under voltage and other accessories where required.

2.05 ENCLOSURE

- A. NEMA AB 1, Type 1, unless otherwise required to meet environmental conditions of installed location.
- B. Outdoor Locations: NEMA Type 3R.
- C. Other Wet or Damp Indoor Locations: NEMA Type 4.
- D. Provide flush mounted enclosures for circuit breakers where indicated on the drawings.

2.06 NAMEPLATES

- A. Provide nameplates per Section 260553 Identification.
- B. Provide permanently attached nameplates (with mechanical fasteners) constructed of plastic laminated material engraved through surface material to white sublayer. Normal power white letters on blue background and emergency distribution system is white letters on orange background per WAC 296-46B-700.
- C. Include the following information: Load name, voltage and phase and fuse size and type (when applicable).

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. Install disconnect switches and enclosed circuit breakers level and plumb.
- B. Securely mount adjacent to equipment on wall or acceptable mounting frame.
- C. Wiring space within Disconnects, Fused Switches or Enclosed Circuit Breakers shall not be used for splices.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- E. Any installation that will occur inside the building must comply with Section 018119 Construction Indoor Air Quality.

3.02 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

END OF SECTION

SECTION 262913

ENCLOSED CONTROLLERS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Scope of work under this Section includes all requirements for motor controllers (starters) to be provided and/or installed under this contract.
- C. The Developer performing the Division 26 work shall furnish motor controllers for all motors shown unless the controllers are included with the equipment furnished under other divisions of these specifications. The Developer performing the Division 26 work shall install all motor controllers including all controllers not factory assembled into equipment furnished under other divisions of these specifications. All motors and motor controllers shall be complete and fully operational upon completion of the project.

1.02 RELATED DOCUMENTS

- A. See Section 262400 for Arc Flash Study requirements.
- B. Motor controls shall conform to NEMA standards for each specific purpose and be U.L. listed.
- C. The following related sections are applicable to this work
- D. Section 018113 Sustainable Building Requirements

1.03 MOTOR VOLTAGE INFORMATION

- A. Voltages available are 208 and 480 volt three-phase; or 120, 208 and 277-volt single-phase. Circuits are designed (in general) for motors with voltage ratings as follows:
 - 1. Smaller than 1/2 HP - 115 volts, single-phase.
 - 2. 1/2 HP and larger - 208 or 460 volts, three-phase.
- B. Obtain submittals and shop drawings and verify motor sizes and voltages provided under other Divisions prior to commencing work.

PART 2 PRODUCTS

2.01 MOTOR STARTERS

- A. Magnetic motor starters: Shall conform to or contain items called for below and unless noted otherwise, shall be full voltage non-reversing for NEMA size 3 and under. Starters larger than NEMA size 3 shall be closed transition, autotransformer or wye-delta type.

No starters smaller than NEMA size 0 and no half size starters are permitted. Wye-delta type must have motor designed for this use.

- B. Overload devices: Shall be melting alloy or bimetallic type. One overload shall be provided for each phase. Provisions shall be made for resetting the overload devices from outside the starter enclosure. Provide ambient compensated overload devices only when the motor is at a constant temperature and the controller is subject to a separate, varying temperature. Automatic reset overload devices are not permitted.
- C. Accessories: Each magnetic motor controller shall include phase loss protector, "HAND-OFF-AUTO" selector switch, 120 volt coil (unless noted otherwise), red running pilot light, green off pilot light, 100VA (minimum) control transformer (except for 115 volt motors), surge suppression kit, with fused primary and secondary, two spare auxiliary interlock contacts and all other accessories required or noted.
- D. Enclosures: All motor controllers shall be contained in an enclosure suitable for the environment in which the controller is mounted. Shall be NEMA 3R when exposed to weather.
- E. Combination motor controller: Shall be fused switch type (Class RK5), or motor circuit protector type rated for 22,000 RMS A.I.C. minimum and containing all accessories as listed above. If externally powered control circuits are used, provide an auxiliary switch on the disconnect switch or protector and fuse in lieu of the control transformer. Switch or protector shall be capable of being padlocked in the off position.
- F. Manual Starters: Shall be toggle switch type, lockable in the "off" position, with overload relays, pilot light and enclosure per above.

2.02 MANUFACTURER

- A. Allen Bradley or Square D.

2.03 2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.04 NAMEPLATES

- A. Provide engraved phenolic nameplates per Section 260553. Permanently attach (with mechanical fasteners) on each controller, nameplates with the following information: load and area served, voltage, phase and (when applicable) fuse size and type.

2.05 FAN SHUTDOWN RELAYS

- A. Developer shall provide relay(s) with sufficient contacts to shutdown all fans over 2000 cfm upon receipt of fire alarm. See Section 283100. Coordinate relay coil voltage with fire alarm system supplier.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 WIRING

- A. Provide wiring from branch circuit overcurrent device to motor controller to motor terminals, including installation of starter and all connections. Motor controllers provided under Division 26 shall be combination type. Where starters furnished under other Divisions of the specification do not include an integral disconnect switch, a separately mounted disconnect switch shall be provided. Coordinate other control wiring with Division 23 of the Specifications. Provide overload elements in controllers sized to match motor nameplate full load amperes. Space within controllers shall not be used as a junction box.

3.02 SUPPORTS

- A. Securely mount to equipment, wall or acceptable mounting frame suitable to withstand earthquake forces.

3.03 FAN SHUTDOWN WIRING

- A. Provide 3/4" raceway with 2 #14 AWG conductors from each fan motor controller to the fire alarm shutdown relay(s). Provide wiring of interlock connections for all (over 2000 CFM) fan starter control circuits via Division 26 furnished fan shutdown relay to shutdown fans upon receipt of fire alarm.

END OF SECTION

SECTION 263000

FACILITY ELECTRIC POWER GENERATING AND STORING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide an engine-generator set together with all required operating accessories properly assembled to give a complete and fully operational power generation system. The engine and alternator shall be the product of one manufacturer or a combination of two manufacturer's equipment regularly assembled by the supplier as a complete package in this size and configuration.
- C. The equipment manufacturer(s) and the authorized supplier shall have complete responsibility for the performance of the engine-generator set and its accessories. Set shall be new, latest production model factory assembled and tested prior to delivery to job site.
- D. Mount generator as a fully enclosed sound attenuated modular enclosure, designed for a maximum noise of 60dBA at 100 feet, to be skid mounted. Entire unit shall be self-contained to be dropped into the location indicated on the floor plan drawings.
- E. Provide all necessary controls and accessories which, used with the engine-generator set, will make a complete operating package for installation up to 500 feet above sea level in an ambient temperature of 40 degrees C. maximum, -10 degrees C. minimum.

1.02 RELATED DOCUMENTS

- A. Refer to Division 33 for natural gas service specifications.
- B. The following related section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 TO QUALIFY AS AN ACCEPTABLE MANUFACTURER AND/OR SUPPLIER

- A. Fulfill the following requirements:
 - 1. Shall have been in the business of distributing and/or installing and maintaining the specific type of engine-generation equipment under the present firm name for at least five years.
 - 2. Shall have the capability of dispatching a maintenance or repair truck with a qualified factory trained repairman and spare parts to the job site within four (4) hours of a request for service on the equipment.

3. Equipment shall be the product of a firm that has regularly assembled and/or manufactured such equipment for at least five years.
4. Bidders will not be considered unless there is a local office (within 100 miles of project site) with six or more factory-trained representatives who have been under their direct employment for a period of at least one year. All bidders shall maintain a stock of spare parts that would minimize system down time in case of a component failure. Parts and service support shall not require crossing of international borders.
5. Shall be authorized engine distributor for the prime mover.

1.04 APPLICABLE CODES AND STANDARDS

- A. The generator set and its installation and on-site testing shall conform to the requirements of the following codes and standards:
 1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
 2. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.
 3. IEC 8528 part 4. Control Systems for Generator Sets.-
 4. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
 5. NEMA ICS 10-1993 – AC Generator sets.
 6. NFPA 70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
 7. NFPA 110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.
 8. UL 2200. The genset shall be listed to UL 2200 or submit to an independent third party certification process to verify compliance as installed.
- B. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.05 RATING

- A. The engine-generator set rating shall be based on operation of the set when equipped with all the necessary operating accessories (radiator fan, exhaust silencer, air cleaners, lubricating oil pump, lubricating oil filters, fuel priming pump, fuel injection pump, jacket water pump, governor, alternating current generator and exciter regulator).
- B. The engine-generator set shall be capable of producing not less than rated KW (with a 0.8 power factor load) continuously for standby power applications at the altitude and ambient temperature conditions as noted above.
- C. On closing of the starting contact, engine generator shall be capable of accepting full rated load and stabilizing at rated voltage plus or minus (+/-) 5 percent of rated frequency, within 8 seconds.

1.06 SERVICE EQUIPMENT SIGN

- A. Provide a sign at the service entrance main disconnect(s) to identify type and location of on-site emergency power source per NEC 700-8.

1.07 SHOP DRAWINGS & SUBMITTAL DATA

- A. Prepare and submit for review prior to manufacture. Include the following information:
- B. Dimensioned clearance drawings of the engine generator set including bolting template, earthquake restraints, and location of all stub ups for fuel and electrical connections.
- C. Literature describing the engine-generator set including the following data in tabulated form:
 - 1. Engine make and type
 - 2. Number of cylinders
 - 3. Make and type of generator
 - 4. Generator electrical rating KVA, KW power factor and winding arrangement and voltage configuration.
 - 5. Number and type of bearings (for generator and for engine)
 - 6. Type of exciter and voltage regulator
 - 7. Type and manufacturer of engine governor
 - 8. Certification of factory vibration test report and torsional analysis
 - 9. Certified engine horsepower curves
 - 10. Engine generator control and monitoring panel
- D. Drawings and/or literature describing the accessories including:
 - 1. Batteries and rack
 - 2. Battery charger and wiring diagrams
 - 3. Jacket water heater
 - 4. Silencer, exhaust adapter and other exhaust system components
 - 5. Remote annunciator descriptions and wiring diagrams
 - 6. Control wiring diagrams
 - 7. Sound attenuated enclosure.

1.08 WARRANTY

- A. The generator set and associated equipment shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.
- B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.
- C. The warranty shall be from the single source manufacturer of the complete generator covering engine, alternator, and controls. Multiple warranties are not allowed.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acceptable manufacturers of Engine-generator set and accessories: Cummins Power Generation, Caterpillar, Kohler, and Pacific Power Products – MTU Detroit Diesel (aka MTU On-Site Energy).

2.02 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.03 GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 480Y/277 volts AC, three phase, four wire, 60 hertz.
2. The generator set shall be rated at designed KW rating at 0.8 PF, standby rating, based on the following site conditions: Altitude 500ft; ambient temperatures up to 40 degrees C.
3. The generator set rating shall be based on emergency/standby service.
4. Provide on-board main circuit breakers with ratings to match rated generator full load output at rated voltage. Circuit breakers shall be insulated case type and selectively coordinate with the downstream loads per Section 262400.

B. Performance

1. Voltage regulation shall be plus or minus 1.0 percent for any constant load between no load and rated load for both parallel and non-parallel applications. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
3. The natural gas engine generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, after applicable de-rating factors, with the engine generator set at operating temperature.
4. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic. Telephone influence factor shall be less than 40.

C. Construction:

1. The engine generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.
2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel.
3. Generator set control interfaces to other system components shall be made on a common, permanently labeled terminal block assembly.

2.04 ENGINE AND ENGINE EQUIPMENT

- A. The engine shall be natural gas fueled as the primary fuel source, radiator and fan cooled. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Engine accessories and features shall include provisions (provide piping stubs and valves and space) for a future automatic changeover to liquid propane in the event of loss of natural gas fuel source.
- B. The engine generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails. Vibration isolators shall be provided between the engine/alternator and the generator set base.
- C. An electronic governor system shall provide automatic isochronous frequency regulation.
- D. Skid mounted radiator and cooling system:
 1. Rated for full load operation in 104 degrees F (40 degrees C) ambient as measured at the generator air inlet, based on 0.5 in H₂O external static head.
 2. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment.
 3. Radiator shall be provided with a duct adapter flange.
 4. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture.
 5. Rotating parts shall be guarded against accidental contact.
- E. Electric starter(s) capable of three complete cranking cycles without overheating.
- F. Positive displacement, mechanical, full pressure, lubrication oil pump.
- G. Full flow lubrication oil filters with replaceable spin on canister elements and dipstick oil level indicator.

- H. Provide a complete engine fuel system, including all pressure regulators, strainers, and control valves. The fuel system shall be plumbed to the generator set skid for ease of site connections to the generator set.
- I. Replaceable dry element air cleaner with restriction indicator.
- J. Flexible supply fuel line.
- K. Provide automatic fuel transfer valve that automatically switches the fuel source from natural gas to propane source.
- L. Engine mounted battery charging alternator, 40-ampere minimum, and solid state voltage regulator.
- M. Coolant heater
 - 1. Engine mounted, thermostatically controlled, coolant heater(s) for engine. The coolant heater shall be UL499 listed and labeled.
 - 2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall be installed using quick disconnect couplers to isolate the heater for replacement of the heater element. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
 - 3. The coolant heater shall be provided with a 12VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.
 - 4. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 100F (40C) in a 40F ambient, in compliance with NFPA 110 requirements, or the temperature required for starting and load pickup requirements of this specification.
- N. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.
- O. Starting and Control Batteries shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors.
- P. A UL listed/CSA certified 10 amp voltage regulated battery charger shall be provided for each engine generator set. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:
 - 1. Loss of AC power red light
 - 2. Low battery voltage red light
 - 3. High battery voltage red light
 - 4. Power ON green light (no relay contact)

5. Charger shall include an Analog DC voltmeter and ammeter, 12 hour equalize charge timer, and AC and DC fuses.

2.05 AC GENERATOR

- A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees Centigrade.
 1. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.
 2. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

2.06 ENGINE GENERATOR SET CONTROL:

- A. A NEMA 1 enclosed control panel shall be mounted on the generator set with vibration isolators. The control shall be vibration isolated and prototype tested to verify the durability of all components under the vibration conditions encountered. The generator set mounted control shall include the following features and functions:
- B. Three-position control switch labeled RUN/OFF/AUTO. In the RUN position the generator set shall start and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal the automatic transfer switch to start and accelerate to rated speed and voltage.
- C. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
- D. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power.
- E. Generator Set AC Output Metering: The generator set shall be provided with a metering set with the following features and functions:
 1. Analog AC Voltmeter dual range, 90 degree scale, 2% accuracy, Analog AC Ammeter, dual range, 90 degree scale, 2% accuracy, Analog Frequency/RPM meter, 45 65 Hz, 1350 1950 RPM, 90 degree scale, +/- 0.6 Hz accuracy.
 2. Seven-position phase selector switch with OFF position to allow meter display of current and voltage in each generator phase. When supplied with reconnectable generators, the meter panel shall be reconnectable for the voltage specified.
- F. Generator Set Alarm and Status Display: The generator set shall be provided with alarm and status indicating lamps to indicate non automatic generator status, and existing

alarm and shutdown conditions. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on the display panel:

1. low oil pressure (alarm)
2. low oil pressure (shutdown)
3. low coolant temperature (alarm)
4. high coolant temperature (alarm)
5. high coolant temperature (shutdown)
6. low coolant level (shutdown)
7. overcrank (shutdown)
8. overspeed (shutdown)
9. low fuel (alarm)

G. Engine Status Monitoring: The following devices shall be provided on the generator set control :

1. engine oil pressure gauge
2. engine coolant temperature gauge
3. engine operation hour gauge
4. battery voltage (DC volts)

H. Engine Control Functions. The control system provided shall include a cycle cranking system, which shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods. Fail to start shall be indicated by operation of the overcrank alarm indication lamp. The control system shall also include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification.

I. Alternator Control Functions:

1. The generator set shall include an automatic voltage regulation system which is matched and prototype tested with the governing system provided. It shall be immune from misoperation due to load induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The system shall include a torque matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of 58 to 59 HZ.
2. Voltage adjusting rheostat, locking screwdriver type, to adjust voltage +/-5% from rated value;

J. The generator set shall be provided with a mounted main line circuit breaker, sized to carry the rated output current of the generator set on a continuous basis.

2.07 OUTDOOR WEATHER-PROTECTIVE SOUND ATTENUATING ENCLOSURE

A. The generator set shall be provided with a sound-attenuated housing which allows the generator set to operate at full rated load in the ambient conditions previously specified.

- B. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 70 dBA at any location 7 meters from the generator set in a free field environment.
- C. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustical materials used shall be oil and water resistant. No foam materials shall be used unless they can be demonstrated to have the same durability and life as fiberglass.
- D. The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. Key-locking and padlock-able door latches shall be provided for all doors. Door hinges shall be stainless steel.
- E. The enclosure shall be provided with an exhaust silencer that is mounted inside of the enclosure, and allows the generator set package to meet specified sound level requirements. Silencer and exhaust shall include a raincap and rainshield.
- F. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color. All surfaces of all metal parts shall be primed and painted.
- G. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.
- H. Engine-generator set and all associated components shall be contained within a custom made heavy-gauge steel, lockable, vandalproof, weatherproof enclosure with automatic opening intake and cooling air exhaust dampers. Other custom modifications include those required to accommodate fuel tank, radiator guard, muffler guard, lockable fuel and radiator caps. Provide thermostatically controlled 500W, 120V heater in bottom of housing to keep the entire unit warm and prevent condensation. Prime paint enclosure all sides. Finish with two coats of exterior enamel.

2.08 FUEL, PIPING, EXHAUST AND VENTILATION

- A. Refer to Division 23. The coordination of the mechanical and piping systems with the generator set installation shall be the responsibility of the generator set supplier.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SEQUENCE OF OPERATION

- A. Generator set shall start on receipt of a start signal from the automatic transfer switch (ATS).
- B. The generator set control shall initiate the starting sequence for the generator set.

- C. The starting sequence shall include the following functions:
 - 1. The engine shall accelerate to rated speed and the alternator to rated voltage. Excitation shall be disabled until the engine has exceeded programmed idle speed, and regulated to prevent over voltage conditions and oscillation as the engine accelerates and the alternator builds to rated voltage.
 - 2. When all start signals have been removed from the generator set, the generator set control shall switch off the excitation system and shall shut down.
 - 3. Any start signal received after the time stop sequence has begun shall immediately terminate the stopping sequence and return the generator set to isochronous operation.

3.02 FACTORY TESTING

- A. The generator set supplier shall perform a complete operational test on the generator set prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.
- B. Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup, and function of safety shutdowns.

3.03 INSTALLATION

- A. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.
- B. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- C. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- D. Equipment shall be initially started and operated by representatives of the manufacturer.
- E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.
- F. Ground emergency generator as a separately derived system per NEC requirements. Provide ground rods, grounding electrode conductors, etc. Bond the neutral and ground at the generator together.

3.04 ON-SITE ACCEPTANCE TESTING:

- A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor.
- B. Installation acceptance tests to be conducted on site shall include a "cold start" test, a two-hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.
- C. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.
- D. A certified copy of the test record shall be included in the O & M manual.

3.05 TRAINING

- A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons.

3.06 SERVICE AND SUPPORT

- A. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.
- B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

3.07 OPERATION AND MAINTENANCE MANUAL

- A. Provide per Section 260500 with additional information as noted below.
 - 1. Shall contain step by step instructions for startup and shutdown. The first page shall contain the name, address and phone number of the local representative to be called for service or parts. This shall be followed by a complete parts lists by actual ordering catalog numbers. Manual shall also contain four copies each of test record forms and service record forms for County use. These forms shall show the proper interval for test, servicing and replacement of all components, lubrication, filters, anti-freeze, etc., including recommended specifications for all lubricants.
 - 2. A single copy of the service record forms, recommended operation and service practices for the unit shall be sealed in plastic and wall mounted in the generator room.
 - 3. Instruction on maintenance procedures shall include proper interval for system tests and duration, replacement interval for fuel, oil and air filters; lube oil and coolant change; interval for fluid level checks (i.e., fuels, oil, lube oil, coolant and battery levels) as contained in the O & M manual test and service record forms.
 - 4. Instructions shall be coordinated with those furnished under Section 263600, Transfer Switches.

END OF SECTION

SECTION 263300

BATTERY INVERTER UNIT

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.

1.02 RELATED SECTIONS

- A. The following section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 DESCRIPTION

- A. Provide uninterruptible battery inverter unit and emergency power system complete and fully operational.
- B. Under normal mode the connected load shall be on. Under emergency mode the unit shall provide rated output power for a minimum period of 90 minutes. In the event of power failure, the batteries shall supply the load. Upon restoration of line power, the unit shall recharge its battery system and maintain it at full charge. Transfer between the normal, emergency, and generator mode shall be fully automatic and without interruption of power to the load. Output shall be 277V, single phase (normally on).

1.04 WARRANTY

- A. The unit shall be guaranteed against defective workmanship and material for a period of one year after final acceptance. Lead calcium batteries shall be warranted for 10 years, 5 years full replacement and 5 years prorated. Warranty shall be confirmed by warranty registration card supplied with each unit.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Chloride, Lithonia, Holophane, or Exide.

2.02 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.03 BATTERIES

- A. Shall be sealed lead calcium type. The batteries shall be specifically designed for long life "stand-by" applications. Batteries shall have sufficient capacity to power the inverter at the rated load for a minimum of 90 minutes. The batteries must operate in an ambient temperature of 104 degrees F (40 degrees C).

2.04 BATTERY CHARGER

- A. Shall be completely automatic, solid state, dual rate and shall be capable of providing 90% battery charge in twelve (12) hours or less. The charger may be a constant voltage type (with temperature compensation) self-protected from short-circuit in its output. The charger shall provide a float rate charge to maintain the batteries at their full charge with minimum water use. Charger shall include a DC voltmeter and ammeter.

2.05 INVERTER

- A. Volt-ampere and voltage ratings as per design. The output frequency shall be 60 Hertz +/-2%. The voltage regulation shall be better than 7% for 10-100% load and high to low battery. The output waveform shall be sinusoidal with less than 5% THD at full load. The maximum transfer time shall be less than 1 second. The inverter shall be capable of powering any combination of incandescent and fluorescent loads to 100% of its volt-ampere rating. A DC input voltmeter and AC output voltmeter and ammeter shall be provided integral to the inverter and mounted on the enclosure. Shall be capable of powering switched loads to its full volt-ampere rating.

2.06 ENVIRONMENTAL CONDITIONS

- A. The battery inverter unit shall operate at full ratings in temperatures from 68 to 86 degrees F in a dry location, without the use of supply fans or other mechanical cooling.

2.07 CONTROL AND SUPERVISION

- A. The battery inverter unit shall contain high/low battery voltage alarm, battery voltmeter, electrolyte level monitor/alarm, AC load voltmeter, test switch, automatic low voltage battery disconnect and Utility On pilot light. The electrolyte level monitor shall use an intrinsically safe battery probe or an optical system for level detection. The control system shall contain automatic battery loading controls to load the batteries. The system shall be set to use the batteries each three or six months to greater than 50% discharge by powering normally connected emergency lighting for at least one hour.
- B. System metering and controls shall consist of an alpha-numeric front panel display, normal, caution and alarm indicating alarms, fused battery disconnect switch, input and output disconnects, audible failure alarms with silence switch, dry contact for remote failure alarm, "D" type 9-pin AS/400 compatible computer interface connector, and battery monitor with alarm.

2.08 LOAD CENTER

- A. The battery inverter unit shall be equipped with internal load center with six 20 amp bolt-on circuit breakers. Circuit breakers shall be as specified in Section 262400 Switchboards and Panelboards of this specification.

2.09 ENCLOSURE

- A. All components of the battery inverter unit shall be contained within a steel enclosure with hinged doors. Provide lock and six keys. The enclosure shall have separate compartments for electronics and batteries. Provide with floor stand at bottom and wall bracket at top.

2.10 SOFTWARE

- A. Provide PC format diagnostic software.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 WIRING

- A. Install all emergency system wiring separate from normal system wiring as required by NEC Article 700.

3.02 TESTS

- A. Test completed systems operation and verify that emergency lighting is provided for the required 1-1/2 hour period.

3.03 HOUSEKEEPING PAD

- A. Provide housekeeping pad as specified in Section 260500.

END OF SECTION

SECTION 263600

AUTOMATIC TRANSFER SWITCHES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide all automatic transfer switches complete, fully operational and fully tested. Conform to UL Standard 1008.

1.02 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.02 TYPE

- A. Transfer and retransfer to normal source shall be automatic. Automatic transfer switches shall be electrically operated, mechanically held and supplied with positive mechanical interlocking dual operator/switch mechanism. The main contacts shall be equipped with a safe manual override capability. UL 1008 listed meeting tables 21.1, 23.1, and 23.2.
- B. Sensing and control logic may utilize solid state components mounted on printed circuit boards. Construction shall allow individual function replacement in the field without requiring replacement of the complete solid state package. The control panel shall meet or exceed the voltage surge withstand voltage test in accordance with IEEE/ANSI C37.90a-1974.

2.03 RATING

- A. Shall have voltage, amperage and ampere withstand ratings per design.

- B. Transfer switches used to transfer from normal to emergency power shall be approved for emergency service, full continuous ampere rated (no derating) with make rating at 20 times and break rating at 6 times full load current rating.

2.04 ACCESSORIES

- A. The following accessories shall be provided as a minimum in addition to those normally required for proper operation.
 1. Full three phase voltage failure with adjustable drop out and pick up. Set at 80% dropout, 90% pick up.
 2. Signals. Two pilot lights for indicating transfer position. Green - normal, red - emergency at transfer switch. Auxiliary contacts for remote pilot lights.
 3. Test switch. For simulating power failure.
 4. Time Delay Before Engine Starting: Adjustable ride through feature of approximately 0-10 seconds for start of engine generator and transfer on momentary loss of normal source. Set at 1 second. Include two auxiliary contacts, 1 N.O. and 1 N.C. for use for engine start signal.
 5. Retransfer. Adjustable time delay (with emergency failure by-pass) of 0 to 30 minutes for retransfer to normal. Set at 15 minutes.
 6. Generator Condition. Voltage and frequency sensitive lockout relay. Prevents transfer until voltage and frequency of generator have reached preset rating. Set at 95%.
 7. Time Delay Neutral - Provide time delay with transfer switch in neutral position and load disconnected from either source, adjustable 0.2 to 50 seconds, to prevent transfer between sources when sources are significantly out of phase for transfer switches. Set at 5 seconds.
 8. Block Transfer and Load Shed Relays - Provide relays in transfer switches and to prevent automatic transfer until a signal is received from the emergency generator control switchboard, and to initiate load shedding by driving the transfer switch to the neutral position.
 9. Phase Reversal Relay. Sensing relay to prevent transfer to new source when phases are reversed from designed phasing.
 10. Exerciser Clock. Shall set the day, time and duration of the generator exercise period and shall include a selector switch for choosing exercise with load transfer, without load transfer, or for bypassing the exercise period.
 11. Elevator Signal Contacts: Provide two time delay contacts that open 1-120 seconds (adjustable) before transfer in either direction and reset after transfer.
 12. Lighting controls – Provide two NO/NC auxiliary contacts for emergency lighting override.

2.05 ENCLOSURE

- A. Each transfer switch shall be enclosed in an enclosure suitable for the environment in which it is located, with front opening lockable door. Provide enclosure suitable for front and side access only.

2.06 SHOP DRAWINGS

- A. Prepare and submit detailed shop drawings for review prior to manufacture. Include the following information: wiring diagrams, dimensions, front view and catalog information indicating complete electrical and mechanical characteristics.

2.07 NAMEPLATES

- A. Provide engraved phenolic nameplates per Section 260553.

2.08 MANUFACTURER

- A. All transfer switches shall be of the same manufacturer. Acceptable manufacturers are: Automatic Switch Company, Caterpillar, Russelectric, and Cummins.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 MOUNTING

- A. Wall mounted or free standing assembly with housekeeping pad. Bolt to wall and/or floor in a manner similar to that for switchboards and/or panelboards. Verify space available with equipment sizes and code required working clearances prior to submittal of shop drawings.

3.02 OPERATION TEST

- A. Provide testing of transfer system coordinated with generator set and start control panel to ensure proper operation of transfer devices under actual operating conditions. Monitor and verify correct operation and timing of the following applicable items:
 1. Normal voltage sensing relays.
 2. Emergency voltage sensing relays.
 3. Test switch.
 4. Time delay neutral.
 5. Engine start sequence.
 6. Time delay upon transfer.
 7. Interlocks and limit switch function.
 8. Timing delay and re-transfer upon normal power restoration.
 9. Engine cool-down time delay and shutdown.
 10. Lighting controls override.

3.03 SEQUENCE

- A. Any automatic transfer switch sensing loss of power shall start the emergency generator set and the set shall continue to run until after all transfer switches have returned to normal power (engine cool-down timer part of emergency generator set).

3.04 OPERATION AND MAINTENANCE MANUALS

- A. Provide per Section 260500. Manuals shall in addition contain the following information:
 1. Recommended testing and service intervals and routine maintenance.
 2. Test and service record forms showing proper intervals for tests.

3. The first page of the manual shall contain the name, address and phone number of the local representative to be called for service and parts.

3.05 INSTRUCTION

- A. The Contractor shall conduct an instruction session during which all maintenance and operational aspects of the system will be described and demonstrated to personnel selected by the County in conjunction with instruction period for Generator System Equipment, Section 263000. The session shall be conducted by a Contractor's representative thoroughly familiar with the characteristics of the system. O & M manual information regarding the system shall be turned over to King County prior to scheduling the instruction session.

3.06 WARRANTY

- A. The manufacturer shall warranty the transfer switches against failures which result, under normal use and service, from defects in workmanship and materials. Warranty shall be for parts and labor for two years from date of "Substantial Completion" and for parts for an additional three years after the expiration of the first two-year period.

END OF SECTION

SECTION 264313

TRANSIENT VOLTAGE SUPPRESSION FOR LOW VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide all TVSS equipment complete, fully operational and fully tested. Work includes complete installation, electrical testing and commissioning.

1.02 RELATED SECTIONS

- A. The following section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 QUALITY ASSURANCE

- A. Comply with the National Electrical Code (NEC), NEMA and IEEE Standards as applicable to wiring methods, construction and installation of TVSS devices. Comply with applicable requirements of ANSI/IEEE C62.41, C62.45; NFPA 20, 70, 75 and 78, and UL 1449. Provide complete packaged units, which have been UL listed and labeled by Underwriters Laboratory. UL surge ratings (UL 1449, February 2007 Edition (2.5) must be permanently affixed to the TVSS device.
- B. The short circuit rating shall be indicated on the device.

1.04 WARRANTY

- A. Manufacturer shall provide a product warranty for a period of not less than five years from date of installation. Warranty shall cover unlimited replacement of TVSS modules during the warranty period.

1.05 SUBMITTALS

- A. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, component and connection locations, mounting provisions, connection details and requirements, including breaker size, and wiring diagram.
- B. Equipment Manual: The manufacturer shall furnish an installation manual with installation, start-up and operating instructions for the specified system.

- C. Installation instructions shall clearly state if the system requires an external overcurrent device to maintain the system's UL 1449 listing.
- D. A UL 1449 stipulation, signed by the manufacturer's authorized representative, is required for all submittals. The stipulation shall:
 - 1. Certify that the TVSS system is UL 1449 listed.
 - 2. Indicate what internal or external fusing is incorporated in the TVSS system and what impact the fusing has on the performance of the device. (i.e. surge capacity and clamping levels).
- E. Provide minimum single-pulse surge current testing documentation on each model proposed for locations per specification.
- F. Documentation of filter performance for stand-alone and system requirements per the specification.
- G. Documentation showing operational test set which can verify the clamping voltage of unit. Factory trained representative shall include start-up and testing as part of the requirements of this specification.
- H. Breaker and wire size requirements shall be indicated.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide high-energy transient voltage surge suppression electronic filter devices, suitable for application in Category A, B, and C environments as indicated. Provide types, sizes, ratings and electrical characteristics indicated which comply with manufacturer's standard materials, design and construction in accordance with published information and as required for a complete installation.
- B. SPD stands for "surge protective device" where used herein.

2.02 MATERIAL STANDARDS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.

2.03 TVSS SYSTEM DESCRIPTION

- A. Provide TVSS devices, which comply with the following:
 - 1. Have operating temperature of -40 to + 122 degrees F and operate reliably in environments with 0 to 95% humidity (non-condensing).
 - 2. Emit no audible noise and capable of operation of up to 12,000 feet above sea level and emit no appreciable magnetic field.

3. Have a maximum continuous operating voltage not less than 125% of the nominal system operating voltage for 120/208 volt systems, 125% for 277/480 volt systems, and a frequency operating range of 47 to 63 Hertz.
 4. Provide protection modes for line-to-neutral, line-to-line, line-to-ground, and neutral-to-ground for three-phase, 4-wire wye systems.
- B. The system protection modules shall contain a linear array of balanced metal oxide varistors (MOV). Each MOV will be individually fused. Silicon avalanche diodes and gas tubes are not to be used or other components, which may short or "crowbar" the AC line and lead to possible disruption of the normal AC power flow.
 - C. All primary transient path wiring shall be of #8 AWG copper minimum or via bus bar of equivalent capacity to provide equal impedance interconnection between phases. No plug-in modules, components or printed circuit boards shall be used in surge carrying paths.
 - D. Each protection module shall have a visual indicator that signifies the protection circuitry is on line. A redundant status indicator shall be mounted on the front of the panel.
 - E. Each protection module shall have a capacitive filtering system connected in each Line to Neutral (L→N)(Wye) mode or Line to Line (L→L)(Delta) mode to provide sine wave tracking and better performance of the protection modules.
 - F. The fusing elements must be capable of allowing the suppressor's minimum rated transient current to pass through suppressor, at a minimum 1,000 times, without fuse operation.
 - G. Manufacturers shall submit independent test data from a nationally recognized testing laboratory verifying that the TVSS unit can withstand its rated single impulse surge current.
 - H. Protection modes: The TVSS shall provide Line to Neutral (L→N)(Wye), Line-to-Ground (L→G) (Wye or Delta), Line-to-Line (L→L)(Delta) and Neutral-to-Ground (N→G)(Wye) protection.
 - I. Each unit shall include a UL 1283 listed filter, which shall reduce low-level fast rise-time electrical line noise as follows per NEMA LS-1 guidelines:

<u>Frequency</u>	<u>Insertion Loss</u>	<u>Frequency</u>	<u>Insertion Loss</u>
100 kHz	34 dB	1 MHz	51 dB
10 kHz	54 dB	100 MHz	48 dB

- J. Provide each unit with status indicators.
- K. The SPD shall be rated for the available fault current of 65,000 amps, and shall be labeled with its rating.

2.04 UNITS INSTALLED AT MAIN SERVICE PANEL

- A. Acceptable Manufacturers and Models:

1. LEA International Inc. - Gb200s
2. Current Technology - TG150
3. Liebert - S1032
4. Eaton - CPS200
5. No other Manufacturers will be accepted.

B. Device shall meet all specification requirements in Paragraph 2.03, except as follows:

1. Equipment shall be a multi-stage parallel protector rated for VAC, 480Y/277 3-phase, 4-wire, plus ground. The equipment's minimum surge current capacity shall be 300,000 Amps per phase (L-N plus L-G).

C. The system protection modules shall contain a linear array of balanced metal oxide varistors (MOV). Each MOV will be individually fused. Each protection module shall have a minimum surge current rating of 150,000 Amps per mode. Each protection module shall be capable of withstanding over 1,000 sequential 10,000 Amp ANSI/IEEE C62.41 Category C3 impulses without degradation or failure.

D. TVSS units shall be provided as an integral component of the switchboard. Provide overcurrent protection for TVSS units in sizes and types as recommended by the manufacturer for a UL-listed assembly. Options should be mounted on a remote panel that can be installed on the outside of the switchboard or switchgear equipment.. Refer to Section 262400 Switchboards and Panelboards.

2.05 UNITS INSTALLED AT DISTRIBUTION PANELS DOWNSTREAM OF THE SERVICE ENTRANCE

A. Acceptable Manufacturers and Models:

1. LEA International Inc. - GB100
2. Current Technology - TG100
3. Liebert - LM100
4. Eaton - CPS200
5. No other Manufacturers will be accepted.

B. Device shall meet all specification requirements in Paragraph 2.03 in this specification section, except as follows:

Equipment shall be a multi-stage parallel protector rated for VAC, 208Y/120 3-phase, 4-wire, plus ground. The equipment's minimum surge current capacity shall be 200,000 Amps per phase (L-N plus L-G).

C. The system protection modules shall contain a linear array of balanced metal oxide varistors (MOV). Each MOV will be individually fused. Each protection module shall have a minimum surge current rating of 100,000 Amps per mode. Each protection module shall be capable of withstanding over 1,000 sequential 10,000 Amp ANSI/IEEE C62.41 Category C3 impulses without degradation or failure.

2.06 UNITS INSTALLED AT PANELBOARDS

A. Acceptable Manufacturers and Models:

1. LEA International Inc. – PBS
 2. Current Technology – EGP 80
 3. Liebert – LPG
 4. Eaton - CPS160
 5. No other Manufacturers will be accepted.
- B. Device shall meet all specification requirements in Section 2 except as follows:
1. Equipment shall be a multi-stage parallel protector rated for 208Y/120 volts, 3 phase, 4 wire, plus ground. The equipment's minimum surge current capacity shall be 160,000 Amps per phase (L-N plus L-G).
- C. The system protection modules shall contain a linear array of balanced metal oxide varistors (MOV). Each MOV will be individually fused. Each protection module shall have a minimum surge current rating of 80,000 Amps per mode. Each protection module shall be capable of withstanding over 1,000 sequential 10,000 Amp ANSI/IEEE C62.41 Category C3 impulses without degradation or failure
- D. TVSS units shall be provided as an integral component of the panel board. Provide overcurrent protection for TVSS units in sizes and types as recommended by the manufacturer for a UL-listed assembly.

PART 3 INSTALLATION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. The specified TVSS system shall be installed no further than eighteen (18) electrical inches from the power conductor(s) it is protecting, and must have a grounding resistance of 25 Ohms or less.
- B. Install devices in accordance with manufacturer's written installation and operation manuals. Have factory trained representative provide factory start-up and initial clamp voltage testing to show each unit is clamping within tolerance, installed properly and functioning correctly.
- C. The installing contractor shall install service entrance SPD with short and straight conductors as practically possible. The contractor shall twist the SPD input conductors together to reduce input conductor inductance.
- D. When mounted internally to the power distribution equipment, the SPD shall be close-nipped to the panel and be supplied by a breaker sized per the SPD manufacturer's recommendation, and with the appropriate number of poles.
- E. Factory trained ISO 9001 certified service division employees shall be required to perform a site inspection. Site inspection shall include verification of proper SPD installation, correct SPD voltage application, and startup procedures.

- F. Contractor to provide CB or molded case switch sized per manufacturer's recommendations for units not provided with internal disconnects.
- G. Contractor to provide wiring from panel to TVSS device per manufacturers recommendations.

END OF SECTION

SECTION 265000

LIGHTING

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide lighting system complete and fully operational.

1.02 RELATED SECTIONS

- A. The following section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 REFERENCES

- A. National Electrical Manufacturer's Association (NEMA) LE5-1993:
 - 1. Procedure for determining Luminaire efficiency ratings.
- B. Underwriters Laboratories, Inc. (UL):
 - UL 496: Edison Base Lampholders
 - UL 542: Lampholders, Starter Holders for Fluorescent Lamps
 - UL 924: Emergency Lighting and Power Equipment
 - UL 935: Fluorescent Lamp Ballasts
 - UL 1029: HID Lamp Ballasts
 - UL 1570: Fluorescent Lighting Fixtures
 - UL 1572: High Intensity Discharge Lighting Fixtures
- C. American National Standards Institute:
 - ANSI C136-15-1986 American National Standards Institute, "High-Intensity-Discharge and Low-Pressure Sodium lamps in luminaires - Field Identification."

1.04 SUBMITTALS

- A. For standard catalog items, provide original product sheets, -neatly and clearly marked-to indicate that light fixture, ballasts and lamps fully comply with contract documents. Include photometric report by an independent certified testing laboratory when required in fixture schedule. Manufacturer's test report is not acceptable.
- B. Submittals shall have fixture types and project name clearly indicated and shall be prepared by the authorized manufacturer's representative serving the project area. A list of

manufacturer's representatives (including address, telephone and fax numbers) identifying which light fixture types they represent shall be included with submittals.

- C. Product Samples, complete with housing, trim with 8' cord, plug, and specified lamp shall be submitted if requested.

1.05 QUALITY ASSURANCE

- A. All fixtures and components shall be new and listed by Underwriters Laboratories (UL) or other testing lab acceptable to local jurisdiction.

1.06 WARRANTY

- A. Ballasts: Provide manufacturer's warranty for a period of not less than five years. Warranty shall include parts and labor to replace defective ballasts.
- B. Exit Signs Utilizing LED Lamp Technology: Provide manufacturer's warranty for a period of not less than five years including parts and labor for full replacement of defective product.

1.07 EXTRA MATERIALS

- A. Ballasts: Provide one case or 10% (whichever is less) of each type used on the project. Turn over to King County.
- B. Lamps: Provide one case or 10% (whichever is less) of each type used on the project. Turn over to King County.
- C. Fuses: Provide one case or 10% (whichever is less) of each type used on the project. Turn over to King County.

PART 2 PRODUCTS

2.01 GENERAL MATERIAL REQUIREMENTS

- A. All adhesives, sealant, paints, and coatings used in installation of electrical systems must comply with VOC content levels, per Section 018113.
- B. Electrical wires and cabling shall be lead-free.
- C. Interior Light Fixtures: Finish ferrous mounting hardware and accessories to prevent corrosion and discoloration to adjacent materials.
- D. For weatherproof or vaportight installations, painted finishes of fixtures and accessories shall be weather resistant enamel using proper primers or galvanized and bonderized epoxy, so that the entire assembly is completely corrosion resistant for the service intended. Where aluminum parts come into contact with bronze or steel parts, apply a coating material to both surfaces to prevent corrosion.

- E. Fixtures shall be free of light leaks and designed to provide sufficient ventilation of lamps to provide the photometric performance required. Ballasts and transformers shall be adequately vented.
- F. All sheet metal work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. Intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. Finish exposed edges so no sharp or ragged edges are exposed. All miters shall be in accurate alignment with abutting intersecting members.
- G. Lampholders shall hold lamps securely against normal vibrations and maintenance handling.
- H. Light fixtures containing lamps which require protective shielding shall have tempered glass lenses.
- I. For adjustable fixtures, provide positive locking devices to fix aiming angle. Fixture shall be capable of being relamped without adjusting aiming angle.
- J. Safety: Provide safety devices for removable fixture elements (cones, reflectors, lenses, etc.) to support removable elements when not in normal operating position. Safety devices shall be detachable if necessary and shall not interfere with fixture performance, maintenance or the seating of any fixture element, and not be visible during normal fixture operation.
- K. Exterior Fixtures
 - 1. Painted surfaces shall have an outdoor life expectancy of not less than 20 years without any visible rust or corrosion.
 - 2. All diffusing materials shall be UV stabilized.

2.02 FLUORESCENT FIXTURES

- A. Housing: Minimum code gauge steel or rigid aluminum construction painted after fabrication with high reflectance white paint (min. 89%).
- B. Frames:
 - 1. Supply with concealed hinges and latching. Provide mitered corners with no gaps or light leaks.
- C. Lamp Mounting:
 - 1. 1. Mount lamps used in programmed start circuits 430ma and below within 1/2" of grounded metal as long as the lamp.
 - 2. 2. For programmed start circuits using single lamp ballasts, provide one grounding lamp holder per lamp.

2.03 HIGH INTENSITY DISCHARGE (HID) FIXTURES:

- A. Housing: Minimum code gauge steel, bonderized or equal rust protected or rigid aluminum construction.

- B. Finish: Visible surfaces. Powder coated paint unless otherwise specified. Color as specified on drawings. Concealed parts, (lamp holders, yokes, brackets, etc.) matte black.
- C. Lamp Holder Housing: Cast aluminum with integral heat radiating fins to assure cool lamp base operation.

2.04 WIRING

- A. All wiring shall be as required by code for fixture wiring.
- B. All flexible cord wiring between fixture components or to electrical receptacle and not in wireways shall have a minimum temperature rating of 105°C.
- C. Cords shall be fitted with proper strain reliefs and watertight entries where required by application.
- D. No internal wiring shall be visible at normal viewing angles, i.e. above 45° from vertical.

2.05 BALLASTS:

- A. Fluorescent General Requirements:
 - 1. All T5 or T8 lamps shall be operated on programmed start ballasts only. Ballasts shall provide normal rated lamp life as stated by lamp manufacturers.
 - 2. Ballasts shall be HPF (greater than 90%), UL listed, and ETL certified. Magnetic ballasts shall be CBM certified. For projects applying for utility funding, ballasts shall meet utility requirements. Provide ballasts with thermal protection unless otherwise specified. Ballasts shall be Class P. Ballast shall have less than 10 percent Total Harmonic Distortion (THD).
 - 3. Confirm voltage requirements with Electrical Drawings. Ballasts shall operate lamps correctly within +/-10% voltage variation without damaging ballasts.
 - 4. Ratings:
 - a. "A" sound rating for 430 ma and 265 ma
 - 5. Low temperature, unconditioned, and/or outdoor application: Provide ballasts suitable for low starting temperature where light fixture is located outdoors, in any unconditioned space where subject to ambient air temperature will be below 50 degrees F.
- B. Magnetic Fluorescent Ballasts: In addition to the general requirements, provide magnetic ballasts as required and as follows:
 - 1. Energy saving type with a ballast factor not less than 95%.
 - 2. Each ballast individually protected by an in-line GMF fuse in a Bussman type HLR fuseholder.
 - 3. Manufacturers: Advance, GE/Magnatek, Robertson, as specifically noted in the Light Fixture Schedule, or approved equal.

- C. Electronic Fluorescent Ballasts: In addition to the general requirements, provide electronic ballasts where required in the Light Fixture Schedule as follows:
1. Ballasts in conformance with the following regulatory requirements:
 - a. EMI and RFI limits set by the FCC (CFR47, Part 18 and FCC Part 18,15j), IEEE Publication 587, Category A (transients).
 - b. Minimum efficiency standards of Public Law 100-357.
 - c. Starting sequence consistent with ANSI Standard C82.1-1993.
 2. Reduced light output ballasts (ballast factors below 87%) are not acceptable except as noted otherwise in the Light Fixture Schedule.
 3. Total harmonic distortion shall be less than 10% of the input current. Current crest factor shall be less than 1.7. Operating frequency shall be between 25 and 60 kHz with no visible flicker.
 4. Ballasts shall operate in ambient temperatures up to 105°F (40°C).
 5. Ballasts for single ended lamps shall be program start, with end of life protection.
 6. Manufacturers: Advance, GE/Magnatek, Universal/ESI, Osram/Sylvania or approved equivalent.
- D. High Intensity Discharge:
1. HPF type (minimum power factor 90%).
 2. Sound Rating: "low noise" or "extra quiet".
 3. Each ballast shall be individually protected by an in-line fuse in a Bussman fuse-holder type HLR for 120 and 277 volt, type HEX for 208, 240 and 480 volt.
 4. Metal Halide: Constant Wattage Autotransformer (CWA) except for lamps below 175 watts without igniters where high resistance auto transformer type will be acceptable. Use Advance Transformer "Smart Cap" ballast where required by lamp selection.
 5. Manufacturers Magnetic Ballasts: SLI, Osram Sylvania, Holophane, Jefferson, Advance, or Universal.
 6. Where ceramic metal halide lamps (Philips Master Color) are utilized, use electronic ballasts.
 7. Manufactured, Electronic Ballasts: 39 watt lamps, Aromat; 50 & 70 watt lamps, Aromat and Advance; 100 & 150 watt lamps, Aromat.

2.06 LAMPS

- A. Each lamp type in the Project shall be manufactured by the same manufacturer.
- B. Fluorescent:
1. Medium Bi-pin, T8 rapid start, compact TT and DTT; 3500K color temperature and 80+ Color Rendering Index (CRI).
 2. Manufacturers: General Electric, Philips, Osram or Sylvania.
- C. High Intensity Discharge Type
1. Refer to fixture schedule for specific metal halide lamps required.
 2. Acceptable manufacturers: General Electric, Osram Sylvania, Philips, or Venture.

2.07 SOCKETS

- A. Fluorescent: Suitable for lamp and ballast type employed.
- B. H.I.D.: Porcelain for mogul or medium base lamps, pulse rated as required. Keyed for all position oriented lamps. For other lamp types, as required by base type.

2.08 OUTDOOR LIGHTING STANDARDS

- A. Pole/Luminaire Assemblies and Bollards: Supply luminaires, davit arms, brackets, poles, handhole covers, base components and all other accessories for a complete assembly. Manufacturer shall be responsible for proper fitting of all elements and the structural integrity of the unit. Provide assembly to withstand 100 mph steady wind rated poles with 1.3 gust factor.
- B. Provide watertight insulating fuse and holder in the base of each lighting standard to individually protect each lighting fixture. Fuse holder similar to Buss style "HEX" (HEB permitted for 120V or 277V), with Buss fuse of appropriate ampacity and voltage. Provide fuse for each hot circuit wire; do not fuse neutral.

2.09 IDENTIFICATION

- A. All "HID" lighting fixtures shall be identified, as required by ANSI C136-15, no alternate method will be accepted. Per the ANSI standard the Markers for Metal Halide fixtures shall be 2-inch black letters on a 3-inch square red background.

PART 3 EXECUTION

Sections under PART 3 are provided as recommendations to the developer in order to achieve the desired results specified in the design criteria and performance specifications.

3.01 LIGHTING FIXTURES, GENERAL

- A. Provide mounting accessories and trims as required for wall and ceiling construction types.
- B. Fixture mounting assemblies shall comply with all local seismic codes and regulations.
- C. Install fixtures with vent holes free of air blocking obstacles.
- D. Lighting fixtures located in recessed ceilings with a fire resistive rating of 1-hour or more shall be enclosed in an approved fire-resistive rated box equal to that of the ceiling.
- E. Contractor shall be responsible for adjusting aperture rings on all recessed fixtures to be flush with the finished ceiling.
- F. Adjust variable position lampholders for proper lamp position prior to fixture installation.
- G. All finishes shall be unmarred upon project completion.

- H. Replace all burned out or inoperative lamps at the end of the construction prior to County occupancy.

3.02 DIFFUSERS AND ENCLOSURES

- A. Remove all dirty lamps, reflectors and diffusers; clean and reinstall. When cleaning "Al-zak" reflectors, use a manufacturer recommended cleaning solution.

3.03 ADJUSTMENT OF LIGHT FIXTURES

- A. Focus all adjustable light fixtures prior to the completion of the project, after normal business hours if required.

3.04 OUTDOOR LIGHTING STANDARDS

- A. Provide rebar reinforced concrete base. For bolted poles, provide galvanized anchor bolts and nuts and plumb to true vertical using a nut above and below the base plate on the anchor bolts. Pack grout between base plate and concrete base and provide drain hole below base plate to prevent accumulation of moisture inside pole base. Provide two piece or individual covers for nuts exposed above the baseplate of the same color as the pole. Ground pole and light fixture.

3.05 EXIT SIGNS

- A. Locate exit signs such that they are to the side or ends of drive aisles, between parking lines, so that the risk of collision with vehicles is minimized. Submit shop drawings that show all exit signs in plan and cross-section. Fully coordinate with the structure.

END OF SECTION

SECTION 271000

STRUCTURED CABLING

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes general requirements for all Division 13 work and is supplemental and in addition to the requirements of Division 1.
 - 1. It is the intention of this Division of the Specifications to establish minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Low Voltage Contractor's (LVC's) responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment, materials, devices and necessary appurtenances specified in Division 13 work to provide a complete system. Connect equipment and devices furnished and installed under other Divisions of this specification under this Division.
 - 2. The LVC shall provide all materials, appliances and apparatus not specifically mentioned herein, but which are necessary to make a complete, fully operational installation of all electrical systems described herein.
 - 3. The LVC shall provide all work to comply with the Electrical Design Criteria and these performance specifications.
- B. Workmanship shall be of the best quality and none but competent and experienced electricians shall be employed and shall be under the supervision of a competent and experienced foreman.

1.02 DESIGN-BUILD RESPONSIBILITY

- A. The LVC shall become the engineer of record as required by the authorities having jurisdiction (AHJ's). It shall be the LVC's responsibility to design and provide complete drawings, and load calculations as required to obtain all necessary approvals and permits, as well as to provide accurate and useful record documents. The LVC shall confirm all special local code requirements, including requirements for engineered stamped documents (signed and dated PE stamp on drawings and specifications if required by the code authority), prior to permit application.

1.03 WORK IN OTHER DIVISIONS

- A. See all other specifications for other work which includes but is not limited to:
 - 1. Temporary Power
 - 2. Cutting and Patching
 - 3. Door Hardware
 - 4. Painting, Refinishing and Finishes

5. Equipment Wiring
6. Mechanical Equipment
7. Fire Protection

1.04 CODES, PERMITS, INSPECTION FEES

- A. The following code and standards are referenced in the Division 13 specifications. Perform all work and provide materials and equipment in accordance with the latest referenced codes and standards of the following organizations:
 1. American National Standards Institute (ANSI)
 2. National Electrical Manufacturer's Association (NEMA)
 3. National Fire Protection Association (NFPA)
 4. Underwriter's Laboratories (UL)
 5. Washington Administrative Code (WAC)
- B. Install the electrical systems based on the following:
 - NFPA 70 National Electrical Code as adopted and amended by the Local Jurisdiction.
 - IBC International Building Code as adopted and amended by the Local Jurisdiction.
- C. The referenced codes establish a minimum level of requirements. Where provision of the various codes conflict with each other, the more stringent provision shall govern. If any conflict occurs between referenced codes and this specification, the codes are to govern. Compliance with code requirements shall not be construed as relieving the Developer from complying with any requirements of the drawings or specifications which may be in excess of requirements of the governing codes and rules and not contrary to same.
- D. Obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein. Arrange for inspection of work by the inspectors and give the inspectors all necessary assistance in their work of inspection.

1.05 WARRANTY

- A. Refer to General Terms Conditions of the Contract.
- B. All materials, equipment and systems furnished that include provisions for storing, displaying, reporting, interfacing, inputting, or functioning using data specified information shall be warranted to perform properly in all respects regardless of the century. Any interfaces to other new or existing materials, equipment or systems shall be warranted to function properly and shall be century compliant both in regards to information sent and received.

1.06 SUBMITTALS AND SHOP DRAWINGS

- A. Submittals and Shop Drawings: Schedule so as not to delay construction schedule and no later than 60 days after award of contract, submit common brochure(s) with index and

divider tabs by specification section (include paragraph numbers to indicate specification compliance), containing all required catalog cuts. Allow two weeks for review for each submittal and re-submittal. Incomplete submittals and shop drawings which do not comply with these requirements will be returned for correction, revision and resubmittal. See General Conditions for format, quantity, etc.

- B. Submit in a three ring binder with hardboard covers. Submittals shall show:
 - 1. Indicate listing by UL or other approved testing agency.
 - 2. Highlight with yellow or blue marker adequate information to demonstrate materials being submitted fully comply with contract documents.
 - 3. Review and check all material prior to submittal and stamp "Reviewed and Approved".
 - C. Shop drawings shall show:
 - 1. Ratings of items and systems.
 - 2. How the components of an item or system are assembled, interconnected, function together and how they will be installed on the project.
 - 3. Coordinate with other division shop drawings and submittals. Identify interface points and indicate method of connection.
 - D. The Developer agrees:
 - 1. The purpose of submittals and shop drawings by the Developer is to demonstrate to King County that the Developer understands the design concept.
 - 2. Submittals demonstrate equipment and material Developer intends to furnish and install and indicate detailing fabrication and installation methods Developer intends to use.
 - 3. To accept all responsibility for assuring that all materials furnished under this Division of the specifications meet, in full, all requirements of the contract documents.
 - E. The King County review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made during this review do not relieve Developer from compliance with the requirements of the drawings and specifications. Developer is responsible for: Dimensions that shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; performing his work in a safe and satisfactory manner.
 - F. Submittals and shop drawings are required per the submittals schedule at the end of this Section.
- 1.07 LOW VOLTAGE EQUIPMENT OPERATION AND MAINTENANCE (O&M) MANUALS
- A. Provide O&M manuals required in Division 1 for all equipment furnished under Division 13 of the specifications. Deliver final bound corrected copies as noted in Division 1 prior to scheduled instruction periods. Obtain a receipt for the manuals and forward a copy of the receipt to King County with the Job Completion Form.

- B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
- C. These O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. Present and arrange information in a logical manner for efficient use by the County's operating personnel. The information provided shall include but not be limited to the following:
 - 1. Equipment manufacturer, make, model number, size, nameplate data, etc.
 - 2. Description of system configuration and operation including component identification and interrelations. A master control schematic drawings(s) may be required for this purpose.
 - 3. Dimensional and performance data for specific unit provided as appropriate.
 - 4. Manufacturer's recommended operation instructions.
 - 5. Manufacturer's recommended servicing data including frequency.
 - 6. Complete parts list including reordering information, recommended spares and anticipated useful life (if appropriate). Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier not acceptable.
 - 7. Shop drawings.
 - 8. Wiring diagrams.
 - 9. Equipment submittals shall contain step-by-step circuit description information designed to acquaint maintenance personnel with equipment operation in each mode of operation.
 - 10. A complete list of local (nearest) manufacturer representative and distributor contacts for each type of equipment and manufacturer. Include name, company, address, phone, fax, email address, and website.
- D. Furnish complete wiring diagrams for each system for the specific system installed under the contract. "Typical" line diagrams will not be acceptable unless revised to indicate the exact field installation.
- E. Group the information contained in the manuals in an orderly arrangement by specification index. Provide a typewritten index and divider sheets between categories with identifying tabs. Bind the completed manuals with hard board covers not exceeding 5" thick. (Provide two or more volumes if required.) Signal and communication systems shall be in separate volumes. Imprint the covers with the name of the job, Owner, Architect, Electrical Engineer, Developer and year of completion. Imprint the back edge with the name of the job, Owner and year of completion. Hard board covers and literature contained may be held together with screw post binding.

1.08 INSTRUCTION PERIODS

- A. After Substantial Completion of the work after the O&M manuals have been delivered to King County and after all tests and final inspection of the work by the Authority(s) Having Jurisdiction; demonstrate the electrical systems and instruct the County's designated operating and maintenance personnel in the operation and maintenance of the various electrical systems. The Developer shall arrange scheduled instruction periods with King

County. The Developer's representatives shall be superintendents or foremen knowledgeable in each system and supplier's representatives when so specified. When more than one training session is specified, the second session shall be 30 to 90 days after the first as agreed to by King County.

- B. Include in each instruction session an overview of the system, presentation of information in maintenance manuals with appropriate references to drawings. Conduct tours of the building areas with explanations of maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures and adjustment locations.
- C. Include the following scheduled instruction periods: 1st Session 2nd Session
 - 1. Panic Alarm System 4 hours 2 hours
 - 2. CCTV System 4 hours 4 hours
- D. Factory trained suppliers representatives shall provide instruction for all systems.
- E. Provide one professionally produced DVD of each training session. Furnish two (2) copies to the County.

1.09 RECORD DRAWINGS

- A. Continually record the actual electrical system(s) installation on a set of prints kept readily available at the project during construction. These prints shall be used for this purpose alone.
 - 1. Mark record prints with red erasable pencil. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown.
 - 2. Accurately locate with exact dimensions all underground and underslab raceways and stub-outs.
 - 3. Note changes of directions and locations, by dimensions and elevations, as utilities are actually installed.
 - 4. Include addenda items and revisions made during construction.
 - 5. Erase conditions not constructed or "X-out" and annotate "not constructed" to clearly convey the actual "as constructed" condition.
 - 6. Organize record drawings sheets in manageable sets, bind and print suitable titles, dates and other identification on the cover of each set.
- B. Transmit the record drawing set to the King County Project Representative at the completion of the work. Final payment to the Developer will not be authorized until these prints have been submitted to and accepted by the King County Project Representative.
- C. Transfer the changes marked up on the record prints into AutoCAD Release 14 (or higher) at the completion of the work. Provide two (2) sets of prints, one set of fixed line reproducible drawings and one set of AutoCAD drawing files on CD. Transmit drawings, CAD files and the record drawing mark-ups to the King County Project Representative. Final payment to the Developer will not be authorized until these document have been submitted to and accepted by the King County Project Representative.

1.10 FINAL ACCEPTANCE REQUEST

- A. Submit properly filled out Job Completion Form (attached in this section) to King County.

1.11 ABBREVIATIONS AND DEFINITIONS

- A. When the following abbreviations and definitions are used in relation to the work for Division 13 they shall have the following meanings:

<u>Item</u>	<u>Meaning</u>
AHJ	Authority Having Jurisdiction.
Boxes	Outlet, Junction or Pull Boxes.
Code	All applicable codes currently enforced at project location.
Connection	All materials and labor required for equipment to be fully operational.
Exterior Location	Outside of or penetrating the outer surfaces of the building weather protective membrane.
Fully Operational	Tested, approved, and operating to the satisfaction of the AHJ, manufacturer and contract documents.
Furnish	Deliver to the jobsite
Install	To enter permanently into the project and make fully operational.
Mfr.	Manufacturer.
NEC	National Electrical Code, National Fire Protection Association, NFPA #70.
Noted	Shown or specified in the contract documents.
Provide	Furnish and install.
Required	As required by code, AHJ, contract documents, or manufacturer for the particular installation to be fully operational.
Wiring	Raceway, conductors and connections

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization and shall be so labeled unless otherwise permitted by the Authority Having Jurisdiction (Inspector).
- B. All materials to be new, free from defects and not less than quality herein specified. Materials shall be designated to insure satisfactory operation and operational life in the environmental conditions that will prevail where they are being installed.

- C. Each type of materials furnished shall be of the same make, be standard products of manufacturers regularly engaged in production of such materials and be the manufacturer's latest standard design.
- D. All materials, equipment and systems furnished that include provisions for storing, displaying, reporting, interfacing, inputting, or functioning using date specific information shall perform properly in all respects regardless of the century. Any interface to other new or existing materials, equipment or systems shall function properly and shall be century compliant.

2.02 NAMEPLATES

- A. Nameplates shall conform to Section 26 05 53 – Identification for Electrical Systems.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Handle all equipment carefully to prevent damage, breakage, denting, and scoring of finishes. Do not install damaged equipment.
- B. Store products subject to damage by the elements above ground, undercover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instruction.

3.02 CUTTING BUILDING CONSTRUCTION

- A. Coordinate with other trades prior to cutting. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills or concrete saws except where space limitations prevent the use of such tools.
- B. All construction materials damaged or cut into during the installation of this work must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

3.03 PAINTING

- A. Items furnished under this Division that are scratched or marred in shipment or installation shall be refinished with touchup paint selected to match installed equipment finish.

3.04 EQUIPMENT CONNECTION

- A. For equipment furnished under this or other Divisions of the specifications, or by owner, provide complete all electrical connections necessary to serve such equipment and provide required control connections to all equipment so that the equipment is fully opera-

tional upon completion of the project. Provide disconnect switch as required by code whenever an equipment connection is shown on the drawings.

- B. Investigate existing equipment to be relocated and provide new connections as required.

3.05 CLEAN UP

- A. Contractor shall continually remove debris, cuttings, crates, cartons, etc., created by his work. Such clean up shall be done daily and at sufficient frequency to eliminate hazard to the public, other workmen, the building or the County employees. Before acceptance of the installation, Contractor shall carefully clean cabinets, panels, lighting fixtures, wiring devices, cover plates, etc., to remove dirt, cuttings, paint, plaster, mortar, concrete, etc. Blemishes to finished surfaces of apparatus shall be removed and new finish equal to the original applied.

3.06 TESTING AND DEMONSTRATION

- A. Demonstrate that all electrical equipment operates as specified and in accordance with manufacturer's instructions. Perform tests in the presence of the King County Project Representative. Provide all instruments, manufacturer's operating instructions and personnel required to conduct the tests. Repair or replace any electrical equipment that fails to operate as specified and or in accordance with manufacturer's requirements.

END OF SECTION

LOW VOLTAGE JOB COMPLETION FORM

PROJECT NAME: King County DOT Metro Transit Div -- S. Kirkland TOD Garage
PROJECT LOCATION: _____
DATE: _____

A. Electrical Inspectors Final Acceptance (Copy of certificate attached.)

D.

Name	Agency	Date
Record Drawings Attached	Transmitted previously to	_____
		Date

E.

O & M Manuals Attached	Transmitted previously to	_____
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F.

Test Reports Attached	Transmitted previously to	_____
		Date

G. The work is complete in accordance with contract documents
at _____ on _____

Supervisor of Low Voltage Work Time Date

Contractors Rep. Signature Date

SUBMITTAL LIST King County Metro – S. Kirkland TOD Garage

SECTION	DESCRIPTION	SUBMIT RECEIVE DATE	STATUS
27 10 00	STRUCTURED CABLING		
28 05 13	CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY		
28 30 00	ELECTRONIC DETECTION AND ALARM		
28 10 00	ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION		
28 23 00	VIDEO SURVEILLANCE		
28 05 00	COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY		

SECTION 273000

VOICE COMMUNICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes voice station cabling and terminations.

1.02 DESCRIPTION

- A. Definition: "Telecommunications Cabling" as used in this Section refers to a unified cable plant primarily designed for carrying signals associated with telephone within the building.
- B. Station Cable: Provide a complete cable system tested for continuity and performance to each outlet, including:
 - 1. Category 6 station cables for voice interconnections.
 - 2. Outlet plates.
- C. Telecommunications Closets (TC's): Provide terminating hardware.
- D. Identification and Labeling: Labeling is to be functional and permanent, in strict accordance with plans and TIA/ EIA 606.
- E. Detailed Documentation: Provide as-built system design and documentation services as required to complete shop drawings for telephone system administration, and detailed documentation of as-built conditions. Jack numbers connected at each outlet location must be those shown in "as-built" documentation.
- F. Work Furnished by Others: Telephone switching equipment and telephone instruments will be furnished or relocated by others."

1.03 REFERENCES

- A. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA-70 (National Electrical Code), Uniform Building Code, FCC Part 68, FCC 76.611. State codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:
- B. ANSI/TIA/EIA Standards
 - 1. ANSI/TIA/EIA-568-A -- Commercial Building Telecommunications Cabling.

2. ANSI/TIA/EIA-568-A-1 -- Propagation Delay and Delay Skew Specifications for 100 ohm 4-pair Cable
3. ANSI/TIA/EIA-568-A-2 -- Commercial Building Standards Updates
4. ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces
5. ANSI/TIA/EIA-606 -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
6. ANSI/TIA/EIA-607 -- Commercial Building Grounding and Bonding Requirements for Telecommunications
7. ANSI/TIA/EIA TSB-67 -- Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems

C. American Society for Testing and Materials (ASTM)

D. National Electrical Manufacturers Association (NEMA)

E. Underwriter's Laboratories, Inc. (UL)

F. Install cabling in accordance with the most recent edition of BICSI® publications:

1. BICSI -- Telecommunications Distribution Methods Manual
2. BICSI -- Cabling Installation Manual

1.04 SUBMITTALS

A. Make submittals in accordance with Section 260500.

1.05 PRE-CONSTRUCTION CONFERENCE

A. Early in the construction time line, and before any shop drawings are produced, a representative of the low voltage communications installer, who shall serve as supervisor to the installation crew throughout construction, shall attend a pre-construction meeting where installation details, including labeling and wire management will be discussed.

1.06 SYSTEM DESIGN OBJECTIVES

A. System Description:

1. The cabling system is designed to support telephone distribution to all equipment rooms and dedicated spaces of the facility. Most information outlets will consist of outlet boxes with uniform Category 5E jacks for voice. The size of outlet boxes and conduit at each location are indicated in the specifications.

B. Telecommunications Closet (TC) Support Fixtures:

1. All required equipment room fixtures must be installed.

1.07 INSTALLER QUALIFICATIONS AND QUALITY ASSURANCE

A. The Low Voltage cable system installer shall at a minimum be a firm normally employed in the low voltage cabling industry with a reference list of five projects and contact

names to confirm successful Category 5/5E UTP cable plant projects within the twelve months prior to the bid opening date in this project.

- B. The County reserves the right to exercise its discretion to require the Developer to remove from the project any such employee of the Developer deemed by the County to be incompetent, careless, or insubordinate.
- C. Personnel whom the cabling contractor intends to use as supervisors or testers shall have been employed by the cabling contractor for at least six months as of the date of the bid opening and have been trained on the contractor's company policies with respect to personnel safety, telecommunications industry cabling quality and neatness standards, and use of CSI-standard specifications.
- D. A fifteen year installation warranty shall be provided by the selected Low Voltage installer. This warranty shall include defects in workmanship and/or material. The warranty period shall begin at the date of the County's acceptance of the project.
- E. The selected low voltage installer must be licensed and bonded in the State of Washington for the work performed under this Specification.

1.08 SUBMITTALS

- A. Project Initiation: Within fourteen calendar days following the pre-construction conference, the low voltage contractor shall furnish the following in a single consolidated submittal:
 - 1. The name of the person who will act as the low voltage cabling Contractor's official contact.
 - 2. The name of every certified Category 5/5E installation technician who may be used in the conduct of the project, and evidence of certification of each. For each separate certification program cited, provide the course outline or description and indicate the date and place of attendance for each technician
 - 3. To qualify under paragraph two, courses attended must include hands-on access to cable and terminating tools and materials, and test equipment required to perform installation functions required in the work of this contract.
 - 4. Complete manufacturer's product literature for all products to be used in the installation. Product submittals must be keyed to the specification.
 - 5. Shop Drawings. The Developer shall submit scaled drawings of all proposed changes in equipment room installation detail.
 - 6. Proposed Contractor Category 5E UTP cable test result forms. Backbone UTP shall be tested as provided herein. Contractor shall provide test documentation.
 - 7. Examples of the jack labeling materials and arrangement proposed. Submittal must include actual samples of each type of connecting fixture proposed, with realistic labels attached.
- B. Project Completion: As a condition for project acceptance, the Developer shall submit the following for review and approval.
 - 1. Complete manufacturer's product literature.
 - 2. An Exceptions List of deviations (in materials, construction, and workmanship) from that specified in this section.

3. Field Drawings. Throughout the course of the project, details concerning the exact physical layout or arrangement of the backboards shall be marked on a field set (with dimensions in inches) reserved for this purpose. The Field Drawings shall be available throughout the project for inspection, and shall be submitted to the King County at Project turnover.
4. Inspection and Test Reports: During the course of the Project the Developer shall maintain an adequate inspection system and shall perform such inspections to insure that the materials supplied and the work performed conform to Contract requirements. The Developer shall provide written documentation indicating materials acceptance testing was conducted as outlined in Part 3 below. The Developer shall also provide documentation indicating that all cable termination testing was completed and that all irregularities were corrected prior to job completion.

1.09 CABLE LABELING, JACKET COLORS, AND PLACEMENT

- A. All cable terminations shall be labeled.
- B. Most cables will be assigned specific termination locations and identification numbers.

PART 2 PRODUCTS

2.01 GENERAL

- A. All material required for a complete installation, shall be furnished by the Developer.
- B. All materials must be new, free from defects and not less than the quality herein specified. They shall be designed to insure satisfactory operation and operation life in the environmental conditions which will prevail where they are being installed.
- C. Each type of materials bid and furnished shall be of the same make and shall be of the standard products or manufacturers regularly engaged in the production of such materials and shall be the manufacturer's latest standard design.
- D. Materials shall be as listed or shall be equivalent products of other manufacturers meeting the intent and quality level of the specifications.

2.02 WIRE PLANT MATERIALS

- A. Materials shall be as listed or shall be equivalent products of other manufacturers meeting the intent and quality level of the EIA/TIA 568A specifications.
- B. All products shall be new, and brought to the job site in original manufacturer's packaging. Electrical components (including innerduct) shall bear the Underwriter's Laboratories label. All communications cable shall bear flammability testing ratings as follows:
 1. CMCommunications Cable
- C. All voice station cables specified herein shall be CM rated.

- D. Initial Cable Inspection: The Developer shall inspect all cable prior to installation to verify that it is identified properly on the reel identification label, that it is of proper gauge, containing correct number of pairs, etc. Note any buckling of the jacket which would indicate possible problems. Damaged cable, or any other components failing to meet specifications shall not be used in the installation.

2.03 STATION CABLING

- A. Voice Station Cable: Provide Enhanced (Cat 5E) cable as identified by TIA/EIA for both voice and data station cables: Each cable reel shall be tested for Category 5E performance at the factory. Voice cables shall have a green jacket.

Acceptable Products: Lucent Technologies 2061
CommScope Ultra II 5504M
Berktek LanMark 350

2.04 STATION HARDWARE

- A. Outlets: Flush mount voice jacks shall be high quality tested Category 5E (plus) 8-pin (RJ45) modular jacks with IDC style terminations. All jacks shall use the T568B pin configuration. Jacks shall exceed the proposed TIA/EIA 568A recommendations for Category 5E connecting hardware. Jack color shall match faceplate.

Acceptable Products: Siemon CT-5-A4-A4-(XX) or equal

- B. Icons and Labels: Icons shall have voice or data symbols as appropriate.

Recommended product: Siemon or equal.

- C. Faceplates:

- 1. Shall be stainless steel.

Recommended product: Siemon or equal

- D. Cable labels.

- 1. All cables shall be labeled at the TC termination and at the user terminal connection with the same identifying code.
- 2. TC-end labels shall be mechanically printed on strips designed for use with the prescribed terminating hardware.
- 3. Jack-end labels must be mechanically created, have letters that are at least 3/16 inches high, and have a high contrast with the label background.
- 4. Label adhesive must be shown to be permanent and not removable without use of heat or solvents, when applied to each of the types of outlet cover plates to be used in the project.

2.05 VOICE TERMINATION HARDWARE

- A. TC termination frames.

1. 300-pair type 110 frames, including four 4-pair connecting blocks and one 5-pair connecting block per row.

Recommended product: Ortronics OR-30200007, OR-302000109, and OR-30200110 and OR-30200140 or equal

B. Termination clips:

Recommended product: AT&T 110C-4 Clips (Com Code 103-801-247); Nordx - AX100707 or equal

- C. Termination Block Label Strips: Standard colored designation label strips that match the colors for application shall be affixed to each row of the 110-type wiring termination. For PBX-feed cables, labels shall be white.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 TC INSTALLATION

- A. Ground conductor. Provide a #6 (minimum) copper stranded cable in a green jacket from the ground bar in the TC to a local electrical panelboard serving the room. Provide a ground wire connection to each rack and piece of overhead tray. Bridge gaps between tray sections with short lug-ended straps.
- B. Any penetration through fire rated walls, and both ends of all vertical conduit chases (including those in sleeves) will be resealed with an Underwriter Laboratories (U.L.) approved sealant. Typical of this type of product is Flameseal. Contractor shall also seal all floor, ceiling, and wall penetrations in fire or smoke barriers and in the TC's.

3.02 CABLE HANDLING

- A. All cable is subject to subtle damage that may degrade future performance, if abused during installation. In all cable installation, set reels and use sufficient pulleys and manpower so that cables are not pulled around blunt corners or against material that might cause chafing. For the purpose of this paragraph, any edge with a radius of less than 5 inches is considered "blunt".
- B. Allowable Cable Bend Radius and Pull Tension: In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation. The following tables provide minimum bend radius and maximum pull tension for twisted-pair cables in conduit. Also refer to manufacturer's recommendations.

MINIMUM BEND RADIUS and MAXIMUM PULL TENSION OF TWISTED-PAIR CABLE

PAIRS	MINIMUM BEND RADIUS	MAXIMUM PULL TENSION
4	3 inches	50 lbs

25	4 inches	200 lbs
100	7 inches	500 lbs
150	8 inches	750 lbs
200	10 inches	1000 lbs
300	11 inches	1500 lbs

**MINIMUM BEND RADIUS AND MAXIMUM PULL TENSION
OF OPTICAL FIBER CABLE**

SERVICE	MINIMUM BEND RADIUS	MAXIMUM PULL TENSION
Riser	12 inches	150 lbs

- C. Cable Lubricants: Lubricants specifically designed for installing communications cable may be used to reduce pulling tension as necessary when pulling cable into conduit. After installation, exposed cable and other surfaces must be cleaned free of lubricant residue.

Recommended product:

Twisted Pair Cable

Dyna -blue; American Polywater

- D. Pull Strings: Provide pull tapes in all sections of conduit. Tapes shall be marked in feet. Greenlee recommended.
- E. Replace or rework cables showing evidence of improper handling including stretches, kinks, short radius bends, over tightened bindings, loosely twisted and over twisted pairs at terminals, and re-terminate cables with sheath removed over 2".

3.03 LABELS

- A. The Contractor will label all outlets, using permanent, legible typed or machine engraved labels. Submit proposed labels.
- B. Terminals in the TC's shall be labeled by the contractor using designation strips designed for 110 hardware or as applicable to terminal hardware.

3.04 STATION WIRING INSTALLATION

- A. Certified Installers. The low voltage Contractor shall supervise the installation of all communications cable. All Category 5E cable shall be installed by individuals trained (and certified) in low voltage data cable system installation. All Category 5E 4-pair UTP cable must be handled with care during installation so as not to change performance specifications. The Contractor shall not over tighten wraps or over bend cables. No plastic tie-wrap may be used. All cable bundling is to be done using "velcro" style wraps.
- B. Wiring. Station wire shall be installed in 1" minimum size conduit.
- C. Coordination. All wiring and associated hardware shall be placed so as to make efficient use of available space in coordination with other uses. All wiring, and associated structures and hardware shall be placed so as to not impair the use or capacity of other building systems, equipment or hardware placed by others, or to not impair the efficient use of their full capacity.

3.05 TELECOMMUNICATIONS CLOSET (TC) DETAILS

- A. Mount termination equipment as required. Leave clear routes for service entrance equipment.
- B. Coordinate with the Electrical Contractor to assure installation of power outlets in each location. Keep telecommunications cabling clear of spaces designated for power outlets. Telecom cable jackets shall not come in contact with electrical outlet boxes or conduit at any point in the system.

3.06 STATION CABLES

- A. Installation: Pull all cables carefully, adhering to standards of care and manufacturer's recommendations for installation of cabling. Assure that when cables are left on the floor before pulling, signs or other procedures are used to assure that no one steps on the cables.
- B. Labeling: All cables shall be identified by a four-digit numerical designator preceded by the TC designation. This "Jack Number" shall be determined by the position at which the cable terminates. Gaps shall be provided in the sequence of numbers, as shown on termination rack details, for possible installation of additional cables between initial termination fields.
- C. NOTE: An identification number for Category 5E jacks represents four pair.

3.07 STATION HARDWARE

- A. UTP cables shall be terminated in high-quality Category-5E "RJ-45" jacks meeting EIA/TIA-568A specifications, using wiring format T568B (TIA), which is both 100baseT and ATM compatible.

3.08 BACKBOARD CABLING/EQUIPMENT RACK CONFIGURATION

- A. Cable installation in the equipment rooms shall be per design. Cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance purposes. Avoid crossing areas horizontally just above or below any conduit opening. Lay and dress cables to allow other cables to enter the conduit without difficulty at a later time by maintaining a working distance from these openings.
- B. Cable shall be routed as close as possible, and parallel to, the ceiling, floor, or corners to ensure that adequate wall or backboard space is available for current and future equipment and for cable terminations. Cables shall not come in contact with, electrical conduit or other equipment.
- C. Cable bundles passing from a wall to a rack or other free-standing object shall not bridge a gap of greater than four inches without the use of a uni-strut or other bridging structural piece. All cables to a rack shall be cabled out to the top. Cable bundles running vertically along the back of a rack shall be held out by supporting bars a distance of at least four inches away from the back side of the rack rail. No cables will be run inside the vertical rack rail channels.

- D. On backboards, lay cables via the shortest route directly to the nearest edge of the backboard from the mounted equipment or block. Lace or bundle all similarly routed cables together, and attach by means of d-rings screwed to the outside edge(s) of the backboard vertically and/or horizontally, then route via "square" corners over a path that will offer minimum obstruction to future installations of equipment, backboards, or other cables.
- E. Do not allow binding on cable. Do not use tie-wraps. Velcro-style straps are recommended for cable bundling, where required.
- F. Labeling: Backbone high-count UTP cables shall be numbered and labeled.

3.09 INSTALLATION TESTING

- A. The Contractor shall perform a series of end-to-end installation performance tests. The Contractor shall submit a proposal describing the test procedures, test result forms, and timetable for all copper plant wiring.
- B. Acceptance of the simple test procedures discussed below is predicated on the Contractor's use of the recommended products (including but not limited to twisted-pair cable, cross-connect blocks, and outlet devices specified in the Products paragraph), and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation will be evaluated in the context of each of these factors.
- C. At a minimum, the Contractor shall test:
 - 1. All station drop cable pairs from EQUIPMENT ROOM terminations to outlet device RJ45 jacks.
- D. Each Category 5E wire/pair shall be tested for the following:
 - 1. termination order
 - 2. polarity (pair reversals)
 - 3. continuity
 - 4. shorts
 - 5. grounds
 - 6. NEXT (near end cross talk)
 - 7. cable length (record all lengths)
 - 8. ACR (attenuation: crosstalk ratio)
 - 9. ELFEXT (equal level far end crosstalk ratio)
 - 10. Return Loss
- E. These test procedures shall be based on EIA/TIA 568A utilizing a commercial UTP cable tester that will test up to EIA/TIA 568 Category 5E specifications and UL Category 5E parameters. Acceptable test equipment includes Scope 155 Version 5.1, Fluke DSP-4000. Testers shall have the latest software update. Testers shall be set to 100 MHz setting for Category 5E cable tests. Each tester shall be certified within 3 months of its use on the project.

- F. UTP Category 5E cables shall be tested from Equipment Room to RJ45 outlets in small groups. After a small group of station cables are installed, they must be tested. Test groups shall consist of no more than forty cables.
- G. The 100 MHz testing will show numerous problems which go undetected with lower frequency testing including the following:
 - 1. Stretched cables.
 - 2. Kinked cables.
 - 3. Short bend radius.
 - 4. Tight bindings.
 - 5. Loose twists and tight twists at terminals.
 - 6. Cable sheath removed too far.
- H. When errors are found, the source of each error shall be determined, corrected, and the cable re-tested. All defective components shall be replaced and retested.
- I. Test records shall be maintained using the test equipment manufacturer's electronic form. The form shall record cable identification ("jack") number, outcome of test, indication of errors found (e.g., a, b, c, d, or e), cable length, re-test results after problem resolution, and signature of the technician completing the tests. Test results shall be submitted in spreadsheet format (Excel or Word compatible) on disk - with a printed copy. Test results for each test group shall be sent to King County.

END OF SECTION

SECTION 280000

SECURITY GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Install a complete and fully functional security system matching the systems at other King County KCMT Transit (KCMT) structured parking facilities, and interconnect and fully integrate the new system with the exiting monitoring and control system at KCMT's existing Security Monitoring Center (SMC).
- B. Study the existing security systems, including other installed systems at KCMT parking structures, the SMC, and the County I-Net to understand the equipment, its functions, and how the overall system operates. King County will provide access to facilities for the Developer to inspect for this purpose. Install systems to match the systems in other KCMT facilities, using current year make and model of the equipment. Network and integrate the new system with the existing system, such that they can be operated, controlled, and monitored remotely from other locations, including the SMC.
- C. The primary components of this security installation include:
 1. Security equipment rack containing at least the following:
 - a. Network Video Recorder
 - b. VOIP concentrator
 - c. Fiber-optic Modules
 - d. Network Switches
 - e. Computer monitor
 - f. Power supplies
 - g. Uninterruptible power equipment
 2. Security cameras and video recording equipment.
 3. Emergency auto dial security intercom call systems and interface equipment.
 4. Electronic Access Control System.
 5. Alarm devices and alarm monitoring equipment.
 6. Conduits, cables and wires
 7. I-Net network (provide King County I-Net service to the facility under this contract).

1.02 DESCRIPTION

- A. General Description: This specification section covers general requirements for the furnishing, installation and testing of complete security system comprising Electronic Access Control System (EACS), Video Surveillance System (VSS), and Security Call System (SCS).
- B. Furnish and install electric security hardware devices, mounting brackets, power supplies, switches, equipment cabinets, controls, consoles and other components of the system as shown and specified.

- C. Furnish and install outlets, junction boxes, pull boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation.
- D. Provide pre-testing and acceptance testing of equipment, programming, wiring and installation.

1.03 EXISTING SYSTEMS AND SUBSYSTEMS

- A. Electronic Access Control System (EACS)
 - 1. The existing EACS is manufactured by Andover Systems with control equipment at KCMT sites communicating over the KCMT network to existing workstations at the KCMT Security Monitoring Center (SMC) located in the parking structure across the street from the new Atlantic Base/Central Base Operations Building. The Access Control Database (ACD) is installed on a KCMT server located at 201 South Jackson Street, Seattle, WA 98104-3856.
 - 2. New EACS equipment shall be configured for standalone operations for the new Atlantic Base/Central Base Operations Building and be capable of connecting to the existing equipment at a later date.
- B. Video Surveillance System (VSS)
 - 1. The existing VSS is manufactured by Integral Technologies and comprises Network Video Recorders (NVR) and Integral Technologies Control Point client software at selected locations for viewing live and recorded video. The video system communicates over KCMT's network and is monitored at the SMC.
- C. Security Call System (SCS)
 - 1. The existing SCS comprises Talk-a-Phone intercom stations located throughout KCMT sites connected to Voice-over-IP (VOIP) concentrators providing communication through the KCMT network. A VOIP headend is located at the SMC to provide communication between the intercom stations and SMC operators.
 - 2. New SCS components shall connect to the KCMT network and be configured to work with the existing VOIP system.
 - 3. The existing VOIP intercom system is based on the Iwatsu Enterprise Communication Server architecture utilizing SIP, VOIP, TDM, and H.323 protocols.
- D. Developer and Manufacturer shall guarantee in writing equipment and software, which is added as part of this work is fully compatible with the existing equipment and is configured as described in the specifications. New equipment shall be fully warranted by the Developer as specified herein.
- E. Developer shall ensure all hardware and software is fully integrated into the existing system to present a single, seamless operating system. Developer shall fully develop and support all hardware and software integration schemes.
- F. Control components that require unique, or proprietary, hardware or software interfaces to achieve parity with the existing system architecture are not considered acceptable.
- G. If records exist, drawings and diagrams of the existing systems shall be made available, through the Project Representative, to the Developer for reference. The Developer shall also survey, research, document and confirm the existing equipment and configuration

in-place, and coordinate expansion of the systems with the Project Representative to avoid any interruption in services.

- H. Developer shall guarantee the existing equipment and software, including user programming, shall be protected from corruption or damage during the installation process.

1.04 DESIGN STANDARDS

- A. Design and construct the security system to meet these minimum standards.
 1. VSS Cameras (Interior of Garage) – install VSS cameras on the ceiling on each level (except top floor) near the corners and not along the driveway centerlines, such that they are not subject to vehicle strikes. Mount cameras at spacing of no greater than 100-feet throughout the structure and ensure each camera has a free and unobstructed view of the parking level. Mount the top floor cameras on poles or elevated structures at spacing and views as described for the lower floors. In addition, install cameras such that a minimum of two cameras have a clear view of each panic station and each interior and exterior door, elevator doors, and pedestrian and vehicle doors/gates. Cameras shall be pan-tilt-zoom.
 2. VSS Cameras (Exterior of Garage) – install VSS cameras on Polevators at each corner of the garage, located no closer than 10-feet from the structure, no lower than 20-feet above ground surface, at spacing of no greater than 200-feet around the exterior of the structure. Cameras shall be pan-tilt-zoom.
 3. VSS Cameras (Inside Elevators) – install VSS camera in each elevator car oriented to provide a complete view of the inside of the car. Install the cameras in vandal-resistant enclosure. Cameras shall be fixed view.
 4. Emergency Call Stations – Install emergency call stations such that a station is visible from every location in the garage, on all levels, in each elevator car, and in the exterior passenger loading area. Emergency call stations shall be integrated with and communicate directly with KCMT's SMC via the integrated VOIP system, and shall be integrated with the VSS camera system such that when the call station is activated, the nearest two VSS cameras automatically move to preset positions viewing the call station. Emergency call stations shall match the call stations installed in other KCMT structured parking garages.
 5. Electronic Access Control System (EACS) – Install EACS consistent with other KCMT structured parking garages, on each door and gate, including but not limited to pedestrian entries, communication and electrical room door, vehicle entry gates, and pedestrian entry gates. The EACS on each door shall at a minimum include card reader, electronic lock, remote connection to King County KCMT's access control system and SMC. Each door/gate shall also be equipped with a keyed lock, and each door/gate shall be remotely unlocking from the SMC. Vehicle entries shall be equipped with an electric-operated roll-down gate, activated locally with a key, and remotely controlled from the SMC.

1.05 RELATED SECTIONS

- A. Provide the work in accordance with Division 26, Electrical General Requirements.
- B. Coordinate with the requirements of Division 08 Section 'Door Hardware'.

1.06 SCOPE OF WORK

- A. Conform to the standards set forth in Section 011000 and information provided herein.
- B. Areas of Work: Areas of work include, but are not limited to:
 - 1. South Kirkland Park and Ride
 - 2. Security Monitoring Center located in the KCMT's Employee Parking Garage at the Atlantic/Central Base Campus.
- C. Systems: Provide the following work complete per the contract schedule, and with acceptable engineering and installation practices as described herein.
 - 1. A Security System consisting of the following primary components:
 - a. Electronic Access Control System (EACS)
 - b. Video Surveillance System (VSS)
 - c. Security Call System (SCS)
 - d. Network Switching Components
- D. Services: Developer shall provide the following services complete and as scheduled:
 - 1. Project Planning and Management
 - 2. Shop Engineering and Documentation
 - 3. Wiring and Installation Diagrams
 - 4. Submittals
 - 5. System Installation
 - 6. System Start-up and Commissioning
 - 7. Training
 - 8. Testing
 - 9. Warranty
 - 10. Post Acceptance Work

1.07 RELATED WORK

- A. General:
 - 1. Observe interface procedures to related work as described in PART 3, herein.
 - 2. Coordinate with the Project Representative on all aspects of aesthetic interface.
 - 3. Verify lighting requirements for cameras and displays to insure adequate lighting is provided for the required performance and functions.
 - 4. Installation of network equipment and connection to the existing KCMT network shall comply with KCMT IS standards and requirements. Refer to Article 3.04 for additional information.
- B. Existing Systems: Coordinate with KCMT and existing Service Provider to ensure the existing SCS system is kept in active operation during the course of this project. Coordinate connection to the existing systems to minimize system down time. Coordinate all aspects of system connection with the Project Representative.
- C. Access Doors: Coordinate with the Project Representative for the provision of access doors where needed to gain access to wiring, boxes, panels and enclosures in walls or ceilings.
- D. Conditions
 - 1. Coordinate with all existing construction, equipment and field devices.

2. Equipment provided under this project shall be installed in a manner consistent with architectural, operational, service and maintenance considerations.

1.08 APPLICABLE PUBLICATIONS

A. Standards: Perform the work in accordance with the following standards:

1. UL Underwriters Laboratories, Inc., UL 294, UL 1076, ULC
2. EIA Electrical Industries Association
3. NTSC National Television Standards Committee
4. NEMA National Electrical Manufacturers Association
5. NECA National Electrical Developers Association, Standards of Installation National Electrical Installation Standards (NEIS)
6. NFPA National Fire Protection Association 731
7. WAC 296 Washington Administrative Code, Department of Labor and Industries
8. WEC Washington State Energy Code, WAC 51-11
9. ADA Americans with Disabilities Act
10. FCC Part 15, Part 68

B. Cable installation, identification and termination shall be performed in accordance with manufacturer's installation manuals in addition to the above applicable codes.

C. In the absence of manufacturer's recommendations on conductor applications, the Developer shall ensure that the cable selected meets all technical requirements of the location of its installation, and of the equipment to be installed.

1.09 QUALITY ASSURANCE

A. Conform to the standard set forth on Section 014000.

B. Developer Qualifications:

1. Hold legally required Washington Developer's licenses necessary to accomplish the installation and activation of the described system at the facilities indicated. Developer shall submit copies of licenses to Project Representative prior to the start of work.
2. Hold legally required state registrations required to meet local requirements for submittal drawings.

3. Is a permanent organization approved by the manufacturer(s), having facilities and employing manufacturer-trained personnel with technical qualifications and experience to prepare the installation, to install the required system and to provide periodic maintenance. The installer shall have been installing security systems for a period of not less than five years.
4. Provide certification that the Developer is manufacturer-authorized representative of the products to be furnished under this contract, including but not limited to KCMT's existing SMC software and hardware system.
5. Maintain a parts inventory and employ trained personnel at a location within a 50-mile radius of the project.
6. Indicate complete and total compliance with the provisions of these Specifications by letter or by submittal of the bid response forms, signed by an officer of the corporation, or a principal if other ownership currently exists. In addition, the letter or forms shall include a complete listing of exceptions, if any.

C. Manufacturer Qualifications:

1. System components shall be furnished by manufacturers of established reputation and experience who shall have produced similar equipment and who shall be able to refer to similar installations rendering satisfactory service.
2. The manufacturer's products shall have been in satisfactory operation on at least three similar installations for not less than three years. Developer shall submit a list of similar installations.
3. Developer shall possess a current factory certification to purchase, install and program Andover Continuum equipment and software. If the work involving Andover Continuum is assigned to a sub-Developer, then that subDeveloper shall perform and execute all phases of that work, including the seamless and successful procurement, installation, termination, testing, warranty and servicing of the entire system(s) at this project's site. In either case, Developer shall bear the final contractual responsibility for total quality assurance.
4. Components including, but not limited to, cameras, intercoms, computers, and power supplies shall have been tested and listed by Underwriters Laboratories, Inc., Factory Mutual Systems, or other approved independent testing laboratory.

D. Qualification requirements for security SubDeveloper

1. Provide the services of a Security SubDeveloper that is a factory-authorized and certified Andover/Integral Technologies/TAC security system provider and certified IWATSU voice-over-internet protocol (VOIP) communication system provider for the installation, configuration, and start-up of the security devices, control system, and software, and VOIP communication system components. The Security SubDeveloper shall be the company or companies responsible for providing work on King County Metro's Andover/Integral Technologies/TAC and IWATSU devices and control systems. Submit current written documentation of certification from Andover/Integral Technologies/TAC and IWATSU that the designated Security SubDeveloper can provide technical service and support for, and have completed the required certification training programs for, all of the following products: Software - Continuum SE, VidMon, Active Alert, Digital Sentry, and Control Point; and Hardware - Net Controller, AC-1 Module, Network and Digital Video Recorders, and IWATSU communications systems. Submit this qualifications documentation for approval by Metro prior to commencing the work.

1.10 SHOP DRAWING & EQUIPMENT SUBMITTAL

- A. Conform to the standards set forth in Section 013300 and additional requirements listed below.
- B. Obtain KCMT standard documents related to security system naming conventions and cable labeling standards for use in preparing shop drawings.
- C. Design Criteria and Performance Specifications shall provide direction on products and project requirements. The Developer may be given a choice of products and methods that may be incorporated into the system. These choices may affect the overall design, configuration and installation of the proposed system. The Developer shall be responsible for the means and methods of installation of equipment and raceways.
- D. Requirements: Provide the following information complete, and in the manner described herein:
 - 1. Shop Drawings: Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following information:
 - a. Title Sheet
 - b. Plans: Showing all devices, pull boxes, cabinets, conduits and conductors in their proposed locations.
 - c. Riser Diagram: Showing all conduit relationships between devices shown on the Plans. Show all power sources including panel identification and circuit number.
 - d. Single-Line/Block Diagrams: Show system architecture and signal relationships of controls, processors and headend devices within the system.
 - e. Point-to-point wiring diagrams. Include Input/Output list and reader list.
 - f. Custom Assembly Diagrams: For each custom assembly, provide an assembly drawing illustrating the appearance of the assembled device. Include dimensions, assembly components, and functional attributes (momentary or alternate action switch, lens color, panel finish, color, etc.). "Custom assemblies" include, but are not limited to:
 - 1) Security Terminal Cabinets
 - 2) Coverplates and Escutcheons
 - 3) Receptacle Assemblies
 - 4) Console Bezels and Materials
 - 5) Component Connection Diagrams
 - 6) For each equipment component such as a computer, data switch, camera or IP encoder, show the front and rear elevation of the device and all connectors/terminations as a pictorial.
 - 7) Show the wire designations on all connectors.
 - 8) Show a schedule of the wire colors connected to the pins on each device connector.
 - 9) Equipment Wiring Diagrams
 - 10) Show a pictorial illustration of each equipment enclosure and/or terminal cabinet, including terminals, components and wiring devices.
 - 11) Show the device nomenclature exactly as shown on the single line diagrams.
 - 12) Terminations: Show every termination and terminating cable, with applicable cable and wire numbers matching the single line diagrams.
 - a) Every termination in the system must be documented.
 - b) Termination information may be rendered as a wiring list(s), if properly coordinated with, and referenced to, typical component and single-line

diagrams. Otherwise, the Shop Drawings shall show a pictorial of every component in the system, with its terminations.

- 13) Show wire colors for each terminal.
 - 14) For each wire exiting the enclosure, show the destination of the wire by floor, room number and the drawing number of the panel where the wire terminates.
- g. Graphical System Screens: Provide drawings showing each graphical screen to be included for the graphical user interface environment, including but not limited to:
 - 1) Site, Building and Floor Maps, with Icons
 - 2) Control Screens
 - 3) Desktop Controls
 - h. All working dimensions and erection dimensions
 - i. Arrangements and sectional views
 - j. Necessary details, including complete information for making connections between work under this Contract and work under other Contracts.
 - 1) Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
 - k. Each Drawing or page shall include:
 - 1) Project name, Project Number and descriptions
 - 2) Submittal date and space for revision dates
 - 3) Identification of equipment, product or material
 - 4) Name of Developer and SubDeveloper
 - 5) Name of Supplier and Manufacturer
 - 6) Relation to adjacent structure of material
 - 7) Physical dimensions, clearly identified
 - 8) ASTM and Specifications references
 - 9) Identification of deviations from the Contract Documents
 - 10) Developer's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
 - 11) The location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material.
2. Equipment Submittals
- a. Provide a Title Page, with project name, Developers name and address, contact information, date of submission, and submission revision number.
 - b. Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
 - 1) The system type,
 - 2) Model number,
 - 3) Project quantity,
 - 4) Specification sheet page reference
 - c. Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components and devices. Number each page, to correspond with the Parts List. Data sheets shall be marked or indexed to identify the corresponding specification section they are being submitted for. Data sheets shall be ordered in the same sequence as the specification product sections.

- d. Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, which model numbers, options and configurations are being proposed for this project.
 - e. Include kinds of materials and finishes for all equipment.
3. Acceptance Testing Plan:
- a. Submit a written document detailing the test procedures to be followed by the Developer in evaluating and proving the installed System(s).
 - b. Provide a sample of the test forms to be used for each system and for each component of each system.
 - c. Include all tests required by the equipment Manufacturer and by this Specification.
- E. The Project Representative will return unchecked any submittal that does not contain complete data on the work and full information on related matters.
- F. Verification: The Developer shall check and acknowledge all shop drawings, and shall place his signature on all shop drawings submitted to the Project Representative. Developer's signature shall constitute a representation that all quantities, dimensions, field construction criteria, materials, catalog numbers, performance criteria and similar data have been verified and that, in his opinion, the submittal fully meets the requirements of the Contract Documents.
- G. Departure from Contract Requirements: If the shop drawings show departures from the Contract requirements, the Developer shall make specific mention thereof in his letter of transmittal, otherwise review of such submittals shall not constitute review of the departure. Review of the drawings shall constitute review of the specific subject matter for which the drawings were submitted and not of any other structure, materials, equipment, or apparatus shown on the drawings.
- 1.11 OPERATING AND MAINTENANCE MANUALS: ("AS-BUILT" RECORD SET)
- A. Phase One: Conform to the standards set forth in Sections 017700, 017823, 017839, and additional requirements listed below. Submit for review the following clearly labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation and prior to requesting final payment:
- 1. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduits, wiring and relationships as-built. Include nomenclature showing as-built wire designations and colors.
 - 2. Manuals: Submit two (2) copies of each of the following materials in bound manuals with labeled dividers:
 - a. Equipment Instruction Manuals: Complete, comprehensive instructions for the operation of all devices and equipment provided as part of this work.
 - b. Manufacturers Instruction Manuals: All specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.
 - c. A final Bill of Material for each system.
 - d. Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.
 - e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.

- f. Performance, Test and Adjustment Data: Comprehensive documentation of all performance verification according to parameters specified herein.
 - g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers Warranty Registration papers as described herein.
- B. Phase Two: Within fourteen (14) days of receipt of reviewed Operating and Maintenance Manual (Phase One), submit six (6) copies and one (1) reproducible copy of the reviewed Record Drawings and six (6) copies of the reviewed Operating and Maintenance Manuals to the Project Representative.
- 1. In each equipment enclosure and/or terminal cabinet, the Developer shall place a Single Line drawing of the system(s) and the respective Terminal Cabinet Wiring Diagram in a clear plastic sleeve permanently attached to the cover of the terminal cabinet.
 - 2. The Developer shall provide to the Project Representative one (1) copy of all executive and user software, including all graphical maps on CD-ROM disks. Include a listing of all software parameters programmed into the Access Control Database (ACD).
 - 3. Provide a hard copy printout of all Input/Output and reader control points.
 - 4. Sufficient information, (detailed schematics of subsystems, assemblies and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

1.12 EQUIPMENT ASSET MANAGEMENT DATABASE

- A. Complete KCMT's Equipment Asset Management Database forms. KCMT will provide the forms when requested by the Developer.

1.13 WARRANTY

- A. Conform to the standards set forth in KCMT Standard Terms and Conditions and the requirements herein.
- B. Furnish and guarantee maintenance service for the system using factory trained authorized representatives of the manufacturer of the equipment for a period of one year after final acceptance of the installation.
- C. The Warranty shall serve two purposes:
 - 1. The Developer shall repair any system malfunction or installation deficiency discovered by the Project Representative or their representatives during the warranty period.
 - 2. The Developer shall correct any installation deficiencies found against the contract drawings and specifications discovered by the Project Representative or their representatives during the warranty period.
- D. Commencement: The warranty begins at the time of issuance of "Final Acceptance of the Installation" statement by the Project Representative.

1.14 EQUIPMENT COMPATIBILITY REQUIREMENTS

While individual items of equipment may meet the equipment specifications and in fact meet the system specifications, the total system shall be designed so that the

combination of equipment actually employed does not produce any undesirable effects such as signal distortion, noise pulses, transients or crosstalk interferences when electrically associated with itself or other equipment.

1.15 KCMT'S RIGHT TO USE EQUIPMENT

The KCMT reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

1.16 SECURITY PROCEDURES FOR PROJECT

- A. Administer and conduct this work as a security sensitive project. King County will designate certain information and documentation as Security Sensitive Information (SSI), including certain information provided to and also prepared by the Developer.
- B. Submit a list of all persons and their companies that will have access to SSI prior to allowing access. Update this list for each new entry, and provide the update to King County prior to allowing access. Allow access and disseminate SSI only to those listed on the approved SSI access list. Enforce SSI controls and restrictions on King County personnel and other governmental employees (for example, permitting agencies).
- C. King County will mark SSI documentation with the following security warning statement.

This document and other records, including data specifically associated with this document, relate to unique and specific vulnerability assessments and/or deployment plans in the event of CRIMINAL TERRORISM. This document and other records are protected by the 2002 Public Disclosure Act amendments, Section 42.17.310(1)(ww), and as such they must be treated as confidential records.

This document contains sensitive security information that is controlled under 49 CFR Part 1520 and shall not be disclosed to persons other than those permitted under 49 CFR Part 1520 and the terms of any agreement with the Federal Transit Administration related to this document. Unauthorized release may result in criminal or civil penalties. This document contains information that is exempt from mandatory public disclosure under FOIA Exemption 3. In addition, Exemptions 2, 4, 5, and 7 may apply.

- D. Mark Developer-generated SSI with this specified security warning statement. Ensure that copies of SSI are marked with this warning. Handle documents as SSI if unsure of the designation, and request direction from King County if clarification on the designation is needed.
- E. In the event that SSI is included as a part of a larger document, documentation, control the entire document as SSI.

- F. Store and protect SSI in locked cabinets when not in use, and limit access to the material to those on the approved SSI access list.
- G. Do not post SSI on any web site or distribute on the internet.
- H. Refer public disclosure requests to King County, who will handle any dissemination in this situation.

PART 2 PRODUCTS

2.01 GENERAL

- A. Conform to the standards set forth in Section 016000 and additional information herein.
- B. **Product Acceptability:** The Products section contains lists of acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include, but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Project Representative shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.
- C. **Manufacturers Specification Reference:** Where specific material, devices, equipment, or systems are specified directly, the current manufacturers' specification for the same becomes a part of these specifications, as if completely elaborated herein.
- D. **Listed Manufacturers:** Manufacturers listed in the product section are known to generally meet the specification requirements. Listing of a manufacturer does not automatically mean it meets all requirements listed herein. The Developer is responsible to provide any hardware and/or software modifications for any submitted product to insure compatibility with the functional performance specified herein.
- E. All equipment shall be new and the current model of a standard product of a manufacturer of record. When a manufacturer provides a newer model than that included in the specifications the Developer shall provide the newer model. A manufacturer of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied.
- F. For each item of equipment offered, manufacturer shall maintain:
 - 1. A factory production line
 - 2. A stock of replacement parts
 - 3. Engineering drawings, specifications, operating manuals and maintenance manuals
 - 4. Manufacturer shall have published and distributed descriptive literature and equipment specifications on each item of equipment offered.
- G. **Complete System:** All auxiliary and incidental equipment necessary for the complete operation and protection of the systems specified herein shall be furnished and installed as if specified in full.
- H. **Similar Devices:** Similar devices within a system shall be identical.

- I. **Safety:** Unless otherwise specified, all electronic equipment shall be UL rated. All electronic equipment shall be of the dead front type, having no exposed live electrical connections, terminals or exposures to hands-on operating surfaces or other exposed surfaces during any power-on condition. Every live electrical connection, terminal or exposure shall be covered with durable, removable insulating material.
- J. **Rack Mounting:** All rack-mounted electronic equipment shall be specifically designed or modified for standard 19-inch rack mounting unless otherwise noted.
- K. **Keying:** Key all panels identically where provided for similar usage within a system. Coordinate with KCMT for keying standards.
- L. **Tamper switches:** equipment cabinets, equipment racks, and any other enclosure with active electronic or electrical equipment shall be provided with a tamper switch connected to the EACS to alert the operator whenever the equipment closure door or cover is opened.
- M. **Framing:** Floor supported units shall be substantially framed and supported. All bolted connections shall be made with self-locking devices.
- N. **Aesthetics:** Coordinate all console or control panels so that their general appearance is similar. Provide locking panel covers on all recessed, semi-recessed and surface mounted control panels not located in equipment rooms. Control panels shall be contained within or mounted to formed and welded aluminum or steel backboxes. Operating panels shall be recessed within the backbox to a depth sufficient to permit a locking hinge panel cover to close completely without affecting any device within the enclosure.
- O. **Labeling:** Provide intelligible permanent engraved identification on or adjacent to all controls, fuses and/or circuit breakers, patching jacks, connectors, receptacles, terminal blocks, meters, indicators, switches, monitors, and the like.
- P. **Engraving, labels, decals or other identification** on any device, equipment or miscellaneous component shall be coordinated with the associated Shop and Field and Equipment Wiring Drawings.
- Q. **No proprietary identification on assemblies will be permitted.**
- R. **Operational Voltage:** Devices connected to the fuse or breaker protected electrical system and all auxiliary equipment necessary for the operation of the equipment associated with systems specified herein shall be designed to operate from 105 to 130 volt, 60 Hertz, alternating current service, with stable performance, fully in accordance with these specifications, and shall have integral fuse or circuit breaker protection.
- S. **Developer-fabricated items** shall be provided with fuses that indicate when they are blown or defective.
- T. **All protection devices** shall be located to facilitate replacement, resetting or observation of status without demounting the associated unit and/or de-energizing adjacent equipment.

- U. Manufacturer's Recommendations: Components and devices shall be operated in accordance with recommendations of the manufacturer and shall contain sufficient permanent identification to facilitate replacement.
- V. Wiring Practices: Consistently identified terminal strips shall be provided for all external connections. These designations shall be shown on drawings.

2.02 MISCELLANEOUS PRODUCTS

- A. Cabinets: Hoffman, Rittal or equal, assembled and wired with all components and as indicated on the drawings. Cabinets shall be equipped with removable back panels, ventilations, fans and filters to maintain acceptable environmental conditions for the components installed within the cabinet. Coordinate color, location, and trim with the Project Representative.
- B. Connection Devices
 1. General Purpose Multi-Pin Panel Mounting Receptacle: Amp, Molex, or equal.
 2. General Purpose Multi-Pin Cable Connector: Cannon, Amp, or equal.
- C. Cable Termination Devices
 1. Screw-Type Barrier Blocks: Kulka 601 or Kulka 601-3700 Series, TRW-Cinch, 140, 141 and 142 Series, Buchanan, or equal.
- D. Relays
 1. Control Circuit Relays: Potter & Brumfield KRP-3 Series Magnecraft, or equal, socketed.
- E. Uninterruptible Power Supply (UPS): Provide UPS for rack mounted equipment and operator workstation equipment. Size the UPS to provide power to the attached load for a minimum of one hour. At rack locations provide rack mounted UPS. Provide American Power Conversion (APC) Model SU5000RXLT-TF3 and SU48R3XLBP External Battery Pack. If this product is not available contact KCMT IT Department for acceptable equal.
- F. Wire and Cable Labels: Provide labels by Brady, Thomas and Betts, or equal.
- G. Tamper Proof Screws: Provide tamper proof fasteners as manufactured by Tamper-Pruf, L.H. Dottie, Theft-Pruf, or equal, for installation of security equipment in accessible locations. Provide 6 tamper proof screwdrivers and transfer to the Project Representative prior to final acceptance testing.

2.03 SECURITY EQUIPMENT RACK MATERIALS

- A. Security Equipment Racks, General Provisions
 1. Install equipment in the consoles and racks as shown on the drawings and details, including head end equipment for the EACS, VSS, and network distribution systems.
 2. Equip each console section with EIA standard 19-inch mounting angles front, back, and sides to its full height. Provide rear rack rails where required to accommodate equipment mounting,
 3. Provide flush, removable back and side panels with quick-release fasteners for each bay.

4. Cabinets and consoles shall be designed and installed to comply with seismic protection standards for the applicable seismic zone.
 5. Provide reinforcing members to ensure solid and flush mating at all surfaces.
 6. Provide louvered venting near the top of each door.
 7. Provide adequate ventilation, filters and fans to facilitate continuous airflow.
 8. Cooling Fans shall be "low-noise" type, of 25 Decibels or lower. Provide sufficient air movement to keep equipment cooled to below 75% of the maximum operating temperature.
 9. Provide permanent, fixed mounting of all equipment, devices, and wiring within the console. Equipment shall not be placed upon the floor of the console. Wiring shall not be wrapped around equipment and devices.
 10. Provide decorative bezels to match the console for custom mounted equipment to provide an aesthetically pleasing finished product.
 11. Provide hardware to mount all equipment in the console such that a flush front plane is maintained, unless otherwise shown on drawings.
 12. Provide adequate terminals for all cables entering consoles and cabinets. Cables shall be terminated at equipment or terminal strips. Free floating connections shall be acceptable.
 13. Provide cable management guides, mounts, runners, clamps and wire duct with slotted sidewalls to facilitate neat and secured cabling. Size to accommodate the installed wire needs plus 50 percent additional capacity.
 14. 10/12-outlet power strip: 72" long, 15-amp capacity, 125-volt, On/Off switch, cord and plug or direct-wired, mount a minimum of one (1) power strip in each rack bay.
 15. For new console bays, provide a semi-gloss textured finish. Coordinate console finish and trim with the Project Representative.
 16. Installation of all wiring and equipment shall be in a neat and orderly manner, to facilitate future service and upgrades.
- B. Equipment Racks: Provide equipment racks as shown on the plan drawings. .
1. Cabinet: Provide Winsted Pro Series II Vertical Equipment Racks, or equal, of 78-3/4" useable panel height, overall size of approximately 83" high x 22" wide x 32" deep; with standard pedestal: steel doors; and fully adjustable panel mounting rails with 10/32" holes at EIA standard universal spacing. Developer to verify dept required based on selected rack mount equipment. Where equipment is to be provided by KCMT verify equipment dimensions before ordering to ensure adequate space for equipment.
 2. Louvered rear door: Full length, flush mounted, paddle latch, one per rack bay.
 3. Top Fan Panel: Provide top panel with exhaust fans, safety guard, cord and plug. Install a multi-fan top panel in each rack bay, with a sufficient number of low-noise fans to provide the required cooling.
 4. Solid side panels, at each end of the console. Midsections shall remain open, allowing access in-between console bays.
 5. Pullout Work Surface: 3 1/2" x 20" rack mountable work surface.
 6. Sliding shelves for all computers and keyboards.
 7. Provide blank plates to cover unused front spaces.
 8. Coordinate console color, trim and finish with the Project Representative.
 9. Provide leveling feet, floor mounting kit, earthquake kit, rack connector kit, keyed locking hardware and miscellaneous hardware to provide a sealed and finished appearance.
 10. Refer to drawings for further details.

11. Obtain approval of all color and finishes with Project Representative before delivering and installing consoles.

2.04 TEST EQUIPMENT

- A. The Developer is responsible for furnishing test equipment required to test the system in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be considered part of the system. The Developer shall furnish test equipment of accuracy better than the parameters to be tested.
- B. The test equipment list shall be furnished as a part of the submittal, to include the make and model number of the following types of equipment as a minimum:
 1. Spectrum Analyzer
 2. Sweep Generator
 3. Continuity tester
 4. Volt/Ohm/Milliammeter
 5. 50 Megahertz dual-trace Oscilloscope with TV Sync Stripper
 6. Regulated, variable 50 VDC power supply
- C. Readiness: Keep all test equipment at hand and maintain in calibrated condition at the jobsite as required for routine and performance testing of this work. Calibration certification shall be traceable to national Institute of Standards and Technology (NIST).

PART 3 EXECUTION

3.01 GENERAL

- A. Perform this Work in accordance with acknowledged industry and professional standards and practices, and the procedures specified herein. Minimum installation standards shall meet the requirements of NFPA 731 – Standard for the Installation of Electronic Premises Security Systems 2006 Edition.
- B. Aesthetics are an important consideration in this installation. All components shall be installed to have aesthetically pleasing results per the Project Representative. Actual locations of all visible components shall be coordinated in advance with The Project Representative.
- C. The Developer shall insure that all installation personnel understand all the requirements of the Specifications.

3.02 SECURITY SYSTEM INTEGRATION

- A. General:
 1. The object of "security system integration" is to automatically configure the system to display, record, and report appropriate system activity to various elements of the system. Automatic configuration frees operators from several difficult control tasks, gives the operator more time to respond to events, reduces operator error, and insures critical system tasks occur consistently.
 2. Security system elements (EACS/VSS/SCS) shall be electronically integrated in such a way as to enable database records and/or event-initiated instructions to be

communicated between system elements, to initiate recording, display, communication and control activities.

3. The EACS may also be electronically integrated with other facility databases to import and export database information.

B. Event-Initiated Interface, General:

1. The system shall support the capability to send and receive messages between EACS, VSS, SCS, and other systems via an RS-232 or LAN communications link, and shall act upon those messages received. All software routines required to accomplish the required data-interface with external equipment and controls will be fully developed, installed, tested and supported by the Developer.
2. Communication of event information between systems shall take place automatically and immediately, when the event is sensed by the system.
3. "Hard-wired" interfaces used to support interactive closed circuit video, Intercom and other event-initiated functions shall not be acceptable, except as otherwise noted herein.

C. VSS:

1. The system shall automatically position and focus one or more cameras, or sequence of cameras, when an alarm is detected by the EACS or when a SCS call is requested. Coordinate with the Project Representative on camera views and programming.
2. Upon receiving event/alarm information from any other system, the VSS virtual switcher shall transmit camera pre-positioning commands to applicable fixed and pan/tilt/zoom cameras, and shall cause the system to process, display, and record applicable cameras.
3. This interface shall be implemented using the LAN or RS-232 integration scheme. Provide an independent RS-232 communications port for this purpose.

3.03 SECURITY SYSTEM FUNCTIONAL DESCRIPTION

- A. General: This Article describes the concept of operation and primary components for the facility security system.

- B. Overview: Connect the Electronic access Control System (EACS) and Video Surveillance System (VSS), and Security Cass System (SCS) to KCMT's SMC and access control system and ensure full functionality with the system. The SCS is controlled by an Iwatsu VOIP intercom system. Refer to Section 285032 for additional information on the SCS interconnection.

C. Onsite Security Devices

1. Electronic Access Control System (EACS): These components are included in the access control system at each door and gate.
 - a. Access Control Modules (ACM) – The onsite ACMs control the operation of the electric locks installed on the connected doors and gates at the site. The ACM receives and processes signals from the card readers, exit unlock bars, door/gate closure contacts, and SMC unlock commands. The ACM stores the access rights for groups of KCMT employee ID badges for a group of doors/gates at the site. Each ACM is connected to the Access Control Database (ACD) located in the EACS server and receives regular downloads of access rights for each door. The ACM also provides location information to the SMC to

- identify door/gate status (open/close), alarm locations, which door/gate is under SMC control. The ACM is also connected to the doors equipped with mechanical door openers for automatic door opening upon card swipe and remote actuation from the SMC.
- b. Card Reader: Reads the existing KCMT ID badges and functions in conjunction with the electric lock and ACM to transmit a valid request to enter to the access control system by unlocking the door/gate.
 - c. Electric Lock: Functions in conjunction with the card readers and ACM for automatic unlock from card swipe and remote unlock from the SMC.
 - d. Exit Unlock Bar: Located on the secure side of the door/gate and allows the door/gate to be opened without restriction. The exit bar functions in conjunction with the ACM to transmit a valid request to exit to the access control system to allow the door to be manually opened from the secure side.
 - e. Mechanical Door Operator: Functions to automatically open and/or close the door/gate. For doors equipped with automatic opening upon card swipe or remote unlock, the mechanical operator receives a door-open control command from the ACM and moves the door/gate to the full open position. For all doors/gates, the mechanical operator is set to position the door/gate to achieve relock position for the electric lock and door/gate closed position for the door/gate closure contacts.
 - f. Door Position Switch: Function in conjunction with the access control modules to signal the open/closed state of the door/gate.
2. Security Call System (SCS): The onsite security call system has three primary elements: intercom call stations at various locations at the facility; security telephones at the SMC locations, and a VOIP security communication network. These components are included in the onsite security call system.
- a. Intercom Call Stations: The intercom call stations (IC) provide two-way audio communication between the call station and the SMC and/or SMC. The intercom call stations are connected via network communication wiring to the SMC SCS headend and onsite VOIP security communication devices. The intercom call stations are equipped with a push button to initiate the call. The intercoms are equipped with one push button that connects calls from the emergency station directly to the SMC telephones.
 - b. Security Telephones (ICM): The Intercom Master Stations are VOIP-based phones installed at each SMC, and are connected to the intercom call stations via the onsite VOIP security communication system. The SMC is also equipped with a security telephone connected to the facility call stations via the King County WAN (KCWAN).
 - c. VOIP Security Call System: The onsite VOIP security call system consists of dedicated security communication network cabling system interconnected through a site network switch. The onsite communication system sends and receives audio signal from the intercom stations and the security telephones to facilitate two-way communication between each station and the SMC and SMC (the SMC security telephone is connected via the WAN connection described below).
 - d. WAN Connection: Connects the local VOIP security communication system to the SMC, including audio communication and location identification interconnection via King County's WAN.
3. Video Surveillance System (VSS): The surveillance camera system has three primary functions: surveillance for alarm conditions at doors/gates or call stations;

face recognition cameras at doors with remote unlocking capability, and general area surveillance. These components are included in the surveillance camera system.

- a. Video Camera: Video cameras provide surveillance of the activities and condition of selected areas, doors/gates, and call station activations. These cameras have several preset positions, including general area surveillance, alarm surveillance at a door/gate, and call station surveillance when activated. All surveillance cameras have pan-tilt-zoom (PTZ) capability.
- b. Face Recognition Cameras: Provide face recognition for visitors requesting remote controlled access through a door/gate. Face recognition camera images are transmitted to onsite monitoring stations for remote access authorization. Face recognition cameras are fixed position.
- c. Network Video Recorder (NVR) – Onsite NVRs records video images locally and provides interconnection with the SMC for controlling the operation of a group of cameras. The NVR also provides camera location information to the SMC to identify which camera is active and under control. The NVR shall have video storage capacity for at least 30 days of video storage from all site cameras under normal operation.
- d. Video Connection System: Consists of IP data connection of the video and control signal from the camera to the local NVR through the network switch to transmit video images and provides the pan-tilt-zoom (PTZ) control signals to the camera from the SMC. Selected cameras will be powered through the network switch via the Power-over-Ethernet (POE) standard. Cameras requiring more power than available through the POE standard will be powered by a dedicated camera power supply.

D. System Operating Description

1. SMC Security Workstation (SMC) – These operations are included at the SMC
 - a. Access Control at SMC
 - 1) Status Reporting: The SMC receives a status signal from the onsite ACM that presents text-based identification of open/close status of each door/gate connected to the station, with continuous status display on the SMC workstation monitor. See the ACM section below for status signal generation.
 - 2) Alarm Reporting: The SMC receives an alarm status signal from the onsite ACM to present text-based identification of an alarm event at each door and gate connected to the station. The SMC has the ability to acknowledge the alarm. See the ACM section below alarm signal generation. Alarm reporting also includes automatic video monitoring as described below in the video monitoring subsection.
 - 3) Remote Unlock Capability: The SMC is equipped with the capability to remotely unlock each connected door and gate using menu-driven mouse pick and click control integrated with the GUI at each work station.
 - b. Security Call at SMC
 - 1) Intercom Calls: The SMC receives VOIP call notification via standard phone ring tone from selected intercom stations to the SMC security phone. Pickup of the SMC security phone initiates two-way audible communication between SMC and the calling station. The call is disconnected by hanging up the SMC security phone.
 - c. Video Surveillance at SMC

- 1) Video Monitoring: The SMC receives video views from selected cameras, with continuous live feed display of each camera on the SMC workstation monitor including text-based identification of the camera location.
 - 2) Video from Intercom Calls and Alarms: When an intercom call or alarm is initiated, the SMC receives an automatic pop-up view of continuous live feed display of the cameras viewing the call or alarm location on the SMC workstation monitor. The alarm view is discontinued upon acknowledgement of the call or alarm by the SMC staff.
 - 3) Remote Video Control: The SMC is equipped with the capability to remotely control the PTZ function of each connected camera using menu-driven mouse-controlled pick and click control integrated with the GUI at each workstation. See the Surveillance subsection below for video signal generation to the SMC.
2. Access Control System: These operations are included in the access control system at each door/gate:
- a. Card reader
 - 1) Card is swiped in front of the card reader and these functions can occur: card is read and has access rights; the card is read and does not have access rights; or card is not read (invalid card format).
 - 2) If the card has access rights, the door/gate opening & closing sequence is initiated (see subsection below). The ACM creates a log of the access and transmits the activity record to the SMC for display. A record of the access event is stored on the access record database.
 - 3) If the card is read but does not have access rights, the ACM creates an alarm and transmits the alarm to the SMC (see alarm condition description below).
 - 4) If the card is not read, nothing happens.
 - b. Door/Gate Opening and Closing – Accessing the facility.
 - 1) A valid card read initiates the door/gate opening and closing sequence starting with the unlock command. Once the door/gate is unlocked, the pedestrian manually pulls or pushes the door/gate open and proceeds through. If the door is equipped with an automatic opening door operator, a control signal is transmitted from the ACM to the door operator to move the door to a fully opened position. The ACM resets the door/gate position status to unlocked and open. After 7 seconds, the mechanical operator automatically repositions the door/gate to the closed and locked position. The ACM then resets the door/gate position status to closed and locked.
 - 2) In the event that the door/gate does not return to the closed and locked position in 7 seconds, the ACM generates a "door/gate held open" alarm and transmits the alarm to the SMC (see Alarm Conditions below).
 - c. Alarm Conditions
 - 1) An alarm condition is created by 1) the card reader detecting an attempt to unlock the door/gate with a card that does not have access rights for the door/gate, 2) the door/gate opening without a valid request to enter/exit, or 3) the door/gate held in the open position (after receiving valid request to enter/exit).
 - 2) When an alarm condition occurs, the SMC automatically receives an alarm text message and simultaneous video image of the cameras that monitor the alarm location, both displayed on the workstation monitor. The security staff at the SMC then assesses the situation and calls for security, operations, or maintenance depending on the circumstance, according to their Post Orders.

- 3) The alarm condition remains active until the security monitor acknowledges it through the security control software.
 - 4) A record of the alarm event is stored on the alarm record database.
 - 5) A record of the recorded video is attached to the alarm message to allow playback of the video stream when reviewing the alarm message.
3. Security Call System: These operations are included in the security call system at each intercom station:
- a. Intercom Call
 - 1) The intercom call button is pressed which initiates a VOIP call to the SMC. The call is routed through the onsite call system to the security telephone at SMC.
 - 2) The security telephone at SMC rings via standard ring tone. Two-way communication is initiated by pick up of the handset by the dispatch staff, and the call is disconnected by hanging up the SMC security phone.
 - 3) The intercom call automatically signals the NVR to activate the closest two surveillance cameras to move to the preset that views the call station, and displays the image at the SMC.
4. Video Surveillance System: These operations are included in the surveillance system:
- a. Surveillance cameras transmit video signals to the onsite NVR for recording whenever motion is detected in the field of camera vision. The NVR time stamps the recordings. Face recognition cameras are activated by intercom call to view the visitor at the intercom station for visual recognition and vetting by the monitoring staff.
 - b. The NVR transmits PTZ positioning information to cameras from control commands from the SMC.
 - c. Selected cameras are continuously displayed at the SMC monitoring stations. Refer to drawings to identify cameras designated for continuous display.
 - d. The SMC can access the surveillance cameras through a mouse pick and click control to view and position the camera via PTZ control.
 - e. In the event of an SCS call, the NVR automatically activates the two closest surveillance cameras to move to the preset to view the call location and and display the image at the SMC.
 - f. In the event of an alarm condition at a door/gate, the NVR automatically activates the camera(s) viewing this door/gate at the SMC.

3.04 COORDINATION

- A. General: Conform to the standards set forth in the contract documents and additional requirements listed below.
 1. Coordinate the work with the Project Representative and all trades to assure that where this work interfaces to other trades, those interfaces are provided, complete and functional.
 2. Meet with a representative of the KCMT and each trade. Identify devices needed to complete functional operation of this work that are being provided by KCMT, General Developer or another trade, and assure that the work being provided by others will be acceptable.
 3. Make sure work by others is scheduled in order that this work can be installed in a timely fashion.

4. Verify all dimensions, and work by others that may be necessary to facilitate the work and coordinate with other trades. Assure that related work by others is coordinated with this work.
 5. Verify all field conditions. Regularly examine all construction and the work of others that may affect the work to ensure proper conditions are provided for the equipment and devices before their manufacture, fabrication or installation. Be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.
- B. Required Resources: Become familiar with the available access and space for equipment and any potential interference requiring coordination. Coordinate with the Project Representative to assure that adequate electrical and HVAC services are available. Provide the physical space for equipment, and ample access room for installation and maintenance of equipment.
 - C. Positioning Members: Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Project Representative without additional expense.
 - D. Interface Devices: Provide items necessary to complete this work in conformance with the Contract Documents or the satisfaction of the Project Representative without any additional expense.
 - E. Equipment shall be mounted with sufficient clearance to meet applicable codes and facilitate observation and testing. Securely hang and/or fasten with appropriate fittings to ensure positive grounding, free of ground loops, throughout the entire system. Units shall be installed parallel and square to building lines.
 - F. Where more than one code or regulation is applicable, the more stringent shall apply.
 - G. Where new equipment is replacing old equipment, Developer is responsible for removing and dispensing the old equipment and doing whatever repair work is necessary to meet standards determined by The Project Representative.
 - H. Install fire stopping for penetrations in slabs and firewalls to meet code at the completion of work and prior to final testing demonstration to the Project Representative.
 - I. Project Documentation: Review all project documentation. If the Developer perceives any conflict or ambiguity in the contract documents, he shall seek interpretation from the Project Representative prior to proceeding.
 - J. Supervision: Maintain a competent supervisor and supporting technical personnel acceptable to the Project Representative during the entire installation. A change of supervisor during the project shall not be acceptable without prior written approval from the Project Representative.
 - K. Work and Manpower Rules: Comply with all applicable jobsite work and manpower regulations.

3.05 WORKMANSHIP

- A. The installation shall be performed in a professional and workmanlike manner.

- B. On a daily basis, clean up and deposit in appropriate containers all debris from work performed under the appropriate Specification sections. Stack and organize all parts, tools and equipment when not being used.
- C. Preparation, handling and installation shall be in accordance with the Manufacturer's written instructions and technical data appropriate to the product specified.
- D. Work shall conform to the National Electrical Developer's Association "Standard of Installation" for general installation practice.
- E. At the conclusion of the installation, work areas, including panel boxes, shall be vacuumed and cleaned to remove debris and grease.

3.06 EQUIPMENT, RACK AND CONSOLE INSTALLATION

- A. Construction: Coordinate access openings and wire paths through building structure, walls, etc.
- B. Compliance: Comply with powering, conduit entry and grounding practices as described herein and as required by code.
- C. Coordination of Access: Coordinate the installation of conduit pathways, access covers, hinged panels to ensure complete access to terminals and interior components. Access shall be designed such that demounting or de-energizing of equipment is not required to gain access to any equipment.
- D. Service Loop: Fasten removable covers containing any wired component with a continuous hinge along one side with associated wiring secured and dressed to provide an adequate service loop. Appropriate stop locks shall be provided to hold all hinged panels and drawers in a serviceable position.
- E. Labeling: Provide an engraved lamacoid marker on the front of desk-mounted equipment including its designation as assigned and referenced consistently throughout this project.

3.07 GROUNDING PROCEDURES

- A. Provide grounding of all systems and equipment in accordance with manufacturers' recommendations, local electrical codes and industry standards.
- B. Signal Ground: Signal ground shall be derived from the one main electrical panel that serves all equipment herein.
- C. Grounding procedures for wire, equipment and devices shall be in strict accordance with manufacturers' recommendations and standard installation practices.
- D. All equipment enclosures of an assembly shall be grounded to the single grounding terminal strip of each assembly.
- E. Multiple Powered System Isolation: Where powered devices of the same system exist in two or more locations and a different signal ground exists in each location, the system's

communication signal shall be isolated from signal ground at both source and destination ends via modem, fiber optics or other equivalent method.

- F. Developer shall eliminate or correct all potential ground-loop problems in a manner approved by the Project Representative.
- G. Enclosure Isolation: Equipment enclosures of this section shall not be permitted to touch each other or any other "grounded device" unless bolted together. Equipment enclosures shall not be permitted to touch metallic conduit at any point. Conduit entry shall be made using flexible non-metallic conduit material only.
- H. Shielding: Shielded cables of this section shall be grounded exclusively to Signal Ground. No shields shall be permitted to carry live currents of any kind. Shields shall be tied to Signal Ground at the signal source end only, unless otherwise noted or required by the manufacturer.

3.08 CONDUIT AND WIRE INSTALLATION PRACTICES

A. Conduit

1. Install security system cabling in conduit.
2. Wires shall be installed in conduit or in another Project Representative approved raceway, unless otherwise noted or excepted. Where a wire run is above a suspended ceiling, its conduit or raceway shall be tied up or clamped (at the Project Representative's option) to the supports and not left to sit on top of the ceiling panels. Conduit shall be supported by independent supports per NEC 300.11.
3. Conduit or raceway that is not hidden must have its location and appearance be specifically approved by The Project Representative. If approved, exposed conduit or raceway shall be run in such a fashion as to make it as inconspicuous as possible. Runs should follow existing building lines and should be square wherever possible.
4. Verify that conduit has been installed, de-burred and properly joined, routed and terminated prior to pulling of cables.
5. Apply a chemically inert conduit lubricant to all wire and cable prior to pulling. Do not subject wire and cable to tension greater than recommended by the manufacturer.
6. Secure all wire and cable runs vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Non-coaxial cables shall be secured. Symmetrical clamping devices with split, circular or other wire conforming, non-metallic bushings shall be provided for all other cables.

B. New Wiring

1. After installation, and before termination, wiring shall be checked and tested to insure there are no grounds, opens, or shorts on any conductors or shields. In addition, wiring between buildings or underground and all coax cables shall have insulation tested with a megohmmeter and a reading of greater than 20 megohms shall be required to successfully complete the test.
2. Run wires continuously from termination to termination without splices. Splices at certain junction box locations may be allowed at the discretion of the Project Representative. Recommendations for splices at these points shall be established with the Project Representative. Developer shall obtain approval from the Project Representative before proceeding with splices.
3. Where splices are required and approved by the Project Representative, the wire shall be joined with solder, then taped or otherwise protected in an approved manner

to provide mechanical and electrical integrity. Wire nuts and/or electrical tape connections shall not be acceptable. Final connections shall be made at terminal boards with full tagging, labeling and documentation.

4. Water-resistant protection shall be continuous throughout the cable in parking areas, surface conduit, poles, in-slab pull-boxes, in-slab conduit, and underground conduit and pull-boxes, and in any areas subject to moisture and/or water infiltration.
 - a. Splices/Junctions: Provide waterproof protection of splices and junctions, in surface conduit and boxes, in-slab conduit and pull-boxes, underground conduit, and underground pull-boxes, to prevent the entry of moisture or water into cables, splices or connections.
 - b. Cable Entries: Provide water-blocking sealants at all conduit entries into pull-boxes, junction boxes, back-boxes, cabinets, etc., to prevent the entry of moisture or water into the conduit and cable system.

- C. Unacceptable Conditions: Correct all unacceptable wiring conditions immediately upon receiving notice to correct.

3.09 IDENTIFICATION AND TAGGING

- A. Cables, wires, wiring forms, terminal blocks and terminals shall be identified by labels, tags or other permanent markings. The markings shall clearly indicate the function, source, or destination of all cabling, wiring and terminals. The wire-marking format contained in the shop drawings shall be utilized for all conductors installed under this Specification. All cables and wires shall be identified, utilizing heat-shrink, machine-printed, polyolefin wire markers. Hand written tags are not acceptable.
- B. Cable identification shall comply with KCMT conductor identification standards. Obtain a copy of the standards from KCMT after award of contract and before starting shop drawings..
- C. All terminal points shall be appropriately identified and labeled as shown on shop drawings.
- D. All panels shall be provided with permanently attached engraved lamacoid labels with identifying names and functions. Labels shall be consistent in form, color, and typeface throughout the system and all must contain the name of the system or subsystem as part of the label textual information. Design, color, font and layout shall be coordinated with, and approved by, the Project Representative.

3.10 DATABASE PREPARATION, CHECKING AND ACTIVATION

- A. Developer shall provide the Project Representative with the appropriate forms necessary to organize the system database inputs. Guidance shall also be provided to KCMT personnel in a timely manner to insure their understanding of database format requirements and constraints. It is essential that the above activities be clearly identified on the Project Schedule so database preparation is accomplished in sufficient time to permit orderly and on time system activation. The forms and guidance shall be presented to the Project Representative not less than 60 days prior to scheduled central system activation.

- B. It shall be the responsibility of the Project Representative to insure the accuracy of the database information entered on forms by thoroughly checking all completed data entry forms.
- C. It shall be the responsibility of Developer to insure that database formatting is correct prior to entry into the system and system activation.
- D. The Developer shall be responsible for the initial database entry into the system prior to activation. The database shall consist of hardware and function-related information, i.e., system configuration, cameras, alarm points, software parameters for system management, cardholder database, access levels, graphical maps and call system interfaces. A printout of the final database shall be provided to the Project Representative for review and approval prior to system activation.
- E. System activation shall be the responsibility of Developer. Once the system and database have been demonstrated to be functioning properly according to manufacturer's guidelines and the system design, all further database entries and upgrades shall be the responsibility of KCMT, unless otherwise noted.
- F. If later versions of the operating system or application software are made available to, or requested by, KCMT, these updated versions shall be installed and checked out by Developer. Before installing upgrade software, Developer shall insure that existing database information is properly "backed-up" prior to any installation action.

3.11 START-UP RESPONSIBILITY

- A. Developer shall initiate System Operation. Competent start-up personnel shall be provided by Developer on each consecutive working day until the System is functional and ready to start the acceptance test phase. If in the Project Representative's judgment Developer is not demonstrating progress in solving any technical problems, Developer shall supply Manufacturer's factory technical representation and diagnostic equipment at no cost to KCMT, until resolution of those defined problems. Where appropriate, Developer will bring the System on-line in its basic state.
- B. Use a start-up sequence that incrementally brings each portion of the system on-line in a logical order that incorporates checking individual elements before proceeding to subsequent elements until the entire system is operational.

3.12 PRELIMINARY INSPECTION & TESTING

- A. Perform a Preliminary Inspection and Test to determine the operating status of components and systems prior to Final Acceptance Testing.
- B. Coordination: Coordinate testing of components of the system in cooperation with other trades.
- C. Verification: Prior to performing Preliminary Testing, perform inspection and/or testing procedures to insure the following:
 1. Safe and proper operation of all components, devices or equipment, and the absence of extraneous or interfering signals.
 2. Proper grounding of devices and equipment.

3. Integrity of signal and electrical system ground connections.
4. Proper powering of devices and equipment.
5. Integrity of all insulation, shield terminations and connections.
6. Integrity of soldered connections and absence of solder splatter, solder bridges, and debris of any kind.
7. Proper dressing of wire and cable.
8. "Wire-checking" of all circuitry, including phase and continuity.
9. Preliminary targeting, back focus, and setup of video camera assemblies.
10. Mechanical integrity of all support and positioning provisions, i.e.: as provided for video cameras, monitors and any other equipment.
11. Sequencing: If applicable, determine and record the sequence of energizing systems to minimize the risk of damage from improper startup.
12. Operation of all systems in accordance with specified performance requirements.

- D. Adjustments and Documentation: After successfully energizing the systems, make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses as applicable. Tabulate all data along with an inventory of test equipment, a description of testing conditions and a list of test personnel. Copies of preliminary test data shall accompany copies of performance testing data as part of the Operating and Maintenance submittal.

3.13 PREPARATION FOR ACCEPTANCE (PRIOR TO FINAL INSPECTION)

- A. Temporary facilities and utilities shall be properly disconnected, removed, and disposed of off-site.
- B. Systems, equipment, and devices shall be in full and proper adjustment and operation, and properly labeled and identified.
- C. Materials shall be neat, clean and unmarred, and parts securely attached.
- D. Broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc., shall be replaced or properly repaired, and debris cleaned up and appropriately discarded.
- E. Extra materials as specified shall be delivered and stored at the premises as directed.
- F. Test reports of each system and each system component, and project record documents shall be complete and available for inspection and delivery as directed by The Project Representative.

3.14 ACCEPTANCE TESTING AND ADJUSTING PROCEDURES

- A. Purpose: Conduct testing and adjusting procedures to realize and verify the performance criteria specified herein. Successfully demonstrate the acceptable performance of each specified system in the presence of the KCMT, the Project Representative and Security Designer.
- B. Scope: Conduct all performance testing, adjustment and documentation procedures to verify and realize compliance with the performance specifications herein.

Make available at least one (1) engineer familiar with this work, additional technical personnel required to modify program parameters during the testing period, and all required test equipment for the duration of performance testing verification, at the convenience of the Project Representative.

- C. Acceptance Testing Readiness: Acceptance testing will be performed after the system is installed and pre-tested completely.
 - 1. The Developer shall have successfully tested the system prior to scheduling formal acceptance testing. Developer shall correct any and all deficiencies found at that time.
 - 2. Acceptance testing will be conducted in accordance with the approved Acceptance Testing Plan.
 - 3. Deliver all equipment, devices and materials required for the security work to the site at least fourteen (14) working days prior to the scheduled Completion Date.
 - 4. Install, test and ready all of the security work for final Acceptance Testing of the Installation ten (10) working days prior to the Completion Date.
- D. Acceptance Testing Schedule: Developer shall confirm in writing to the Project Representative when the system is ready for acceptance testing. Developer shall then schedule a complete Acceptance Test at the convenience of the Project Representative.
- E. Acceptance Testing: Developer shall test and verify the performance of all equipment, systems, interfaces and peripheral equipment in the presence of the KCMT, Project Representative and The Security Designer. Tests shall be performed in accordance with the requirements of individual systems as specified herein and in related specification sections.
- F. Correction of Jobsite Observation Report Items: Perform all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Project Representative within ten (10) working days of the completion date. Corrective work shall be performed at no additional cost to the KCMT.
- G. Test Documentation: Document all acceptance testing, calibration and correction procedures described herein with the following information:
 - 1. Performance date of the procedure.
 - 2. The names of personnel conducting the procedure.
 - 3. The equipment used to conduct the procedure.
 - 4. Type of procedure and description.
 - 5. Condition during performance of procedure.
 - 6. Parameters measured and their values, including values measured prior to calibration or correction as applicable.
 - 7. Parameters associated with calibration or corrective networks, components or devices.

3.15 FINAL PROCEDURES

- A. Portable Equipment: Furnish portable equipment specified herein to the KCMT, along with complete documentation for the materials furnished. All portable equipment shall be presented in the original manufacturer's packing, complete with manufacturer's instructions, manuals and documents. Testing of all portable equipment shall have been previously conducted by the Developer.

- B. Post Acceptance Work: Check, inspect and adjust all systems, equipment, devices and components specified, at the Project Representative's convenience, approximately sixty (60) days after Acceptance of the Installation.

END OF SECTION

SECTION 280513

SECURITY CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 DESCRIPTION

- A. This specification section covers the furnishing and installation of conductors and cables to interconnect electronic equipment, devices and systems throughout the facility.

1.02 GENERAL CONDITIONS

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.03 RELATED WORK

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.04 SHOP DRAWINGS & EQUIPMENT SUBMITTAL

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.05 EQUIPMENT COMPATIBILITY REQUIREMENTS

- A. Provide the work in accordance with Section 280000, Security General Requirements.

PART 2 PRODUCTS

2.01 GENERAL

The Developer shall provide wire and cable as specified, or as recommended by the manufacturer. Wiring shall meet NFPA 70 standards. Cable shall be rated and approved for the intended use. Cables submitted as or equal shall utilize identical color code as specified cable.

2.02 ELECTRONIC ACCESS CONTROL SYSTEM (EACS)

- A. Alarm Monitoring Cable (Cable Type 'A'): Belden 5500FE or equal
- B. Request-to-Exit Detector (Cable Type 'B'): Belden 5441FE or equal
- C. Card Reader (Cable Type 'C'): Alpha 1296C or equal
- D. Card Reader below grade (Cable Type 'CU'): General 7524556 or equal
- E. Lock Power (Cable Type 'D'): Belden 5300UE or equal
- F. Network Controller (Cable Type 'H'): Belden 7851A or equal

2.03 VIDEO SURVEILLANCE SYSTEM (VSS)

- A. Digital Video w/POE (Cable Type 'H'): : Belden 7851A or equal
- B. Digital Video w/POE below grade (Cable Type 'HU'): Belden 7934A or equal
- C. Camera Power (Cable Type 'D'): Belden 5300UE or equal
- D. Camera Power below grade (Cable Type 'DU'): West Penn AQC 224 or equal

2.04 SECURITY INTERCOM SYSTEM (SIS)

- A. IP Intercom Field Station (Cable Type 'H'): : Belden 7851A or equal
- B. Intercom Master Station (Cable Type 'H'): : Belden 7851A or equal

2.05 EXPOSED CAMERA WIRING:

- A. Wiring between camera enclosures and their respective 'J' Box shall be in "Seallite" flexible conduit. Seallite shall be firmly affixed to 'J' Box cover plate and camera enclosure. Refer to camera details. Flexible conduit shall be no longer than three feet in length.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wires shall be installed in conduit or in another approved raceway, unless otherwise noted or excepted. Where a wire run is above a suspended ceiling, its conduit or raceway shall be tied up or clamped to the supports and not left to sit on top of the ceiling panels.
- B. Conduit Verification: Verify that conduit has been installed, de-burred and properly joined, routed and terminated prior to pulling of cables.
- C. Wire Pulling: Apply a chemically inert conduit lubricant to wire and cable prior to pulling. Do not subject wire and cable to tension greater than recommended by the manufacturer.
- D. Wire Routing: Secure wire and cable runs vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Non-coaxial cables shall be secured. Symmetrical clamping devices with split, circular or other wire conforming, non-metallic bushings shall be provided for other cables.
- E. Verification of Continuity: After installation, and before termination, wiring shall be checked and tested to insure there are no grounds, opens, or shorts on any conductors or shields. In addition, wiring between buildings or underground and coax cables shall have insulation tested with a megohmmeter and a reading of greater than 20 megohms shall be required to successfully complete the test.
- F. Splicing

1. Run wires continuously from termination to termination without splices.
2. Splices at certain junction box locations may be allowed at the discretion of King County and the Engineer. Locations which may require spliced wires should first be established with King County and Engineer. Developer shall obtain written approval before proceeding with splices.
3. If splices are required and approved by Engineer, the wire shall be joined with solder, then taped or otherwise protected in an approved manner so as to provide mechanical and electrical integrity. Wire nuts and/or electrical tape connections shall not be acceptable. Final connections shall be made at terminal boards with full tagging, labeling and documentation.
4. Coaxial Splices: Coaxial splices, if required, shall be on plate mounted dual-barrel type insulated BNC connectors, secured in such a manner that no stress is placed upon the connector.

G. Water Protection

1. Water-resistant protection shall be continuous throughout the cable in surface conduit, poles, in-slab pull-boxes, in-slab conduit, and underground conduit and pull-boxes, and in any areas subject to moisture and/or water infiltration.
2. Splices/Junctions: Provide water-proof protection of splices and junctions in surface conduit and boxes, in-slab conduit and pull-boxes, underground conduit, and underground pull-boxes, to prevent the entry of moisture or water into cables, splices or connections.
3. Cable Entries: Provide water-blocking sealants at conduit entries into pull-boxes, junction boxes, back-boxes, cabinets, etc., to prevent the entry of moisture or water into the conduit and cable system.

H. Boxes: Provide a box loop for wire and cable routed through pull boxes or distribution panels. Cable loops and bends shall not be at a radius less than that recommended by the manufacturer. Coordinate pull box size with the Division 26 as necessary to accommodate this requirement.

I. Wire Labeling: Identify wire and cable clearly with permanent labels wrapped around the full circumference within one-inch of each connection. Locate the label so that it is visible, and so that wire does not need to be undressed or disassembled for clarity. Correlate the label with the number designated on the associated Shop and Field Drawings. Assign wire or cable designations consistently throughout a given system. Each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations. Cables within pull boxes and underground vaults shall be labeled with the origination and destination of each cable.

J. Wire Lacing and Dressing: Dress, lace, tie or harness wire and cable vertically, horizontally and at right angles to the enclosure surfaces to prevent mechanical stress on electrical connections as required herein and in accordance with accepted professional practice. No wire or cable shall be supported by a connection point. Use the specified cable management guides within enclosures and cabinets to ensure a neat wiring scheme.

K. Class Mixing:

1. Class 1 circuits shall not be mixed with Class 2.

2. Wiring in the same conduit or wireway shall not contain wiring of multiple types where voltage differences exceed twenty (20) dbv except where line and microphone levels will not be used at the same time.
 - L. Non-Coaxial Terminations: Make non-coaxial connections and splices (except microphone or line level) to screw-connection terminal blocks with insulated crimp-type spade lugs or under terminal block pressure plates. Size terminal blocks and lugs properly to assure high electrical integrity. Connect only one (1) wire per spade lug and not more than two (2) lugs per screw terminal.
 - M. Shielded Cables: Shielded cables shall be insulated. Do not permit shields to contact conduit, raceway, boxes, terminal cabinets or equipment enclosures. Tin terminated shield drain wires and insulate with heat shrinkable tubing.
- 3.02 COORDINATION
- Provide the work in accordance with Section 280000, Security General Requirements.
- 3.03 WORKMANSHIP
- Provide the work in accordance with Section 280000, Security General Requirements.
- 3.04 GROUNDING PROCEDURES
- Provide grounding of all systems and equipment in accordance with section 280000, Security General Requirements.
- 3.05 CONDUIT AND WIRE INSTALLATION PRACTICES
- Provide conduit, wire and cable installation in accordance with Section 280000, Security General Requirements.
- 3.06 IDENTIFICATION AND TAGGING
- Provide identification of wire, panels, and devices in accordance with Section 280000, Security General Requirements.
- 3.07 FINAL PROCEDURES
- Perform final procedures in accordance with Section 280000, Security General Requirements.

END OF SECTION

SECTION 280800

CONFIGURATION AND COMMISSIONING OF SECURITY SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish and install system control software, connect the project security devices to existing security control systems, and configure, test, activate, and commission the project security system integrated to the Metro's Security Monitoring Center (SMC), Access Control Database (ACD), Security Call System (SCS), and Facility Surveillance System (FSS). Conduct initial configuration, inspection, testing, and activation work at a Security Monitoring Test Station (SMTS) established at the project site prior to activation at the SMC, ACD, SCS, and FSS. As part of this work, prepare documentation package and conduct training for Metro Staff during the commissioning work.
- B. The work includes (in general sequence of activities):
1. NVR Pre-configuration (by Metro) - Prior to NVR Site installation, deliver NVRs to Metro for configuration and installation of King County required network security, naming, Active Directory and Domain Configuration, patching, and anti-virus software.
 2. Review King County System Configuration and Functionality Requirements – Review configuration and functionality requirements identified herein, including the existing security systems that will be interconnected to the equipment and systems installed under this project. Request clarifying information if necessary prior to implementation.
 3. Configure System – Configure the software, devices, graphical interfaces, and overall integrated system to achieve the specified functionality and integration requirements. Conduct configuration work at the SMTS, including connecting site devices via King County Intranet to the SMTS. Review King County operating system and firewall configurations necessary to plan and conduct the work.
 4. Inspect and Test System (additional requirements specified elsewhere in document) – Inspect and test the equipment and software at the site, and demonstrate interconnection functionality at the SMTS prior to system activation. Also, provide support during King County's inspection and testing of the system components. Obtain approval from Metro prior to activating the system at SMTS.
 5. Activate System at SMTS – Activate the site system at the SMTS and conduct operational demonstration and system validation testing of the end-to-end system. Demonstrate system functionality, and provide technical support for inspection and testing of the activated system by King County. Closely monitor system operations for the time period specified in this section, and troubleshoot and repair any non-performing equipment or configuration work to achieve specified performance requirements. Repeat the activation step until the system achieves specified performance. Obtain approval from Metro prior to activating the system at SMC, ACD, SCS, and FSS.
 6. Activate System at SMC, ACD, SCS, and FSS – Activate the site system at the SMC and ACD and conduct operational demonstration and system validation testing of the end-to-end system. Demonstrate system functionality, and provide technical support

for inspection and testing of the activated system by King County. Closely monitor system operations for the time period specified in this section, and troubleshoot and repair any non-performing equipment or configuration work to achieve specified performance requirements. Repeat the activation step until the system achieves specified performance. System will remain in service after this task is successfully completed.

7. Commission System – Following successful activation, place the system into full service, and regularly monitor the system during the commissioning period specified in this section. Routinely monitor system during the commissioning period, and troubleshoot and repair any user-identified equipment or configuration issues to achieve specified performance and functionality requirements.
8. Documentation – Prepare documentation package for the work.
9. Training – Conduct training for Metro staff.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 IMPLEMENTATION PLANNING

- A. Implementation Plan – Prepare and submit an implementation plan that documents the requirements, work plan, and testing requirements necessary to conduct this scope of work. Work includes: a) conduct system review; b) establish project requirements, c) plan the work, and d) submit implementation plan for proposed activities. Review the configuration and functionality of Metro’s existing security and monitoring control system, SMC, ACD, SCS, FSS, and INET systems as necessary to establish project requirements necessary for a complete and fully functional system. Identify the required software and hardware settings and configurations and establish configuration requirements necessary to achieve system functionality. Submit an implementation plan that addresses the requirements of each task scope herein and includes, at a minimum, these elements: narrative description of the overall process; proposed software and hardware settings and configuration requirements; work breakdown and schedule for the work with key milestones (including any SMC/ACD/SCS/FSS operational interruptions); contact information and communication plan; system protection plan; test plan (including at a minimum the testing requirements identified herein and pass/fail criteria); activation plan (including rollback plan); and commissioning plan. Identify information needed from Metro to complete the work. Attend one meeting to review the proposed plan and respond to comments from Metro staff prior to implementation.

3.02 CONFIGURATION

- A. Configure the system to achieve specified performance and functionality requirements. Provide a SMTS for use that is configured for remote access to Metro’s security and access control systems. Obtain approval from Metro for project specific hardware (i.e.: laptops, desktops, memory sticks, etc.) prior to connecting such devices to King County’s network. The work under this task includes, but is not limited to, these activities:

1. Windows OS & Firewall Installation and Configuration (by Metro) – Furnish and install Metro’s standard Windows Operating System and firewall on all system devices as necessary (Network Video Recorder, network switch, etc.). Review the software configurations as necessary to plan and execute the work. Conform to Metro network standards.
2. Security Monitoring Test Station Setup – Inspect Metro’s existing SMTS and provide Metro with any additional requirements for system setup prior to commencing with using the SMTS for system configuration.
3. IP Addressing – Coordinate with Metro to obtain IP addresses for the Developer to install on all required devices (NVRs, cameras, etc.). Review the addresses as necessary for project implementation, and implement the addressing consistently throughout the work.
4. Device Naming – Submit device names for review prior to proceeding with device naming. Implement specified device names and naming conventions consistently throughout the work.
5. Call Station and VOIP Configuration – Configure the VOIP module and assign VOIP phone numbers to the call stations. Implement the phone numbering consistently throughout the configuration work.
6. Access Control System Configuration – Submit device names, functionality, and alarm requirements for the access control devices. Configure the access control system to integrate with and function with the existing Metro access control system and Access Control Database (located at King Street Station). Implement the naming convention and functionality requirements consistently throughout the configuration work. Provide technical support to Metro during access rights configuration and testing.
7. Video Surveillance System Configuration (cameras, existing NVRs) – Submit device names, preset positions, and functionality requirements for the video surveillance system for review prior to proceeding with the configuration. Implement the naming convention and functionality requirements consistently throughout the configuration work.
8. Monitoring and Alarm Requirements – Submit monitoring status report and alarm condition to be generated from the site, and the associated alarm message, screen information, and functionality to be generated at the SMC, prior to proceeding with the configuration. Implement the monitoring and alarm requirements consistently throughout the configuration work.
9. Graphical User Interface (GUI) Configuration – Submit the graphical layout requirements and GUI functionality for the project, including the camera views, device graphics, and alarm activation and acknowledgement, prior to proceeding with the configuration. Use project AUTOCAD drawings to use to prepare the graphics for the GUI. Configure GUI graphics and implement control functionality to be applied to the monitoring and control systems at the site and SMS. Implement the approved GUI plan consistently throughout the configuration work.

3.03 INSPECTION AND TESTING

- A. Inspect and test the configured system components onsite and at the SMTS to meet the specified technical and functional requirements, prior to full activation at the SMTS (additional requirements specified elsewhere in document). Notify Metro of readiness for inspection and testing at least seven (7) days in advance of commencing the test, and obtain Metro concurrence of with the schedule prior to commencing. Conduct discrete unit, system, and performance testing activities, and demonstrate the specified

performance and functionality of the installed equipment. Conduct initial readiness testing as described herein in preparation for Metro's readiness review, and make the system ready for inspection by Metro. Metro will then conduct inspection testing and establish system readiness for activation. Metro's readiness review will include testing and acceptance of these items (at a minimum): unit and system functionality testing; hardware, software, application and data specification conformance; SMS systems status (ready for activation); equipment connection; back-up and recovery documentation; training documentation; approved Developer staffing plan and schedule for subsequent work tasks. Obtain approval from Metro prior to commencing system activation.

3.04 ACTIVATION AT SMTS

- A. Following successful testing and receipt of written approval by Metro, activate the system at SMTS and conduct testing under simulated normal operating conditions. Demonstrate successful interactions and interconnection functionality of the new system at the SMTS work station. Confirm and demonstrate that the system operates as a complete entity between the site and the SMTS, including the system user interface, data conversion requirements, and specified applications and functions. Monitor the system continuously for a period of 24 hours, during which time Metro staff will test and evaluate the interconnected test system. Provide hands-on instruction to Metro staff to facilitate system use and testing during the activation period. Adjust the system as required by Metro during this activation period. Roll back the system interconnection if operational impacts are identified by either Developer or Metro. Obtain approval from Metro prior to commencing system activation at SMC and ACD.

3.05 ACTIVATION AT SMC, ACD, SCS, AND FSS

- A. Following successful activation and initial operation at SMTS, activate the system at SMC, ACD, SCS, and FSS and conduct testing under simulated normal operating conditions. Demonstrate successful interactions and interconnection functionality of the new system at the SMTS work station. Confirm and demonstrate that the system operates as a complete entity between the site and the SMC, ACD, SCS, and FSS including the system user interface, data conversion requirements, and specified applications and functions. Monitor the system continuously for a period of 24 hours, during which time Metro staff will use and evaluate the complete interconnected system. Provide hands-on instruction to Metro staff to facilitate system use and testing during the activation period. Adjust the system as required by Metro during this activation period. Roll back the system interconnection if operational impacts are identified by either Developer or Metro. Obtain approval from Metro prior to commencing system commissioning.

3.06 COMMISSIONING

- A. Following successful activation at SMC, ACD, SCS, and FSS, provide commissioning services for the system interconnection for a period of thirty (30) days of normal operation, to run consecutively with the successful activation period. Troubleshoot and adjust the system as identified by Developer or required by Metro during this commissioning period.

3.07 DOCUMENTATION

- A. Submit a documentation package including the pre- and post-expansion configuration, naming/addressing, equipment interconnection diagrams, software settings, operations and maintenance information (including troubleshooting guide). Work includes: prepare and submit documentation package; and attend review meeting.

3.08 DATABASE PREPARATION, CHECKING, AND ACTIVATION

- A. Provide King County Transit with the appropriate forms necessary to organize the security systems database inputs not less than 30 days prior to scheduled connection of new equipment to King County Transit's existing security and access control system.
 - 1. Clearly identify the delivery of the forms on the Project Schedule.
 - 2. See Table 1 at the end of this section for a list of point names and programming configuration. Portions of the programming tables are incomplete as systems have not been programmed and are shown as blank fields or SAMPLES.
- B. Train King County Transit-designated personnel to ensure their understanding of database formats requirements and constraints not less than 30 days prior to scheduled central system activation.
 - 1. Clearly identify the training on the Project Schedule so that database preparations are accomplished in sufficient time to permit orderly and on time security systems activation
- C. Thoroughly check completed data entry forms for compliance with system requirements prior to security systems activation.
- D. Ensure that all database formatting is correct prior to security systems activation.
- E. Provide the initial database entries into the security systems prior to activation.
 - 1. The databases will consist of hardware related information, i.e., doors, alarm points, software parameters for system management, alarm and cardholder information, camera and monitor matrices relationships, , pan-tilt-zoom camera pre-positioning, etc.
 - 2. The databases will consist of hardware related information, i.e., doors, alarm points, software parameters for system management, alarm and cardholder information, camera and monitor matrices relationships, , pan-tilt-zoom camera pre-positioning, etc.
 - 3. Submit a printout of the final databases for review and approval prior to security systems activation.
- F. Provide updated database upon security systems activation.
 - 1. Once the security systems and databases have been demonstrated to be functioning properly according to manufacturers' guidelines and the systems designs, all further database entries and upgrades will be the responsibility of King County Transit.
- G. If later versions of the operating security systems or application software are made available by the manufacturers, submit information to the King County Project Representative on the requirements for installation, operation, and advantages/disadvantages of the later version.
 - 1. Fully coordinate a software acceptability review and obtain written approval to use the new software from King County Project Representative prior to installation of any new software.

2. Before installing upgrade software, ensure that duplicate files of the existing database information are prepared and stored separately to enable restoring the existing database if needed.

3.09 TRAINING

- A. Conduct four (4) hours of training for Metro staff. Training topics shall include, at a minimum: the hardware and software specifications; system configuration parameters, operating procedures (including training for SMC, ACD, SCS, and FSS staff for the use of the system); maintenance procedures (including training for maintenance staff for equipment setup, maintenance, and troubleshooting); review of the Developer's submitted Operation and Maintenance manuals; and review of construction record documentation. Prepare and submit a written training program prior to conducting the training. Propose a training schedule at least seven (7) days in advance of the session, and obtain Metro concurrence with the schedule. Conduct training prior to and/or during the system configuration and activation tasks and complete training prior to commencing the commissioning period.

**TABLE 1
TYPICAL SECURITY SYSTEM PROGRAMMING AND NAMING CONVENTIONS**

Security Configuration Summary Page					
Site Prefix:					
Continuum					
Netcontroller Name:					
IP Address: Subnet: Gateway:					
Design Point #	Object Alias	Object Device	Object Description		
NVR (Digital Sentry)					
NVR Name:					
IP Address: Subnet: Gateway:					
Design Point #	Camera Name	Camera Type & Model	PTZ y/n	Input on DVR#	Input Name
Vidmon					
Device Description	Point Type	NVR Association	Camera Name	Preset #	
Continuum					
Netcontroller Name:					
IP Address: Subnet: Gateway:					
Design Point #	Object Description	Mod #	Channel	Elec Type	Units

**TABLE 1 (Continued)
TYPICAL SECURITY SYSTEM PROGRAMMING AND NAMING CONVENTIONS**

NVR (Digital Sentry)				
NVR Name:				
IP Address: Subnet Gateway				
Design Point #	Input on NVR #	TX Board	Camera Name	PTZ Address
DVR1 Model				
DVR1 Serial #				
DVR1 Digital Sentry Version				
DVR1 OS				

END OF SECTION

SECTION 281000

ELECTRONIC ACCESS CONTROL SYSTEM (EACS)

PART 1 GENERAL

1.01 DESCRIPTION

- A. General Description: This specification section covers the furnishing and installation of a complete expansion to a complete enterprise-wide, low-voltage, electronic access control system.
- B. Developer shall furnish and install security hardware devices, mounting brackets, power supplies, switches, controls, consoles and other components of the system as shown and specified.
- C. Also furnish and install all outlets, junction boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation.

1.02 RELATED WORK

- A. Provide the work in accordance with Section 280000, Security Control General Requirements.
- B. Door Hardware
 - 1. General: Coordinate with the requirements of Division 08 Section 'Door Hardware'.
 - 2. Security Door Requirements: The Developer shall be responsible for surveying each security door before installation, and reviewing the door hardware configuration and installation conditions with respect to the specified functions. The Developer shall verify the compatibility and completeness of the proposed hardware and its installation, submit detailed drawings showing the proposed modifications and installation, and provide all equipment and services required to achieve the specified electrical and mechanical performance. Coordinate acceptable door hardware and installation techniques with the Project Representative.
 - 3. Door Position Switches shall be furnished and installed. Electrical connection shall be under this section.
 - 4. Doors and Door Hardware:
 - a. Electric door locks, panic hardware and power boosters and power transfer devices shall be furnished and installed.
 - b. Developer shall modify locks, doors and doorframes as needed to provide the specified operation.
 - c. Door hardware and installation shall comply in all respects with the requirements of Public Law 101-336, Americans With Disabilities Act

1.03 SHOP DRAWINGS & EQUIPMENT SUBMITTAL

- A. Provide the work in accordance with Section 280000, Security Control General Requirements.

1.04 OPERATIONS AND MAINTENANCE MANUALS

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.05 WARRANTY

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.06 TRAINING

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.07 EQUIPMENT COMPATIBILITY REQUIREMENTS

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.08 TECHNICAL REQUIREMENTS, ELECTRONIC ACCESS CONTROL SYSTEM (EACS)

A. General

1. The Electronic Access Control System (EACS) components provided under this scope of work shall be compatible with the existing EACS System and shall function as an integral part thereof. The existing EACS system is an Andover Continuum system, providing access control services. The EACS for this project shall have its own server and operate as an independent system and be capable of interfacing to the existing system in the future.
2. Developer shall be responsible for providing equipment and software to achieve the specified system performance described herein and, by reference, realize absolute and seamless compatibility with the existing system.
3. Developer shall ensure that modifications provided under this scope of work have no negative effect on the existing systems and operations, and no permanent effect beyond that specified or implied by the scope of work unless otherwise noted herein.

- B. Purpose: The electronic access control system is designed to monitor and restrict access to specified areas, and to report on the activity and violations of restricted access in those areas

C. Environment:

1. The system shall be wholly contained within the KCMT S. Kirkland Park and Ride Garage. Refer to the Design Criteria and these Performance Specifications to determine the scope limitations for this phase of work.
2. Primary Monitoring Post: Primary monitoring posts are located at the Atlantic and Central Dispatch areas. Refer to plans for locations.
3. Secondary Monitoring Station: A secondary monitoring station shall be provided in Server Room 2022.
4. Infrastructure and Connectivity:
 - a. S. Kirkland Park and Ride Garage: The EACS workstations and controllers shall reside on the security Local Area Network (LAN). Coordinate with the KCMT IT department on the provision of LAN ports and network rights for new connections. The network switch will be provided by KCMT.
5. Access Control Database (ACD): The existing system has an Access Control Database (ACD) managed by KCMT for users requiring access to sites equipped

with access control readers. Users in the existing database will require access to the new system. Coordinate with KCMT for users in the existing ACD requiring access to the new S. Kirkland Park and Ride Garage and import those records into the new ACD being provided for the new S. Kirkland Park and Ride Garage.

D. Functions

1. Access Control

- a. Secured Doors: Doors equipped with electric locks shall be individually programmed for locking and unlocking at specific times of the day.
- b. Access Card: The system shall authorize users to gain access by means of presentation of a valid access card to an access card reader at a controlled door, elevator, or other controlled portal.
- c. Lamps: The reader shall display a green lamp when door passage is possible and a red lamp when it is not. If an invalid card is presented, the red lamp shall flash for at least two (2) seconds.
- d. Authorized and Unauthorized Users: The system shall distinguish between authorized and unauthorized users using individually programmable parameters of identification, time, location and entitlement.
- e. Access Authorization: The system shall read the access card, record the transaction in the system database and energize a relay that shall open the authorized access portal. "Door force" and "door held open" alarms associated with the portal shall be software bypassed (prevented from reporting an alarm) for duration of time programmable on an individual door and individual cardholder basis
- f. Free Egress Authorization
 - 1) Unless otherwise shown on the plans or described herein, the system shall detect the normal egress of a user at any individual portal and shall bypass any alarm associated with the portal for duration of time programmable on an individual door and individual cardholder basis.
 - 2) On doors with integral electro-mechanical locking mechanisms (strikes, electrical panic hardware, or electrical mortise locks), the mechanical action of the door hardware shall enable egress without requiring release of the electrical mechanism.
 - 3) Developer shall verify Request-to-Exit devices and the respective System Controller will react quickly enough to bypass the alarm before a fast-moving individual can reach and open the door.
- g. Anti-passback: The system shall support regional, global and user-defined anti-passback.
- h. Card Tracking: The system shall support tracking the use of individual cards and/or PIN numbers by recording the use of a card and/or PIN numbers that have been configured for tracking, and alerting the System Operator when they are used.
- i. Fire Alarm System Interface: The Security System shall allow emergency unlocking of all controlled doors upon command from the Fire Alarm System.
- j. Interface to VSS:
 - 1) Automatic call-up of cameras on alarm
 - 2) View real time and recorded video associated with an alarm from the workstation
 - 3) Provide VSS monitoring capability from the EACS workstation

PART 2 PRODUCTS

2.01 PRODUCT ACCEPTABILITY

- A. The Products section contains lists of acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. King County shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.

2.02 ELECTRONIC ACCESS CONTROL EQUIPMENT

- A. System: Andover Continuum Electronic Access Control System, no acceptable equal, configured as described herein.
- B. Software
 - 1. Windows Software: Windows 7, 32-bit system, latest version. Coordinate with KCMT to verify software requirements.
 - 2. Security Software: Provide Andover Continuum Cyber Station Version 1.91
 - 3. Developer shall provide a minimum of two (2) reprogramming sessions within twelve (12) months of the final acceptance of the system to modify the user programming.
- C. System Controller Panels: *Provide sufficient controllers and input/output boards to meet all requirements of specifications.*
 - 1. EACS Controller: Where new controllers are required provide the following;
 - a. Andover Continuum Model NetController II, compatible with the EACS application software, with a minimum 20,000 card record capacity, power supply, battery standby, and Communications Module, as described herein.
 - b. Developer shall review drawings and specifications with the Project Representative, and may propose changes to the topology of the system based on device layout, where such changes improve performance or functionality of the system. King County has final authority as to the final approach for system topology.
 - 2. Controller Connectivity
 - a. Controllers shall support connection to the security LAN/WAN using TCP/IP protocol, and shall also support connection to the manufacturer's standard data communications protocol (RS-232, RS-485, or RS-422).
 - b. TCP/IP-connected controllers may act as a network "gateway", to re-transmit controller data via the manufacturers standard data communications protocol (RS-232, RS-485, or RS-422), to other EACS controllers located in the same room. Provide controllers which support the manufacturer's standard data communications protocol, RS-232/20ma, as required.
 - 3. Controller Power Supply: Andover Model PS120/240 AC 65-U.
 - 4. Controller Modules: *Provide reader, input and output control capacity at each controller location, to meet the requirements of the site configuration.*
 - a. *Single Reader Interface Module:* Andover Model AC-1, Reader Interface Module, no acceptable equal, compatible with the proposed system and readers. Module shall support one reader portal, with
 - 1) Downloadable Firmware
 - 2) Door Contact Input
 - 3) Request to Exit Input

- 4) Aux Input
 - 5) Two Form-C relay outputs
 - 6) RS-485 Communication to the Controller
5. Controllers and modules shall be mounted within a Security Terminal Cabinet (STC). Cabinet shall be suitable for the environment in which it is installed, as recommended by the manufacturer and required by the specifications.
- D. Access Control Readers: Provide proximity card readers compatible with the existing KCMT card population where shown on the drawings.
1. Reader shall be potted with a UL listed flame retardant potting material.
 2. Reader cover shall be secured to the reader using a security screw.
 3. Reader shall be designed for both surface mounting and mounting on a single-gang electrical box.
 4. Reader shall operate in a temperature range of minus 31 degrees (-31°) to one hundred fifty one (151°) degrees Fahrenheit, minus thirty five degrees (-35°) to sixty seven degrees (67°) Centigrade.
 5. Compatible with HID, Indala, and other proximity identification media.
 6. Reader shall provide an operating distance of between one to six inches depending on the reader model, card model and mounting environment.
 7. Reader shall operate at 13.56 MHz and 125 KHz in the same reader device.
 8. Reader shall contain Automated Credential Transition Technology allowing upgrade from proximity technology to new contactless technology by presentations only. No enrollment changes shall be required through the access control PC.
 9. Reader shall be capable of transmitting the card data in the SIA Wiegand protocol.
 10. Reader shall include a tamper detection mechanism as a standard feature. Tamper mechanism shall not be a reed switch which may be defeated by a magnet.
 11. Reader shall operate across a voltage range of eight volts direct current (8VDC) to sixteen volts direct current (16VDC).
 12. Reader shall have a tri-color light emitting diode (LED) and audible annunciator.
 13. Reader shall flash the LED green momentarily and emit a short beep to indicate that a card was read.
 14. Reader shall have a minimum 5-year warranty against manufacturer defects and workmanship.
 15. Reader shall have the capability to perform secure transactions protecting data transmission between the card and reader utilizing cryptographic methods of mutual authentication and message authentication coding.
 16. Reader shall be compatible with the proposed EACS system and controllers.
 17. Reader shall be suitable for indoor or outdoor use.
 18. Reader Configurations
 - a. For single gang box mounting: HID Model RP40 multiclass reader, with Indala module capable of reading Indala 125kHz proximity, HID ICLASS, and other touchless identification media.
 - b. For mullion mounting: HID Model RP15 multiclass reader with Indala module.
- E. Lock Power Supply (LPS)
1. Provide Altronix AL1012ULXPD16CB, or equal, UL Listed Class II power supplies within a ventilated, locked cabinet where indicated on the contract drawings, or as otherwise required to affect proper system performance. Cabinet shall be equipped with a tamper switch, which shall be connected to the EACS to provide a supervisory alarm. Power supply shall include separate terminals for each door lock.

2. Capacity: The power supply shall be capable of powering 200 percent of the load required at the time of acceptance (100% spare capacity).
3. Power Monitoring: The system shall monitor the loss and restoration of power at the STC. Restoration of power shall be displayed at the console, but shall not require resetting of the system.
4. Battery Back-Up: Power supplies shall be equipped with integral battery recharging circuits and batteries. If a separate cabinet is used for batteries, the cabinet shall be locked and provided with a tamper switch connected to the EACS.
 - a. Fail Safe Door Locks: Provide 4 hours of battery backup for low-voltage electrified door hardware.
 - b. Fail-Secure Door Locks: Provide battery backup sufficient to operate fail-secure door locks 100 times per hour, for four hours.
5. Provide a Fire Alarm Interface Relay to interface the LPS to the STC and Fire Alarm System, as shown on the contract drawings.

F. Alarm Initiating Devices

1. Door Position Switch: Door Position Switches shall be furnished and installed by the Developer. The Developer shall align, prepare and fabricate doors and frames to accept specified door position switches. The Developer shall be responsible for coordinating the installation so systems and hardware operate as specified.
 - a. Surface Mounted Door Switch: Sentrol Model 2505-A-06 or Flair Model MSS-100-23 Surface Mounted Magnetic Switch with armored cable. Route armored cable to junction box and permanently secure to box with clamp or set-screws. Use where shown on drawings, and where flush mounted devices cannot be installed.
 - b. Non-fire Rated Doors, Flush Mount:
 - 1) Hollow Metal Doors: Sentrol Model 1076C-W or Flair Model MSS200 Concealed Magnetic Door Switch.
 - 2) Storefront Doors: Sentrol Model 1076C-W or Flair Model MSS200 Concealed Magnetic Door Switch.
 - 3) Wood Faced Doors: Sentrol Model 1277-W or Flair Model RMS-94 Concealed Magnetic Door Switch.
 - c. Fire Rated Doors
 - 1) General: Developer shall coordinate all security hardware equipment and installation so as to maintain the Fire Rating of each specific door to the satisfaction of the local Authority Having Jurisdiction.
 - 2) Hollow Metal Doors: Sentrol Model 1078CW, or 2750, concealed magnetic door switch, or equal, approved by UL for use on UL classified fire doors with metal faces, rated up to 3-hours.
 - 3) Hollow Metal Doors, Hinge Switch: Stanley Model "CS" Electrical Hinge Switch, or equal by Markar products. Finish and style as directed by King County.
 - 4) Storefront Doors: Sentrol Model 1078CW Concealed Magnetic Door Switch, or equal.
 - 5) Wood Door w/Hollow Metal Frame: Sentrol Model 1078CW Concealed Magnetic Door Switch, with Sentrol Model 1835 Mini-Max Wide Gap Magnet. Magnet shall be made of rare-earth magnetic materials, and shall be of 5/8" x 1/8", cylindrical (washer) shape. Drill 1/8"-deep hole to flush mount magnet to top of door.

- d. Gates and Roll-Up Doors: Sentrol Model 2205-A or Flair Model 1000, with armored cable. Route armored cable to junction box and permanently secure to box with clamp or set-screws.
- G. Duress, Under Desk Mounted: Provide Sentrol Model 3040 duress switch, or equal.

PART 3 EXECUTION

3.01 GENERAL

- A. The Developer shall install system components and appurtenances in accordance with the manufacturer's instructions, and as shown. The Developer shall furnish necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown.
- B. Follow the General Requirements of Section 280000, Security General Requirements for equipment and services provided under this section. In addition, provide the following.
- C. Installation: The Developer shall install the system in accordance with the standards for safety, NFPA 70, UL 681, UL 1037 and UL 1076, and the appropriate installation manual for each equipment type. Flexible cords or cord connections shall not be used to supply power to any components of the system, except where specifically noted. All other electrical work shall be as specified in Division 26, and as shown.

3.02 SYSTEM CONFIGURATION

- A. Portal Hardware
 - 1. Hardware Coordination: Coordinate door hardware requirements with door manufacturer and installer.
 - 2. Request-To-Exit Activation: Request to Exit (REX) devices are an integral part of locking hardware. In most locations, egress may be controlled by card readers to support anti-passback zones. Where REX devices are provided to support non-reader egress, verify that the devices and System Controllers will react quickly enough to bypass alarms before a fast-moving individual can open the door.
 - a. On doors with integral electro-mechanical locking mechanisms (strikes, electrical panic hardware, or electrical mortise locks), the mechanical action of the door hardware shall enable egress without requiring release of the electrical mechanism. The Request-to-Exit device shall not unlock the door.
 - 3. Access Control and Lock Configuration
 - a. Secured Doors: Doors equipped with electric locks shall be individually programmed for locking at all times. A valid credential presented at a reader will allow the portal to unlock for a programmed period of time.
 - b. Upon authorization by card reader or manual means, "door force" and "door held open" alarms associated with the portal shall be automatically bypassed (or masked) for a duration of time programmable on an individual door and individual cardholder basis.
 - c. Auto-Relock: The door shall re-lock immediately upon closing, after an authorized access, and the bypass duration shall be immediately truncated. A magnetic contact will be required at every door for this purpose, and to sense the position of the door for "door forced" and "door held open" sensing.

- d. Free Egress Authorization: Unless otherwise shown on the plans or described herein, such as for anti-passback zones, the system shall detect the normal egress of a user at any individual portal and shall bypass any alarm associated with the portal for a duration of time programmable on an individual door and individual cardholder basis. Request-to-exit timing shall be independently programmed for each cardholder during the initial enrollment process. This function allows extended timing for persons carrying equipment to pass through certain portals. The timing function shall automatically truncate after an adjustable period (0 - 4 seconds) after a portal is closed. This feature allows a subsequent alarm at the portal to be detected, and prevents the portal from being re-opened without an authorized request.
4. Fire Alarm Interface: Electrified locks and strikes which are part of this work and which are locked in the path of legal exiting, shall be connected to the building Fire Alarm System, where provided, in accordance with AHJ requirements such that they automatically unlock in the event of activation of the Fire Alarm System. This shall occur whether the activation is a result of a manual pull station, smoke detector or sprinkler flow switch.
 - a. A fire alarm "general/common alarm relay" shall be programmed at the Fire Alarm Control Panel to activate the EACS interface relays located in each Lock Power Supply cabinet. The Developer shall research and provide all necessary fire alarm system conduit, wire, hardware and programming to perform the required interface.
 - b. This interface shall not depend on the EACS Server or Remote Controllers for its operation. Locate these interface relays electrically ahead of lock power distribution as shown on the drawings. The Developer shall supply and install programmed alarm interface relay(s) with sufficient capacity to control the power supplied to all controlled locks.
- B. Tamper Devices:
1. Terminal cabinets, equipment cabinets, enclosures, power supply cabinets, exposed wireways, and pull and junction boxes with wire connections or splices shall be equipped with tamper switches programmed to report an alarm.
 2. Junction boxes requiring tamper switches that are associated with an individual alarmed device (such as a door position switch) may report to the respective device alarm point. Other cabinet and box tamper switches shall report as independent alarm points.
 3. Power Supplies and Battery Chargers: Power supplies and battery chargers shall be connected to alarm monitoring points to provide an indication of tamper, power failure, battery disconnection, and charger trouble.
- C. Graphical User Interface (GUI) Environment
1. General:
 - a. Developer shall create maps, icons, menus, text, and other functions of the GUI, as noted herein, to incorporate elements and functionality of the project as specified and required by King County.
 - b. The system monitor shall display color graphic maps, menus and real-time information in graphical image formats, as required by King County and described herein. All viewing, menu and operating activity, including map "browse", "zoom", scrolling, output control, alarm acknowledgment and reset functions shall be operable by point-and-click interface with the mouse and by programmable "function keys" on the system keyboard.

- c. **Alternate Display and Control Techniques:** Alternate map control and display techniques that provide the required functionality and information may be considered by King County. Developer shall submit a clearly delineated description of map display and control operation, demonstrate its use and effectiveness to King County using a working copy of the software, and obtain approval from King County before proceeding with the work.
 - 2. **Map Database:** Developer shall research (with King County), design, develop and provide maps described herein in complete operating condition including graphic representations, icons, alarm and control interfaces.
 - a. **Individual Site Plans:** Individual site plan maps shall include the entire site perimeter showing buildings, vehicle and foot traffic features and street frontage. Individual site plans may contain multiple buildings. Large-scale maps shall have dynamic zoom or designated "hot spot" areas to allow the capability to zoom into an area down to 1/8" scale. Site plans shall have icons for exterior mounted devices and entry/exit portals.
 - b. **Building Maps:** Building Maps shall include the building footprint and surrounding areas, ground floor plan, a floor stacking plan (elevation) and stairwell risers. Building plans shall have icons for exterior mounted devices and entry/exit portals.
 - c. **Floor Plan Maps (Where access control, alarm, or video security measures are deployed):** Floor plan maps shall include rooms, corridors, elevators, door and room designations (number and usage), penetrable wall points, column supports, location of security control equipment and any other details necessary to clearly and completely depict the secured environment.
 - d. Individual site plans, building plans, and floor plan maps shall show text and icons for devices monitored and/or controlled by the security system.
- D. **Emergency Standby Power:**
 - 1. EACS components including, but not limited to, computers, EACS Remote Controllers, and peripheral devices shall be protected from power failure by being connected to the building standby power source. Refer to the plans and coordinate with the Project Representative on the provision of 120VAC standby power.
 - 2. **Low-Voltage Equipment:** EACS Remote Controllers and Lock Power Supplies shall also have their own 4-hour battery back-up systems.
 - a. Power back-up may be in the form of direct DC battery power back-up or by 120VAC Uninterruptable Power Supplies (UPS), depending upon equipment requirements.
 - b. Lock Power Supplies shall allow fail-secure locks to be operated by the system a minimum of 100 times-per-hour, during this time period. Fail-safe locks shall be maintained for the full 4-hours.
 - c. Battery back-up systems may be distributed throughout the facility to provide the required emergency power to individual components.
 - d. Battery back-up systems shall include battery chargers to keep storage batteries at their peak charge.

3.03 SECURITY SYSTEM INTEGRATION

Provide security system integration equipment, software and programming, in accordance with Section 280000, Security System Integration.

3.04 EQUIPMENT, RACK AND CONSOLE INSTALLATION

Mount equipment in rooms, consoles, equipment racks, and desktops in accordance with Section 280000, Security General Requirements.

3.05 GROUNDING PROCEDURES

Provide grounding of all systems and equipment in accordance with Section 280000, Security General Requirements.

3.06 WIRE AND CABLE INSTALLATION PRACTICES

Provide wire and cable installation in accordance with Section 280000, Security General Requirements.

3.07 DATABASE PREPARATION, CHECKING AND ACTIVATION

- A. Provide database preparation, checking and activation for systems and equipment in accordance with Security General Requirements, Section 280000.
- B. Developer shall import the existing cardholder database into the new system, as part of this work.
- C. In addition, provide the following:
 - 1. Required Graphical Maps: Developer shall research (with Owner), develop and install property, building, floor plans, and other graphic maps with all icons and details necessary to clearly display all system information and functions, including but not limited to the information described herein. Developer shall provide a complete and operating graphical environment for all EACS systems and subsystems.
 - 2. Required System Programming:
 - a. Developer shall research with King County, develop and install all executive and user software required for the final acceptance of the system as specified herein.
 - b. Developer shall provide King County with forms and instructions to facilitate the gathering and entry of user software data. Forms shall include but not be limited to information regarding cardholder data, access privileges, time schedules, portal groups, access groups, alarm points, tenant/elevator authorization, password protection levels, two-man and anti-passback locations.

3.08 START-UP RESPONSIBILITY

Provide start-up services for all systems and equipment in accordance with Security General Requirements, Section 280000.

3.09 SYSTEM PERFORMANCE TESTING AND ADJUSTING PROCEDURES

- A. Provide Preliminary Testing, Inspection, Performance Verification Testing, Commissioning and Endurance Testing services for EACS systems and equipment in accordance with Section 280000, Security General Requirements.
- B. Electronic Access Control System Testing

1. Test and verify the normal operation of every alarm point in all four states at each alarm panel. Test each alarm point for the alarm function by normal operation of the alarm point, i.e.: for a door position switch, open the door and so forth.
2. Test and verify the operation of the Electronic Access Control System.
3. Test each door during its programmed secure time period to assure that it commands the lock to activate, and permits access by valid keyholder within one second from presentation of the key.
4. Verify all egress systems on access controlled doors work correctly.
5. Verify system integration schemes function automatically and correctly.
6. Verify all activity at Monitoring Stations functions correctly.

3.10 FINAL PROCEDURES

- A. Perform final procedures in accordance with Section 280000, Security General Requirements.

END OF SECTION

SECTION 282300

VIDEO SURVEILLANCE SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

- A. General Description: This specification section covers the furnishing and installation of a complete low-voltage video surveillance system (VSS).
- B. Developer shall furnish and install all VSS security hardware devices, mounting brackets, power supplies, switches, controls, consoles and other components of the system as shown and specified.
- C. Furnish and install special boxes, cable, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with Division 26 Electrical.
- D. Outlets, junction boxes, pull boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation; will be provided by the Developer, in accordance with Division 26 Electrical specifications.
- E. General Conditions: Provide the work in accordance with Section 280000, Security General Requirements.

1.02 RELATED WORK

- A. In accordance with Section 280000, Security General Requirements

1.03 SHOP DRAWINGS & EQUIPMENT SUBMITTAL

- A. In accordance with Section 280000, Security General Requirements

1.04 WARRANTY

- A. In accordance with Section 280000, Security General Requirements

1.05 QUALITY ASSURANCE

- A. In accordance with Section 280000, Security General Requirements

1.06 TECHNICAL REQUIREMENTS, VIDEO SURVEILLANCE SYSTEM (VSS)

- A. Purpose:
 - 1. The video surveillance system will provide staff with the means to monitor, record, and review activity at strategic areas.
 - 2. The System will provide the ability to record images received from cameras located throughout the facility in a digital format and retrieve the recorded video information in random access mode based on parameters requested by the user.
- B. Environment

1. **Infrastructure (Local):** The video camera and processing components at each site shall utilize a combination of standard copper cable or fiber optic cable depending on individual site conditions.
2. **Infrastructure:** The primary VSS Network Video Recorder (NVR) and VSS Clients shall reside on an independent security network within the structure and shall have the capability to connect to the Security Monitoring Center monitoring equipment through the KCMT network. Recording, viewing, switching, short and long-term storage, reviewing, and configuration shall be implemented over this infrastructure. .
3. **Initial Configuration for Video Storage:** The VSS storage system shall provide a minimum of 30 days of storage for all cameras.

C. Attributes

1. The system shall comprise network video recorder, router/switches, and ancillary equipment assembled into a fully operating system as shown on the plans.
2. **Field Components:** Field Components shall comprise IP video cameras, positioning devices, lenses, camera mounts and housings and other video system devices and wiring as described herein.
3. **Video Processing Components:** Video processing components shall comprise network video recorder (NVR), computer video monitoring stations (clients), and other video processing devices as described herein.
4. The system shall be capable of displaying and recording individual video inputs at variable frame rates including, but not limited to, the following frame rates: 1, 2, 3.75, 7.5, and 15 images per second (ips). The system shall be configured to allow a combination of any and all cameras to be recorded at 15ips at 4CIF simultaneously.
5. The system shall be capable of recording individual video inputs at variable quality/compression rates, including but not limited to, 1CIF, 2CIF, and 4CIF.
6. The system shall stream video to the monitors for viewing without any artifacts such as jitter or pixilation. Controls for PTZ cameras shall provide control of the cameras with no delay between issuing the command and the camera responding.
7. **Triplex Mode:** The system shall be capable of recording images, playing back recorded images, and viewing live images simultaneously without affecting the recording of any video input. Video images shall be able to be viewed live at a different frame-rate than the recording rate.
8. **Data Storage Subsystem**
 - a. The data storage system may be configured with an integral server that supports the VSS software and provides both functions within a single piece of hardware. This type of configuration shall meet all the functional requirements as specified herein.
 - b. The data storage subsystem shall utilize enterprise class hard disk system with a reliability of 99.9%
 - c. The data storage subsystem shall utilize dual channel communication between storage servers and the hard drive storage media.
 - d. The system shall be capable of automatic failure detection of a hard drive and have the ability to rebuild the system on hot spare drives.

- e. The system shall have management software for configuration and monitoring of the data storage subsystem. The management software shall alert operators when any system parameter exceeds normal tolerances.
 - f. The system shall be equipped with RAID array hard drives to allow failed hard drives to be replaced without loss of recorded information. Hard drives shall be hot swap type.
 - g. The system shall be equipped with redundant hot swappable power supplies to prevent loss of recording due to power supply failure.
9. External System Integration
- a. The object of "security system integration" is to automatically configure the system to display, record, and report appropriate system activity to various elements of the system. Automatic configuration frees operators from several difficult control tasks, gives the operator more time to respond to events, reduces operator error, and insures critical system tasks occur consistently.
 - b. The VSS shall be electronically integrated with other system databases to provide data import/export functionality.
 - c. The system shall support integration with other security-related equipment as an integral part of the VSS environment.
 - d. The system shall support the capability to send and receive data, streaming video pictures, and messages to/from EACS, SCS, and other systems via an RS-232 or LAN communications link and shall act upon those messages received. All software routines required to accomplish the required data-interface with external equipment and controls shall be fully developed, installed, tested and supported by the Developer. "Hard-wired" interfaces used to support interactive alarm and control functions shall not be acceptable, unless specifically allowed herein.
 - e. Communications of information between systems shall take place automatically and immediately when the event is sensed by the system. This interface shall be implemented using Computer Gateway Interface (CGI) or other LAN integration protocol.
 - f. The system shall support the capability to import and export database information from other computer-based system. Import/export shall be available in both real-time and batch mode processing. All software routines required to accomplish the required data transfers shall be fully developed, installed, tested, and supported by the vendor and Developer.
 - g. The system shall be capable of bi-directional communication with the Andover Electronic Access Control System (EACS) server. Communication can be accomplished through TCP/IP or RS-232 protocols. The VSS shall be capable of generating alarms based on criteria set for each video input and send the information to an EACS server. The VSS shall be capable of receiving messages from an EACS server to modify the recording parameters on an individual channel basis.
10. Video Monitoring and Broadcast
- a. LAN Broadcast: The system shall support remote video monitoring and control over the KCMT LAN/WAN IP network, by any properly configured computer or LAN device, with VSS monitoring software.

- b. Internet Broadcast: The system shall support remote video monitoring and control over the Internet, by any properly configured computer or LAN device, via any web browser.
 - c. Email: The system shall support delivery of video and textual messaging, by Email service, over King Countys' LAN and Wireless LAN network, to staff carrying suitably configured personal digital assistants (PDA) or internet enabled wireless phones.
 - d. Camera Control: Video cameras so equipped, shall be capable of pan/tilt/zoom positioning and remote control functions. Video camera positioning and imaging signals shall be transmitted over the KCMT LAN/WAN networks as described herein, to permit remote viewing and camera control "on demand" on any LAN device, from any location, with appropriate software and authorization.
 - e. Live Video Viewing: System shall support up to 16 simultaneous viewers of live video feeds over the IP network.
 - f. Archived Video Viewing: System shall support up to 8 simultaneous viewers of archived video feeds over the IP network.
11. Security: The system shall employ security measures to ensure access to monitoring and configuration functions by authorized users only. The system shall support:
- a. Password access control and authorization
 - b. Audit trail for any access to the system.
 - c. User authentication
 - d. Encryption of all data sent over the network and Internet.
12. Graphical User Interface (GUI): The system shall integrate to the EACS client workstations and provide full functionality provided by the Control Point software.
13. Emergency Standby Power
- a. VSS components, including but not limited to computers, processing equipment, and peripheral devices shall be protected from power failure by being connected to the buildings Standby Power source.
 - b. VSS Server and Storage Sub-system: The VSS server and storage sub-systems shall also be supported by its own one hour, 120VAC Uninterruptible Power Supply (UPS). UPS systems shall include battery chargers to keep storage batteries at their peak charge.

D. Functions

1. Video Recording Protocols

- a. Recording Modes: The information listed below is a guideline for cameras not assigned a specific recording protocol. Cameras assigned specific recording protocols shall supersede the modes listed below.
 - i. Time Lapse mode: 1 fps at normal compression (CIF)
 - ii. Near Real-Time Mode: 7.5fps at high quality compression (4CIF)
 - iii. Real Time Mode: 15fps at high quality compression (4CIF)
 - iv. Alarm Mode: 7.5fps at high quality compression (4CIF)
 - v. Critical Alarm Mode: 15fps at high quality compression (4CIF)
 - vi. Motion Detection Mode: 7.5fps at high quality compression (4CIF)

- vii. Event Mode: 3.75fps at high quality compression (4CIF)
- b. Recording Periods
 - i. Normal Business Hours: 6:30am to 6:30pm
 - ii. Off Normal Hours: 6:30pm to 6:30am
 - iii. 24-hour Mode
- c. Initial recording protocol programming shall be as follows:
 - i. During normal business hours interior cameras and building exterior cameras shall be recorded at 3.75 fps at 4CIF.
 - ii. During off-normal hours interior cameras shall be recorded at 1 fps at 4CIF and exterior cameras at 3.75 fps at 4CIF
 - iii. During off-normal hours if there is motion within a camera field of view the camera will record at 7.5 fps at 4CIF and adjacent cameras that would detect the movement of a person leaving the field of view of the primary camera will be set to record at 3.75 fps at 4CIF. When the person enters the view of one of the adjacent cameras it will record at 7.5 fps at 4CIF and adjacent cameras will be set to 3.75 fps at 4CIF. If motion is detected for more than 30 seconds at any one camera recording shall be changed to 15 fps at 4CIF for the camera detecting the motion.
 - iv. Any camera associated with an alarm point shall record at 7.5 fps at 4CIF when the associated point goes into alarm mode. For the purpose of storage calculation estimate 10% alarm activity.
- 2. Views shall be retrieved on a camera-by-camera basis, and the individual frames shall be connected, or "streamed", to present a seamless series of frames for continuous viewing. When retrieving views recorded in "normal mode", the system shall "hold" each frame for a sufficient period, to provide a smooth visual presentation to the user. Pictures may also be retrieved on a single-shot basis.
- 3. Software routines required to accomplish the required functionality will be fully developed, installed, tested and supported by the Developer.
- 4. Alarm Mode
 - a. One or more cameras may be associated with a controlled door or gate, duress button, intercom station, emergency phone or alarm monitored portal or area.
 - b. Associated cameras shall be programmed to be automatically pre-positioned and "called" into alarm mode by integrated system or VSS event commands, to be displayed in full-screen view on a video workstation and recorded in "real-time" on its associated VSS Server.
 - c. The system shall allow an individual alarm input to initiate pre-positioning, viewing and recording sequences of two or more alarm point-associated cameras, simultaneously. When two or more cameras are simultaneously designated for event recording, they shall all be recorded in "full-motion". The system shall allow one camera, of each associated group, to be designated for primary recording, with the switching sequence favoring this camera with a longer recording duration.
- 5. Video Storage/Retrieval
 - a. All stored video will be time/date stamped and synchronized with the VSS clock.

- b. The system shall retrieve any stored video based on time/date parameters entered by the operator.
 - c. The system shall be capable to perform motion detection on stored video. Any recorded video channel may be selected and a zone may be selected within the view of the camera scene. The stored video can then be searched and will only display clips of video that identify motion in the selected zone.
6. Video Switching
- a. The routing of video input signals to the appropriate video processing device (video workstations, Email, PDA's) shall be a function of the VSS servers, video workstations and software.
 - b. Operator Control: Cameras and monitors may be controlled individually or in pre-programmed groups by automatic or manual means including, but not limited to:
 - i. Event-initiated activity
 - ii. Standard video switcher keyboards, compatible with positionable devices and the video management software
 - iii. Graphical user interfaces, including the VSS and video management software map screens, with related mouse or computer keyboard interfaces.
7. Video Loss/Video Snow Detection: The system shall detect the loss of image, or loss of usable image, which could comprise snow, a painted lens or any other technical problem. Any video loss shall be reported to the operator workstations, pinpointing the specific camera and appearing as an alarm icon on the graphical alarm map.
8. Camera Identification: Camera identifications shall be in white lettering with black letter borders. All camera displays shall carry an English language description of the camera location. Developer shall configure the system so that only one camera identifier appears on recorded and displayed views at any given time.
9. Alarm Prioritization: The system shall be capable of assigning priorities to various functions. Functions assigned to a higher priority shall have precedence over functions at a lower priority. The highest alarm priority shall override any other function that may be running. Emergency phones shall be assigned to the highest priority and shall annunciate at the workstations regardless of any other function that is running.

PART 2 PRODUCTS

2.01 GENERAL

- A. Product Acceptability: The Products section contains lists of products capable of performing the specified functions. The Developer is responsible to verify the manufacturer of the product they select can perform the specified functions. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified and the functions listed in the specifications. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Project Representative shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified. A video comparison under actual conditions may be required for cameras proposed as

substitutes as a result of technical specifications for cameras not accurately depicting camera performance.

2.02 VIDEO SURVEILLANCE SYSTEM (VSS) EQUIPMENT

- A. Manufacturers: Integral Technologies, no acceptable equal.
- B. Video surveillance system (VSS)
 - 1. Provide Integral (Pelco) Digital Sentry Version DS 7.1.90 Network Video Recorder, no acceptable equal, to provide enterprise-wide monitoring, surveillance and recording. Software shall support GUI, maps, and attributes as specified.
 - 2. Provide the number of servers necessary to manage the total number of cameras as shown described herein.
 - 3. Provide the number of licenses necessary for all system devices and software.
 - 4. Provide sufficient storage capacity as described in the specifications.
- C. Network Client Software
 - 1. Provide Integral (Pelco) Control Point Version DS 7.1.90 software at the client workstations, no acceptable equal, to provide live and archived video services, and to configure and administer the VSS system.
 - a. Monitors and controls all live cameras in the system.
 - b. Controls archive and playback sequences.
 - 2. Provide the number of viewing and camera licenses necessary for all system devices and software.
- D. VSS Server/Archive Server CPU: Provide VSS Servers as shown on the plans. The following describes the minimum guideline configuration for the VSS Server. The Security Developer shall be responsible for insuring the acceptable performance of the system based on the VSS manufacturers' hardware requirements and the performance criteria specified herein for the VSS.
 - 1. General: The term server is used in these specifications and on the plans to refer to the digital video headend processing equipment. Server configuration includes software and hardware required to manage, store, and retrieve video images over the network.
 - 2. Initial Configuration: A VSS server shall be located in the telecommunications room at the structure. The server shall be configured to store a minimum of thirty days (30 days) of video for the attached cameras.
 - 3. Server Appliance: The VSS Server shall be a Pelco DS NVR server, configured as required by the VSS manufacturer, with the following minimum attributes:
 - a. Provide a minimum of 1.5TB of storage
 - b. Rack-Mount Configuration (1 RU)
 - c. Minimum 6GB PC3 DDR3 memory
 - d. 8 MB Level 2 Cache
 - e. Raid Controller (RAID 5/Raid 10 or better): Embedded dual channel Ultra3 SCSI or SATA, w/256MB cache
 - f. Computer Monitor, 17" Flat Panel: Provide Dell Keyboard/Mouse/Monitor unit in 2 RU pull out rack drawer.

- g. Integrated XGA video controller with minimum of 128MB RAM.
 - h. System compatible Bus Mouse and Hardware
 - i. 4 USB 2.0 ports
 - j. 2 Serial Ports, COM1 and COM2
 - k. Microsoft Windows 7.
 - l. Security Network: The Host Workstation shall be capable of providing Network communications between Client Workstations subservient to the Host and to other Host or Administrative Workstations. Data, alarms, and information shall be shared between Hosts and Client Workstations at the discretion of the network administrator.
 - m. Network Card: 1 GB Ethernet Communications Board, compatible with KCMT's existing LAN network
- E. Video Management Software (VMS): Integral (Pelco) Control Point Software.
- F. Video Cameras:
1. Integral Mini-Dome (4.0") with Pan/Tilt/Zoom Camera and Lens: (structure-mounted cameras)
 - a. Provide Pelco IP PTZ camera or equal.
 - b. The integral mini-dome camera shall incorporate an interline transfer Super Dynamic CCD, 379,392 [768(H) x 494(V)] pixels.
 - c. The camera shall be equipped with digital signal processing (DSP) to produce a high quality picture with a horizontal resolution of over 530 lines with a minimum illumination of 1.67 lux (f/1.6) in color mode; 0.11 lux (f/1.6) in SensUP mode providing an output of 50 IRE. The camera shall feature an infrared cut filter capable of being removed automatically upon low light threshold or manually.
 - d. The Camera's zoom lens shall have a ¼" format and a focal length of 4.2-42mm (10X magnification). The zoom lens shall have an auto iris and auto focus feature that shall allow manual override if the need arises. The minimum aperture throughout this range shall vary from a minimum of f/1.6 at the wide angle setting to f/3.0 at the telephoto lens position.
 - e. The pan-and-tilt motor shall be a high-speed unit allowing 360° rotation with a tilt angle of 94°. The camera shall feature a direct drive motor assembly. The camera shall be equipped with a slip ring assembly having an optical interface and be rated for continuous operation. The Camera unit shall support digital flip technology for instant view of objects passing under the camera. The camera unit shall support continuous tilt movement through a 180° tilt range.
 - f. The unit must be UL listed. Power source shall be 24VAC, 60Hz and power consumption 27W for outdoor model with heater and 12W for indoor models. The camera shall also support Power over Ethernet (POE) for indoor models.
 - g. Enclosure shall be IP65 rated.
 2. Integral Mini-Dome (3.5") with Fixed Position Camera: (elevator car cameras)
 - a. The digital signal processing (DSP) Super Dynamic color CCD dome camera shall be Pelco or equal. Provide lens for field-of-view required at each camera.
 - b. The integral mini-dome camera shall incorporate an interline transfer Super Dynamic CCD, 379,392 [768(H) x 494(V)] pixels. The camera's Super Dynamic

function shall enable 32 times wider dynamic range than conventional cameras, and capture images in dark and bright areas simultaneously. For better picture quality, the camera shall feature a 2H vertical enhancer and high light aperture correction.

- c. The camera shall deliver a usable color picture at a scene illumination of 1.5 lux at f/1.4. The camera shall feature a built-in variable-focal ALC lens 3.8-8.0mm (X2), displaying 480-line horizontal resolution and a signal-to-noise ratio of 50dB.
 - d. A user-friendly set-up menu shall provide on/off selection for Auto Tracing White balance (ATW) and Automatic Gain Control (AGC) and variable control of aperture level. The camera shall enable easy installation with single wire control for menu set-up.
 - e. The unit must be UL listed. Power source shall be 24VAC, 60Hz and power consumption 11W. The camera shall also support Power over Ethernet (POE).
 - f. Coordinate dome color and shading with the Project Representative.
 - g. Provide enclosure suitable for the environment in which the camera is located.
3. Integral Dome with Pan/Tilt/Zoom Camera and Lens: (Pole/vator mounted cameras)
- a. The unitized dome/camera assembly shall be a Pelco or equal. The Developer shall prove by data sheet and side by side video comparison that the 'or equal' camera provides the same picture quality in all lighting conditions as the specified camera. The unitized camera/dome assembly shall be a self-contained unit that incorporates an integral color camera, pan-and-tilt motor, zoom lens and receiver/driver.
 - b. The enclosure dome shall have a nominal diameter of 6-1/2".
 - c. The camera shall feature an advanced 1/4" CCD with a built-in complimentary color filter and 768(H) x 494(V) pixels with microlens on each pixel.
 - d. The camera shall be equipped with digital signal processing (DSP) to produce a high quality picture with a horizontal resolution of over 540 lines with a minimum illumination of 1.4 lux (f/1.6) in color mode; 0.33 lux (f/1.6) in black & white mode providing an output of 50 IRE. The camera shall feature an infrared cut filter capable of being removed automatically upon low light threshold or manually.
 - e. The camera shall be equipped with an auto back light compensation and shall feature mask setting and level adjust capability. The camera shall be equipped with a built-in digital motion detector with mask setting and level adjustment as well. The camera shall also be equipped with an electronic sensitivity up feature to enhance camera performance in extreme low light conditions. The camera shall feature auto tracing white balance capability with a 48-section mask and level adjustment capability for accurate color reproduction.
 - f. The camera unit shall include 8 privacy zones that mask areas dynamically; the zones shall change size automatically with camera lens focal length and camera pan/tilt position. The privacy zone shall feature a supervisor override function. The camera shall feature titling for each of 8 areas, user-definable 16 character titles or preprogrammed camera position readout (North, Northeast, East, Southeast, South, Southwest, West, and Northwest).
 - g. The Camera's zoom lens shall have a 1/4" format and a focal length of 3.4-122.4mm (36X magnification). The zoom lens shall have an auto iris and auto focus feature that shall allow manual override if the need arises. The camera

shall also provide continuous digital zoom of 12X. The minimum aperture throughout this range shall vary from a minimum of f/1.6 at the wide angle setting to f/3.0 at the telephoto lens position.

- h. The pan-and-tilt motor shall be a high-speed unit allowing 360° rotation with a tilt angle of 180°. The camera shall feature a direct drive motor assembly. The camera shall be equipped with a slip ring assembly having an optical interface and be rated for continuous operation. The Camera unit shall support digital flip technology for instant view of objects passing under the camera. The camera unit shall support continuous tilt movement through a 180° tilt range.
- i. The camera shall feature a built-in digital motion detector with a 48-section mask and level adjustment capability.
- j. The pan-and-tilt shall allow for preset sort and sequence rotation speed of 300° per second. The unitized surveillance device shall feature a minimum of 64 preset positions.
- k. The camera shall automatically sequence through the preset positions in logical programming order (sequence mode) or actual position (sort mode). The camera shall include 10 programmable scene files, each having a combination of special camera settings such as built-in digital motion detector and electronic sensitivity up. The camera shall be capable of scanning each preset position for motion at the preset position's scene, and delivering an alarm condition.
- l. The pan-and-tilt section shall feature automatic panning mode. The automatic panning limits and speed adjustment shall be selectable from an on-screen menu and not with mechanical or physical limit stops. The camera unit shall include a patrol feature in which a user-recorded pattern of pan, tilt and zoom settings may be replayed repeatedly.
- m. The camera shall support multiplexed control communications (over a single coaxial cable) and RS-485 communication modes.
- n. The camera shall be enclosed in an aluminum die cast housing that is holds the IP52 drip proof environmental structure rating, and be UL listed.
- o. The power source shall be 24VAC, 60Hz at 46W.
- p. Camera and control receiver shall be compatible with the systems' data protocol, and shall implement the entire range of camera configuration adjustments supported by the manufacturer. Cross-manufacturer interfaces that limit this capability are not acceptable.
- q. Provide enclosure suitable for the environment in which the camera is located. Provide exterior cameras with sunshield, and heater/defogger, 24VAC.

G. Pole Mount for Cameras

1. PoleEvator or approved equal. Install Polevator, concrete foundation, mounting hardware, conduit, wiring, and all materials for a complete and fully functional pole-mounted camera.
2. Ancillary Hardware shall be provided by the Developer, if required, and shall be compatible with and comparable in strength to other attached hardware.

H. Camera Enclosure Mounting Hardware

1. Provision for mounting hardware: The Developer shall include provision and installation of miscellaneous hardware and mounting extensions at each camera location to provide acceptable viewing performance.
 2. Structure-mounted Camera Wall Mount, for PTZ Mini-Dome: Provide Pelco or equal. Coordinate color with Project Representative.
 3. Ancillary Hardware shall be provided by the Developer, if required, and shall be compatible with and comparable in strength to other attached hardware.
- I. Camera Power Supply (CPS): Altronix Model R2400 Series, Pelco RCS series, or equal rack-mount UL Listed Power Supply. Provide sufficient camera power supplies to increase the system capacity at each location by 75% of the final device capacity required under this contract. Total power output of power supply varies by manufacturer. Developer shall calculate maximum load for selected power supply and provide number required to power devices at each location.
 - J. Wiring: Refer to Specification Section 280513.

PART 3 EXECUTION

3.01 GENERAL

- A. In accordance with Section 280000, Security General Requirements

3.02 SYSTEM CONFIGURATION

- A. Camera recording and display configurations shall be arranged via a combination of the VSS Server, Network Video Storage Server, Video Monitoring Workstations, and LAN network.
- B. Developer shall coordinate with KCMT to determine the required pre-programmed surveillance and event-initiated configurations.

3.03 SECURITY SYSTEM INTEGRATION

- A. Provide security system integration equipment, software and programming, in accordance with Section 280000, Security General Requirements.

3.04 EQUIPMENT, RACK AND CONSOLE INSTALLATION

- A. In accordance with Section 280000, Security General Requirements

3.05 GROUNDING PROCEDURES

- A. Provide grounding of all systems and equipment in accordance with Section 280000, Security General Requirements.

3.06 WIRE AND CABLE INSTALLATION PRACTICES

- A. Provide wire and cable installation in accordance with Section 280000, Security General Requirements.

3.07 DATABASE PREPARATION, CHECKING, AND ACTIVATION

- A. Provide database preparation, checking and activation for systems and equipment in accordance with Security General Requirements, Section 280000.

3.08 START-UP RESPONSIBILITY

- A. Provide start-up services for all systems and equipment in accordance with Security General Requirements, Section 280000.

3.09 SYSTEM PERFORMANCE TESTING AND ADJUSTING PROCEDURES

- A. Provide performance testing and adjusting of all systems and equipment in accordance with Section 280000, Security General Requirements.

B. VSS Performance Testing

1. Demonstrate acceptable picture quality and camera views for each camera.
2. Demonstrate acceptable picture quality on each video monitoring workstation, and display devices accessible over the LAN.
3. Demonstrate switching, recording and playback functions for the video server, and digital video recorders.
4. Demonstrate camera-positioning functionality, on pan/tilt/zoom cameras, throughout the entire range of possible camera positions.
5. Ensure primary views are acceptable. Demonstrate the view obtained by each pre-programmed camera position.
6. Demonstrate automatic event-initiated recording sequences, including camera pre-positioning, where applicable.
7. Demonstrate video guard tour functions.

3.10 FINAL PROCEDURES

- A. Perform final procedures in accordance with Section 280000, Security General Requirements.

END OF SECTION

SECTION 283000

SECURITY CALL SYSTEM (SCS)

PART 1 GENERAL

1.01 DESCRIPTION

- A. General Description: This specification section covers the furnishing and installation of a complete expansion to the existing Voice-over-IP (VOIP) Security Call System. Furnish, install, test, and make fully operational at locations shown, the specified equipment to provide a new, fully-functional security call system consistent and compatible with existing King County Transit security call systems and capable of connecting, functioning and integrating as specified with the King County SMC.
- B. Developer shall furnish and install security hardware devices, mounting brackets, power supplies, switches, controls, consoles and other components of the system as shown and specified.
- C. Also furnish and install all outlets, junction boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation.

1.02 RELATED WORK

- A. Provide the work in accordance with Section 280000, Security Control General Requirements.

1.03 SHOP DRAWINGS & EQUIPMENT SUBMITTAL

- A. Provide the work in accordance with Section 280000, Security Control General Requirements.

1.04 OPERATIONS AND MAINTENANCE MANUALS

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.05 WARRANTY

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.06 TRAINING

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.07 EQUIPMENT COMPATIBILITY REQUIREMENTS

- A. Provide the work in accordance with Section 280000, Security General Requirements.

1.08 TECHNICAL REQUIREMENTS, SECURITY CALL SYSTEM (SCS)

- A. General
 - 1. The Security Call System components provided under this scope of work shall be compatible with the existing SCS and shall function as an integral part thereof. The

existing SCS system is a VOIP system, providing audio communications from field intercom stations to selected monitoring locations. New devices shall be provided, installed and connected to the existing system through the new security provided Local Area Network (LAN) and owner provided Wide Area Network (WAN) for communications between sites.

2. Developer shall be responsible for providing equipment and software to achieve the specified system performance described herein and, by reference, realize absolute and seamless compatibility with the existing system.
 3. Developer shall ensure that modifications provided under this scope of work have no negative effect on the existing systems and operations, and no permanent effect beyond that specified or implied by the scope of work unless otherwise noted herein.
- B. Purpose: System shall permit security staff to communicate with persons requesting access or assistance and to question or redirect persons who have violated a security zone near an intercom field station.
- C. Environment:
1. The system shall be wholly contained within the structure. Coordinate with the requirements of the Design Criteria and these Performance Specifications to determine any scope limitations for this phase of work.
 2. Central Administrative Post: The existing system administrative station is located in the KCMT Security Monitoring Center. Primary system programming, configuration and control shall occur at this location. Monitoring shall occur at the KCMT Security Monitoring Center. .
 3. Infrastructure and Connectivity:
 - a. Structure: The SCS intercom field stations (IC) and intercom master stations (ICM) shall reside on the building Local Area Network (LAN) or network segment. Coordinate with the KCMT IT department on the provision of LAN ports and network rights for new connections.
 - b. Enterprise: The structure security network shall be connected to the KCMT LAN/WAN, to establish SCS connectivity between the structure and the KCMT Security Monitoring Center.
- D. Attributes:
1. Field stations shall meet all requirements of the Americans with Disabilities Act.
 2. Field stations shall communicate over a local area network connection at the station.
 3. The field stations will be "hands-free" devices. All field stations will report to the SCS VOIP server for call routing and to the master stations for call communications.
 4. The system shall be capable of communications from any field station to any master station or any master to any other master.
 5. Field stations shall have two call buttons; one programmed to call the Atlantic Dispatch ICM and one programmed to call the Central Dispatch ICM.
- E. Functions:
1. Calls may be initiated at a field station by pressing the field station call button. Control thereafter will be by the monitoring station. Calls may also be initiated from the monitoring station to any field intercom station, or by automatic event processing activity initiated from the EACS.

2. The SCS shall interface to the EACS and VSS to automatically display the camera or cameras viewing the intercom station when the call button is pressed.
3. The intercom field station shall be equipped with two call buttons. One button shall be labeled Atlantic and shall connect to the Atlantic Dispatch area intercom master station and the other button shall be labeled Central and communicate to the Central Dispatch area intercom master.

PART 2 PRODUCTS

2.01 PRODUCT ACCEPTABILITY

The Products section contains lists of acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. King County shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.

2.02 SECURITY CALL SYSTEM EQUIPMENT

- A. Furnish and install Talk-A-Phone brand emergency phone tower, 114" tall, 24VDC, blue, with strobe, consistent with those installed in other King County Metro Transit structured parking facilities.
- B. Connect to IWATSU VOIP concentrator to receive emergency call from emergency phone tower and automatically connect to KCMT SMC.
- C. Review the specific information regarding required products and materials and to identify any additional components required to provide a complete and functioning system, including, but not limited to, conduit, junction boxes and cables.
- D. Install Punch-Down blocks (Type 66) on VOIP outgoing circuits

PART 3 EXECUTION

3.01 GENERAL

- A. The Developer shall install system components and appurtenances in accordance with the manufacturer's instructions, and as shown. The Developer shall furnish necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown.
- B. Follow the General Requirements of Section 280000, Security General Requirements for equipment and services provided under this section. In addition, provide the following.

3.02 SECURITY SYSTEM INTEGRATION

- A. Provide security system integration equipment, software and programming, in accordance with Section 280000, Article 3.02, Security System Integration.

3.03 GROUNDING PROCEDURES

- A. Provide grounding of all systems and equipment in accordance with Section 280000, Security General Requirements.

3.04 WIRE AND CABLE INSTALLATION PRACTICES

- A. Provide wire and cable installation in accordance with Section 280000, Security General Requirements.

3.05 DATABASE PREPARATION, CHECKING AND ACTIVATION

- A. Provide database preparation, checking and activation for systems and equipment in accordance with Security General Requirements, Section 280000.

3.06 START-UP RESPONSIBILITY

- A. Provide start-up services for all systems and equipment in accordance with Security General Requirements, Section 280000.

3.07 SYSTEM PERFORMANCE TESTING AND ADJUSTING PROCEDURES

- A. Provide Preliminary Testing, Inspection, Performance Verification Testing, Commissioning and Endurance Testing services for SCS systems and equipment in accordance with Article 3.14, Section 280000, Security General Requirements.
- B. SCS Performance Testing
 1. Demonstrate intercom call-in, switching, and call forwarding functions for intercom master stations and field intercom stations.
 2. Demonstrate acceptable audio quality for administrative master stations and field intercom stations.
 3. Demonstrate automatic camera call up on activation of field stations.
 4. Demonstrate the functionality of integration schemes, including automatic event-initiated sequences, automatic station calls, camera pre-positioning and video recording, where applicable.

3.08 FINAL PROCEDURES

- A. Perform final procedures in accordance with Section 280000, Security General Requirements.

END OF SECTION

SECTION 283100

FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Developer's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. This Section includes fire alarm systems with fire alarm control panel, manual stations, detectors, signal equipment, controls, elevator recall, off-site reporting, sprinkler system monitoring, and devices.
- C. The Developer shall design and provide a complete fire alarm system per Authorities Having Jurisdiction (AHJ's) requirements. The AHJ's include, but are not limited to: the local fire marshal, the local elevator inspector, and the local building department. System shall include a fire alarm control panel, audible and visual notification, sprinkler system monitoring, door hardware and security system interface, off-site notification via phone lines, and all other components and functions required to provide a system that complies with the AHJ's requirements. All required functionality, i.e. alarm initiation and indication, elevator recall, and sprinkler system monitoring, shall be accomplished with the components specified herein.
- D. All devices shall be suitable for operation at 0 degrees F.

1.02 RELATED SECTIONS

- A. Division 08 Section "Finish Hardware" for door closures/holders, electric door locks, and release devices that interface with fire alarm system.
- B. Division 21 Section 211100 "Fire Sprinkler and Standpipe Systems" for waterflow, valve tamper switches and post indicator valves that interface with fire alarm system.
- C. Division 14 for "Electric Traction Elevators."

1.03 REFERENCES

- A. American National Standards Institute (ANSI)
- B. National Electrical Manufacturers Association (NEMA)
- C. Underwriter's Laboratories, Inc. (UL)
- D. National Fire Protection Association (NFPA)

1.04 APPLICABLE CODES AND STANDARDS

- A. Provide the system in compliance with the following:

1. NFPA Codes, Standards and Manuals (latest issue enforced)
 - a. 70 - National Electrical Code
 - b. 72 - National Fire Alarm Code
 - c. 90A - Standard for the Installation of Air Conditioning and Ventilating Systems
2. International Fire Code (IFC)
3. International Building Code (IBC)
4. Washington Administrative Codes (WAC)
 - a. WAC296-46 Safety Standards – Installing Electric Wires and Equipment
 - b. WAC51-40-1101 Chapter 11, Accessibility
 - c. WAC 51-44 State Building Code Adoption of the Uniform Fire Code
5. Factory Mutual
 - a. FM Global Data Sheet 5-40 Fire Alarm Systems
 - b. FM Global Data Sheet 5-48 Automatic Fire Detection
6. Other Codes
 - a. Local fire code, building code, mechanical code, elevator code, sprinkler code, electrical code, rules and interpretations required by the AHJ.

1.05 QUALITY ASSURANCE

- A. Each and all items of the Fire Alarm System shall be listed as a product of a fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL) and Factory Mutual (FM), and shall bear the UL and FM labels. All control equipment shall be listed under UL Category UOJZ as a single control unit. Partial listing is NOT acceptable.
- B. In addition to UL-UOJZ requirement mentioned above, the system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC article 760.
- C. All control equipment shall have transient protection devices to comply with UL 864 requirements.

1.06 DEVELOPER DESIGN

- A. The Developer shall design and provide a complete fire alarm system. Design shall be performed by a NICET Level 3 designer and shall be marked with the designer's certification number under the direct supervision of a professional engineer. The system shall include a fire alarm control panel, alarm initiation devices, alarm indication devices, sprinkler system monitoring, sprinkler alarm bell initiation, elevator recall, notification of the remote monitoring station, and all other functions specified herein and on the drawings. These functions shall be accomplished with the fire alarm control panel specified, as well as all other devices specified in this section. It shall be the responsibility of the fire alarm system supplier to design raceway routing and wiring and to show the same on shop drawings.
- B. The Developer shall contact all AHJ's prior to bid to determine the requirements for the system. All functionality shall be provided with the fire alarm control panel specified as well as other components specified herein.

- C. Evacuation alarm sound level: The number of fire alarm notification devices shall be increased if required by the AHJ.

1.07 SUBMITTALS

- A. General: Make submittals in accordance with Section 260500.
- B. Product Data: Submittals shall include a compilation of manufacturer's catalog or specification sheets of all system components. Items being provided shall be clearly indicated. Any variations of the submittal from the specifications shall be clearly indicated. Include the following additional information:
 - 1. Point Schedule
 - 2. Complete schedule of customized English message formats of alarms and troubles for system.
 - 3. Battery systems and standby battery load calculations showing capacity for 50% additional devices of each device type for future growth. Provide additional loop controllers or networked panels as required.
 - 4. Fire Alarm zone and address schedule including alphanumeric description for each monitor and control point.
 - 5. Outputs zone schedule for off-premise UL Central Station Monitoring.
 - 6. Complete sequence of operations for all fire alarm system functions.
 - 7. Recommended spare parts list. The list shall include recommended quantities for each item.
 - 8. Acceptance Test Procedure: The ATP shall include step-by-step procedures for performance testing every fire alarm device and system output to demonstrate full functionality in accordance with the Specification requirements.
- C. Shop Drawings
 - 1. Riser Diagrams. Fire alarm supplier and/or subDeveloper shall develop CAD based (AutoCAD 2005 or more recent) original fire alarm riser diagram to show main geographical fire alarm zones and point to point wiring requirements.
 - 2. Floor Plans. CADD based floor plans shall be drafted to show conduit routing, device locations, end of line resistors, wire count and color coded wiring between device locations on each plan. Show room names and numbers for each room where a fire alarm device is located. Plans shall be on 22 inches by 36 inch sheets of heavy bond media. Submitted drawing shall have AHJ approval marked thereon.
- D. Submissions to Authorities Having Jurisdiction: In addition to distribution requirements for Submittals specified in Division 1 Section "Submittals", make an identical submission to authorities having jurisdiction. Resubmit if required to make clarifications or revisions to obtain approval.
- E. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.
- F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Comply with NFPA 72.
- G. Certificate of Completion: Comply with NFPA 72.

- H. Operation and Maintenance Manual: Per Section 260500. Include record drawings, Certificate of Completion, and test results. Nominal 8-1/2"x11 size. Provide complete operating instructions, preventative maintenance instructions, catalog sheets on all devices and equipment, manufacturer's operation and maintenance instructions, reduced 11x17 copies of all system drawings, and complete system software on permanent media.
 - I. Record Drawings: All review drawings shall be revised to reflect the accurate as-built condition. Working plan shall show accurate locations of devices, and actual routing of conduit and location of end-of-line devices.
- 1.08 TO QUALIFY AS AN ACCEPTABLE SUPPLIER AND/OR SUBDEVELOPER
- A. Have the ability to provide the fire alarm system indicated in the contract documents from the criteria contained in the specification.
 - B. Provide AHJ approved shop drawings which show complete system plan views indicating equipment layout, device layout, raceway routing and sizing, point to point wiring, termination and connection diagrams and wire numbers for all conductors and terminations.
 - C. To have been in the business of installing and maintaining the specific type of system equipment under the present firm name for at least five years.
 - D. To have distributing and/or installing the specific brand and model line of system equipment for at least three years prior to the date of these criteria.
 - E. To have the capability of dispatching a maintenance or repair truck with a qualified repairman to the job site within four hours of a request for service on the equipment.
- 1.09 ADDITIONAL REQUIREMENTS
- A. Fire Alarm System Supplier and/or SubDeveloper Requirements:
 - B. Coordination the installation of the fire alarm system including the preparation of shop drawings in conformance with Section 283100 Paragraph 1.07.C.
 - C. Furnish and load all software required to implement a complete monitoring and control system.
 - D. Submit shop drawings to the "Authority Having Jurisdiction" (AHJ) as defined in NFPA 72. One copy of the above shop drawings with this approval evidenced shall be included with the submittal required by Section 260500.
 - E. Provide raceway, back boxes, wiring, and power circuits for the fire alarm system, and install the devices ready for final termination at the Fire Alarm Panel by the Fire Alarm System SubDeveloper.
 - F. Provide all 120V power circuits to fire alarm control equipment and remote power supplies. Remote power supplies are not shown.

- G. In addition, the Developer shall schedule periodic inspections by the AHJ during the course of the installation and shall make any minor corrections, deletions, relocations or additions to the system as required for acceptance of the completed system by the AHJ. Developer shall obtain and pay for all required permits.
- H. Coordinate the interface requirements between mechanical control systems and the fire alarm system.
- I. Performance Test: The fire alarm system shall have a successful performance test, accomplished by the installer and witnessed by the Fire Marshal.

1.10 DESCRIPTION

- A. General: Non-coded, addressable-analog fire alarm system with manual and automatic alarm initiation; automatic sensitivity control of certain smoke detectors; and multiplexed signal transmission dedicated to fire alarm service. Provide a complete and fully operational fire detection and alarm system, sprinkler monitoring and alarm, and elevator recall system which fully complies with the local fire, sprinkler, and elevator codes currently enforced at the project location. All functionality shall be provided with the fire alarm control panel and other components specified. If any conflict occurs between government adopted code rules and these contract documents, the codes are to govern. All wiring shall be within conduit.

1.11 GENERAL OPERATION

- A. The system shall be solid state, microprocessor based, using a true digital format between the Central Processing Unit (CPU) and each addressable device. Systems which do not transmit digital data between CPU and devices over a one-pair cable are not acceptable. System shall be able to communicate with a minimum of 100 addressable devices per pair of wires.
- B. Adding points within the system, up to its maximum point capacity shall not require memory additions.
- C. The control panel shall be initially configured to monitor a minimum of 380 addressable points. Control panels, transponders and remote power supplies shall be sized to accommodate 20% future growth beyond the scope of the initial project. All secondary power supply batteries shall be sized for future system growth. Spare battery capacity required by NFPA 72 and local codes shall be in addition to future system growth capacity of 50% for each device type.
- D. Under normal condition the fire alarm control panel shall display a "SYSTEM NORMAL" message and the current time and date.
- E. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steadily for trouble and supervisory conditions.
- F. The panel shall display the following information relative to the abnormal condition of a point in the system. These three characteristics relative to an abnormal condition of a point shall be displayed simultaneously:

1. Custom location label (80 characters minimum)
 2. Type of device (i.e., smoke, manual station, waterflow)
 3. Point status (i.e., alarm, trouble)
- G. All information displayed by the fire alarm control panel shall also be capable of being transmitted and displayed on any system CRT and printer or graphic terminal.

1.12 OPERATION OF FIRE ALARM SYSTEM

- A. Operation of any initiation device shall immediately cause all of the following:
1. All fire alarm speakers to sound a three pulse temporal tone pattern (per ANSI S3.41) throughout the facility until silenced by a switch at the Fire Alarm Control Panel (FACP) or until the system is reset. Visual alarm lights throughout shall flash repetitively until the system is reset.
 2. Elevator recall per AHJ requirements.
 3. Auxiliary controlled devices shall operate until the alarm condition is corrected and the system reset.
 4. Full English language annunciation of the alarm condition, type and location at the FACP display. An audible signal shall sound and the alarm condition shall flash on the FACP display and CRT until acknowledged. Emergency instructions shall be displayed in English for the operator.
 5. Printout in full English language of the alarm condition, type and location plus time and date. All fire alarm initiated event commands shall be recorded automatically.
 6. Automatically transmit a general alarm and common trouble alarm to the local Fire Department via an outside vendor via an DACT.
 7. Send a signal to the mechanical control system to identify when the building is in alarm.
- B. History Logging: The system shall log and store 300 events in an alarm log and 300 events in a trouble log. These events shall be stored in random access memory with battery protection. Each event shall include the time and date of the events occurrence.
- C. A drill switch is to be provided at the Fire Alarm Control Panel to sound an evacuation alarm signal but not send an alarm to the Fire Department.
- D. The system, including annunciation, and remote annunciation shall be completely supervised to sound an audible and visual trouble signal upon the occurrence of any open or grounded circuits except that auxiliary control circuits (door holders, and fan shutdown) and smoke detector remote indicator lights need not be supervised. An open or grounded zone circuit or annunciator circuit shall illuminate the trouble lamp and sound the trouble alarm at the control panel.
- E. Sprinkler System Monitoring
1. Coordinate the Fire Alarm System with the Sprinkler System to provide circuits for detection and annunciation as required by the AHJ to supervise PIV, OSY and gate valve positions. Provide circuits from the fire alarm control panel for detection and annunciation of water flow. Each waterflow device and its associated valve position switch shall have their own address. In the event of water flow, a fire alarm bell/strobe shall be initiated. Locate the bell per AHJ requirements.

2. Activation of any tamper switch shall activate the system supervisory trouble light. Differentiation between valve tamper switch and open/or grounds in the initiation circuit wiring shall be provided. Water flow shall initiate a bell/strobe on the building exterior.
- F. Elevator Capture. Provide circuitry to the elevator controllers from the fire alarm control panel to indicate when an alarm has been initiated by the associated elevator lobby smoke detectors to initiate recall. Coordinate exact circuitry required with elevator sub-Developer. Provide circuits from FACP to corresponding elevator controller. Elevator capture shall be accomplished with equipment specified in this specification.
- G. Bypass Switches: Provide the following bypass switches for testing purposes:
1. Elevator Bypass - to prevent recalling the elevators.
 2. Door Release Bypass - to prevent releasing the smoke doors.
 3. Fan Control Bypass - to prevent shutdown of fans or starting of elevator and stairwell pressurization fans.
 4. Remote Alarm Bypass - to prevent the transmission of all fire alarm signals to the King Country Metro Tunnel Control Center.
 5. Horns, strobes, and speakers Bypass - for testing purposes.

1.13 DEFINITIONS

- A. FACP: Fire Alarm Control Panel.
- B. LED: Light-emitting diode.
- C. Definitions in NFPA apply to fire alarm terms used in this section.

1.14 INTERFACE REQUIREMENTS

- A. The Developer is responsible for coordinating the system with other Developer furnished systems and equipment. The work consists of but is not limited to the following:
- B. Elevators:
 1. Fire Emergency. Two control modules with dry contacts and wiring to the elevator controllers to signal a fire emergency mode for automatic elevator recall. One shall be for primary recall and the second for alternative recall.
 2. Elevator Lobby Smoke Detectors. To signal smoke in an elevator lobby to the FACP.
 3. Elevator power shutdown control circuit shall be monitored for presence of operating voltage. Loss of voltage shall cause a supervisory signal at the control panel and remote annunciators.
 4. Fire Signal Speakers. Provide speakers for all elevators.

1.15 RECORD DRAWINGS

- A. Provide per Section 260500. Record drawings shall clearly indicate:
 1. Actual routing of all raceways and location of all junction boxes.
 2. Actual cable types, numbers and routing.

3. Actual system wiring diagrams, connection diagrams and interface of all components in the system.

1.16 UNIT PRICES

- A. Provide unit prices to add/delete the following:
 1. Manual Pull Station
 2. Smoke Detector
 3. Duct Smoke Detector
 4. Heat Detector
 5. Fire Alarm Speaker
 6. Visual Alarm Light
 7. Monitoring Module
 8. Control Module (control relay)
 9. Remote Indicating Light
 10. Input/Output Modules (including back planes)
 11. Printer

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. All equipment shall be the product of a single manufacturer except that certain individual components which are regularly used as part of the system may be the product of a different manufacturer. Approved manufacturer:
 1. Edwards Systems Technology EST-3, NO SUBSTITUTIONS ALLOWED.

2.02 FACP ALPHANUMERIC DISPLAY

- A. Plain-English-language descriptions of alarm, supervisory, and trouble events; and addresses and locations of alarm-initiating or supervisory devices originating the report. Display monitoring actions, system and component status, system commands, programming information, and data from the system's historical memory.

2.03 AUTOMATIC REPORTING

- A. Provide two dedicated phone lines to King County's outside vendor for receiving calls from the DACT. The outside vendor at this time is Protection One. Coordinate with Archie Alexander at King County's Power Distribution department one month prior to building opening. System shall report both alarm and trouble signals for each major geographic zone. Conform with applicable requirements of NFPA 72 "Installation, Maintenance and use of Protective Signalling Systems". System shall report via an Edwards Systems Technology 3-MODCOMM DACT. Final connection to phone lines shall be made by King County Personnel.

2.04 CENTRAL FACP

- A. Cabinet: Lockable steel enclosure. Arrange interior components so operations required for testing or for normal maintenance of the system are performed from the front of the

enclosure. If more than one unit is required to form a complete control panel, fabricate with matching modular unit enclosure to accommodate components and to allow ample gutter space for field wiring and interconnecting panels.

1. Identify each enclosure with an engraved, red, laminated, phenolic-resin nameplate with lettering not less than 1/2 inch high. Identify individual components and modules within cabinets with permanent labels.
 2. Mounting: Surface.
- B. Alarm and Supervisory Systems: Separate and independent in the FACP. Alarm-initiating zone boards consist of plug-in cards. Construction requiring removal of field wiring for module replacement is unacceptable.
- C. Control Modules: Include types and capacities required to perform all functions of fire alarm systems.
- D. Indications: Local, visible, and audible signals announce alarm, supervisory, and trouble conditions. Provide each type of audible alarm with a different sound.
- E. Resetting Controls: Prevent the resetting of alarm, supervisory, or trouble signals while the alarm or trouble condition still exists. Provide manual reset feature at the FACP for smoke and heat detectors. Duct detectors shall be resettable from the FACP.
- F. Keyed Disable Switch: At the FACP, provide an outboard disable switch panel. Operation of the panel shall be enabled by turning a key in the main switch. The key switch shall be Allen-Bradley 8080T-H31A or IDEC ASD2K11N-RL. Once enabled, individual pushbutton switches shall bypass system functions.
- G. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components, including annunciation, supervision, and control.
1. Display: A minimum of 80 characters; alarm, supervisory, and component status messages; and indicate control commands to be entered into the system for control of smoke detector sensitivity and other parameters.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

2.05 TRANSIENT PROTECTION DEVICES

- A. All control equipment shall have transient protection devices to comply with UL 864 requirements:
1. Provide an Isolated Loop Circuit Protector (ILCP) device on all fire alarm initiating circuits, alarm indicating appliance circuits, signaling line circuits which extend beyond the main building by either aerial, underground or other methods, walkways, bridges or other above ground connectors.
 2. The ILCP shall be located as close as practicable to the point at which the circuits leave or enter the building.
 3. The ILCP grounding conductor is to be a No. 12 AWG wire having a maximum length of 28 feet to be run in as straight a line as practicable and connected to a building

ground electrode system (unified ground) per Article 800 of the National Electrical Code.

4. The ILCP is to have a line to line response time of less than one nanosecond capable of accepting greater than 2000 amps (9 joules each line) to earth. Shield to earth current is to be 5000 amps maximum.
5. The ILCP shall be protected by a high dielectric insulating material and of small enough size to mount in a standard 4" square 2 -1/8" deep electrical box.
6. Spark gap devices or devices incorporated in or installed within the fire alarm control panel in lieu of the specified ILCP are not acceptable.
7. All ILCP's shall comply with UL 497B requirements.

2.06 SECONDARY POWER SUPPLY

- A. General: Components include gel cell sealed batteries, charger, and an automatic transfer switch.
 1. Battery Nominal Life Expectancy: 2 years, minimum.
- B. Battery Capacity: Comply with NFPA 72.
- C. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide capacity for 150 percent of the connected system load while maintaining batteries at full charge. If batteries are fully discharged, the charger shall recharge them completely within four hours. Supervise charger output as part of system power supply supervision.
- D. Integral Automatic Transfer Switch: Transfers the load to the battery without loss of signals or status indications when normal power fails.
- E. Size battery capacity for an increase of the total number of each type of device by 50 percent.

2.07 MANUAL PULL STATIONS

- A. Description: Fabricated of metal or plastic, and finished in red with molded, raised-letter operating instructions of contrasting color. EST model SIGA-278.
 1. Double-action mechanism requiring two actions, such as a push and a pull, to initiate an alarm.
 2. Station Reset: Manual reset key operated.
 3. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm.
 4. Integral Addressable Module: Arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.

2.08 SMOKE DETECTORS

- A. General: Include the following features:
 1. Operating Voltage: 24-V dc, nominal.
 2. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation except resetting the control panel.

3. Plug-in Arrangement: Detector and associated electronic components are mounted in a module that connects in a tamper-resistant manner to a fixed base with a twist-locking plug connection. Terminals in the fixed base accept building wiring.
4. Integral Visual-Indicating Light: LED type to indicate when detector has operated.
5. Sensitivity: Can be tested and adjusted in-place after installation.
6. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
7. Remote Controllability: Unless otherwise indicated, detectors are analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
8. All smoke detectors located adjacent to roll down smoke doors or motorized smoke doors shall be provided with a relay base.

B. Photoelectric Smoke Detectors: Include the following features:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
3. EST SIGA-PS or SIGA-IS with base.

C. Ionization Detector: Include the following features:

1. Responsive to both visible and invisible products of combustion.
2. Self-compensating for changes in environmental conditions.

2.09 OTHER DETECTORS

A. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or rate of rise of temperature that exceeds 15 deg F per minute, unless otherwise indicated. EST SIGA-HRS or SIGA-HFS with based.

1. Mounting: Plug-in base, interchangeable with smoke detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

B. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F. Heat detectors in unprotected areas should be rate compensated detectors.

1. Mounting: Plug-in base, interchangeable with smoke detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

2.10 NOTIFICATION APPLIANCES

A. Description: Equip for mounting and have screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly and enclosure. Suitable for 0 degrees F and weatherproof..

B. Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing the operating mechanism behind the bell. When operating, bells provide a sound-pressure level

of 94 dB, measured 10 feet from the bell. 10-inch size, unless otherwise indicated. Bells shall be weatherproof.

- C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns produce a sound-pressure level of 98 dB, measured 10 feet from the horn. Horns in garage area shall be weatherproof. Suitable for 0 degrees F.
- D. Visible Alarm Devices: Xenon strobe lights listed under UL 1971 with clear lens. The word "FIRE" is engraved in minimum 1-inch-high letters. Flash rate shall not exceed two flashes per second nor be less than one flash per second. Maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40 percent. Shall be suitable for installation in a single-gang outlet box. Color of housing shall be red in finished areas, red housing in unfinished areas such as garage and mechanical areas. All devices in garage area shall be weatherproof and suitable for operation down to 0 degrees F. 75cd at 10 feet minimum.
 - 1. Strobe Leads: Factory connected to screw terminals.
 - 2. Combination visual/audible notification devices are allowed.
- E. Voice/Tone Speakers:
 - 1. High-Range Units: Rated 2 to 15 W.
 - 2. Low-Range Units: Rated 1/4 to 2 W.
 - 3. Mounting: Flush.
 - 4. Matching Transformers: Tap range matched to the acoustical environment of the speaker location.
 - 5. Speakers shall be UL listed for emergency alarm systems.

2.11 REMOTE DEVICE LOCATION-INDICATING LIGHTS AND IDENTIFICATION PLATES

- A. Description: LED indicating light near each smoke detector that may not be readily visible when standing in the room. Light is connected to flash when the associated device is in an alarm or trouble mode. The lamp is flush mounted in a single-gang plate. A red, laminated, phenolic-resin identification plate as the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector is.

2.12 MONITOR MODULE

- A. Description: Microelectronic monitor module listed for use in providing a multiplex system address for listed fire and sprinkler alarm-initiating devices with normally open contacts and for heat detectors located in high ambient temperature areas. All modules shall be single-input.

2.13 CONTROL RELAY MODULE

- A. Description: Microelectronic control module listed for use in controlling smoke/fire dampers, door release service and other control functions.

2.14 FIRE ALARM TERMINAL CABINETS

- A. NEMA Type 1 enclosure, hinged door front with flush hinge, latch and lock. Provide terminal blocks in all cabinets with 25% spare capacity. Box and front shall be steel, painted red with label "Fire Alarm". Flush mounted.

2.15 GUARDS FOR PHYSICAL PROTECTION

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, notification appliance, or other device requiring protection.
 - 1. Factory fabricated and furnished by the manufacturer of the device.
 - 2. Finish: Paint of color to match the protected device.

2.16 WIRE

- A. Wiring shall be UL-Listed limited energy cable for fire protection signaling. Non-Power-Limited Circuits. Conductors shall be minimum size #14 AWG for all non-addressable circuits and West-Penn or Allied two twisted pair #18 shielded cable on all addressable-loop circuits. Wiring insulation shall be color-coded and cable shall have an overall red-colored jacket. The cable shall be plenum rated. Conductors shall be solid copper and shall be of the type and AWG size as required. Stranded wire shall not be used for detector circuits.
- B. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.

2.17 RACEWAYS, OUTLETS AND JUNCTION BOXES

- A. Shall conform to specification sections "Raceways and Boxes". All fire alarm cabling and wire shall be within conduit. 3/4" minimum.

2.18 PRINTER

- A. The printer shall be free-standing and have a minimum 96-character standard ASCII character set in accordance with ANSI X3.64 and X4.14. The printer shall have adjustable sprockets for print width up to at least 100 columns per line with a minimum speed of 160 characters per second. The character spacing shall be 10 characters per inch and the line spacing shall be between three and eight lines per inch. The printer shall utilize standard form size sprocket-fed fanfold paper, and have multiple copy capability. The unit shall have programmable control of top-of-form and variable (multiple) line-skip capability. Provide 2000 pages of fanfold paper in addition to paper used for testing and training. (Get signed receipt from County) EST Model PT-1S dot-matrix printer at the FACP.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SYSTEM SUPPLIER AND/OR SUBDEVELOPER REQUIREMENTS

- A. Provide and/or supervise all wiring, wiring terminations and connections.
- B. Provide and/or supervise all equipment installation.
- C. Perform and/or supervise all testing during and after installation.

- D. Certify in writing at completion stating that system has been inspected, tested and is complete and fully operational in accordance with Contract Documents.
- E. Instruct and/or assist the Developer in instructing King County personnel in the operation and maintenance of the system.
- F. Device names, control sequences, security parameters, and other software configurable items shall all be outlined and documented.

3.02 EQUIPMENT INSTALLATION

- A. Manual Pull Stations: Mount semiflush in recessed back boxes.
- B. Water-Flow Detectors and Valve Supervisory Switches: Connect for each sprinkler valve station required to be supervised.
- C. Ceiling-Mounted Smoke Detectors: Not less than 4 inches from a side wall to the near edge. For exposed solid-joist construction, mount detectors on the bottom of joists. On smooth ceilings, install not more than 30 feet apart in any direction.
- D. Wall-Mounted Smoke Detectors: At least 4 inches, but not more than 12 inches, below the ceiling.
- E. Smoke Detectors near Air Registers: Install no closer than 60 inches.
- F. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
- G. Heat Detectors in Elevator Machine Room: Provide heat detector within 24" of each sprinkler head for shunt trip control of power to the elevator machinery.
- H. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed.
- I. Visible Alarm-Indicating Devices: Install wall mounted devices such that the lens is not less than 80 inches and not greater than 96 inches above the finished floor. Ceiling mount devices allowed for ceiling application. More than two visible notification devices in the same room or adjacent space within the field of view shall flash in synchronization. Synchronization of devices not in the same field of view is allowed. In corridors where there are more than two devices in any field of view, they shall be spaced a minimum of 55' apart or they shall flash in synchronization.
- J. Device Location-Indicating Lights: Locate in public space near the device they monitor when the device is not visible when standing in the room.
- K. FACP: Surface mount with tops of cabinets not more than 72 inches above finished floor.
- L. Annunciator: Install with the top of the panel not more than 72 inches above finished floor.

- M. Shunt Trip Voltage Sensor -- Provide and monitor voltage sensor for shunt trip power circuit for the elevator controller per NFPA 72 requirements.

3.03 WIRING INSTALLATION

- A. Provide all wiring complete per system requirements. All wiring shall be contained in steel raceways and red color junction boxes. Seal raceways to prevent air passage at each smoke detector. Permanent wire markers shall be affixed to all conductors at terminations and splices. Numbering system shall be consistent with shop drawings. All terminations shall be T&B "Sta-Kon" (or equivalent) self insulated, flanged or forked tongue lugs where connected at screw type terminals.
- B. Wiring within Enclosures: Wiring in main control cabinet shall be neatly arranged and bundled with tie wraps. Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- C. Cable Taps: Use numbered terminal strips in junction, pull and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- D. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- E. Provide 3/4" raceway and wiring from the control panel to the main telephone terminal board as required for alarm transmission to the monitoring company.
- F. Provide 3/4" raceway, 3 #12 wire from control panel to 20 amp circuit breakers with lock-on device in a 120-volt panelboard. Panelboard on emergency distribution system when applicable.

3.04 IDENTIFICATION

- A. Paint power-supply disconnect switch red and label "FIRE ALARM." When the fire alarm system primary power is served from a branch circuit panelboard the panel cover shall be labeled "FIRE ALARM PRIMARY SOURCE" and the branch circuit breakers serving the fire alarm system provided with "lock-on" devices.

3.05 GROUNDING

- A. Ground cable shields and equipment according to system manufacturer's written Instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding.

- C. Install grounding electrodes of type, size, location, and quantity as required.
- D. Ground equipment and conductor and cable shields. For audio circuits, minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, crosstalk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

3.06 ACCESS DOORS

- A. Provide where required for access to system components.
- B. Provide door, mounting frame and trim for access openings in ceiling. Door shall have fire rating equivalent to that of the ceiling it is installed in. Nominal door opening shall be 24" x 24" with hinge fully concealed. Latches shall be flush screwdriver operated type. In latched position, door shall seat firmly against frame at all points and there shall be no warps, sags or open gaps.

3.07 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and connections and to supervise pretesting, testing, and adjustment of the system. Report results in writing.
- B. Testing of duct smoke detectors shall be performed using artificial smoke and with the detector in place.
- C. All wiring shall be tested for proper connections, continuity, and resistance to ground.
- D. The entire system shall be tested in accordance with a written Acceptance Test Procedure (ATP) to demonstrate and certify proper system operation. As a minimum, the ATP shall provide a detailed method of testing the following to demonstrate to King County that the system functions as intended by the design. An official Record of Completion shall accompany the request for final inspection to the AHJ.
 - 1. All alarm and control functions.
 - 2. All trouble and supervisory functions.
- E. Pretesting: After installation, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the compliance of the system with requirements of Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
- F. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of witnesses to preliminary tests.
- G. Minimum System Tests: Test the system according to procedures outlined in NFPA 72. Minimum required tests are as follows:
 - 1. Verify the absence of unwanted voltages between circuit conductors and ground.

2. Test all conductors for short circuits using an insulation-testing device.
 3. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on record drawings.
 4. Verify that the control unit is in the normal condition as detailed in the manufacturer's operation and maintenance manual.
 5. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
 6. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
 7. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications.
 8. Test Both Primary and Secondary Power: Verify by test that the secondary power system is capable of operating the system for the period and in the manner specified.
 9. A Final Acceptance Test shall be conducted by the Developer for approval by the AHJ. The fire alarm system shall be pre-tested and free of all defects, including ground faults, open circuits, and short circuits prior to the start of the Acceptance Test. All testing is the responsibility of the Developer, including all costs.
- H. Retesting: Verify by the system test that the total system meets Specifications and complies with applicable standards.
- I. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log on the satisfactory completion of tests.
- J. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.
- K. Manufacturer's representative shall submit a letter stating that it has tested the system and found it acceptable in all respects. The signed NFPA 72 checklist from the final acceptance test shall be provided to King County for inclusion in the system's records.

3.08 CLEANING AND ADJUSTING

- A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.09 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Train King County's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting, and maintaining equipment and schedules.
2. Training Aid: Use the approved final version of the operation and maintenance manual as a training aid.
3. The Developer shall provide classroom training for King County personnel. The training shall be organized in two separate sessions to cover shift workers and shall emphasize the necessary adjustments, maintenance, parts replacement, servicing, theory of operation, and trouble shooting of the installed system. One session shall be four (4) hours in length and shall cover the overall system layout, functions, operation and use. The second session shall be eight (8) hours in length and shall cover specific system repair, restoration, changes, and updating.

3.10 OPERATION AND MAINTENANCE MANUALS

- A. Provide all information as required by Section 260500.
- B. Include record drawings, letter of certification and record drawings.

END OF SECTION

SECTION 310000

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies earthwork which consists of excavation, filling, grading, and excess material control. Fill materials are also included in this Section. King County Transit prefers the use of materials which are sourced locally and include a high percentage of recycled content.

1.02 REFERENCES

- A. All work to be performed and materials to be used shall be in accordance with the Bellevue City Code (BCC), unless otherwise indicated herein.
- B. Washington State Department of Transportation (WSDOT) Standard Specifications 2012.
- C. ASTM D1557, Method of Test for Moisture-Density Relations of Soils, Using 10 pound (4.5 kg) Rammer and 18 inch (457 mm) Drop.
- D. ASTM D3017 , Method of test for Moisture Content of Soil and Soil Aggregates in Place by Nuclear Methods (Shallow Depth)

1.03 SUBMITTALS

- A. If directed by the Project Representative, submit samples of all imported fill materials to be used thirty (30) days in advance of use. Samples shall consist of 0.5 cubic feet of each type of material, or less as directed by the Project Representative.
- B. Submit the following:
 - 1. Compaction test results.

1.04 RELATED SECTIONS

- A. Design Criteria and otjher Performance Specifications apply to the work of this Section.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Fill materials shall meet the gradations listed below and shall maximize the recycled products content. The recycled products shall be any one, or any combination of more than one, of the following:
 - 1. Recycled asphalt concrete meeting the requirements of TSS, 9-03.21(2)

2. Recycled Portland cement concrete meeting the requirements of TSS, 9-03.21(3).
 3. Recycled glass meeting the requirements of TSS, 9-03.21(4)
 4. Steel furnace slab meeting the requirements of TSS, 9-03.21(5).
- B. Crushed Surfacing Base and Top Course: Shall conform to the requirements of WSDOT, Paragraph 9-03.9(3).
 - C. Gravel Backfill for Drains: Shall conform to the requirements of WSDOT, Paragraph 9-03.12(4).
 - D. Bedding Material for Rigid Pipe: Shall conform to the requirements of WSDOT, Paragraph 9-03.15.
 - E. Structural Fill: Shall be imported, well-graded sand and gravel, free of organics, debris, and other deleterious material which can be compacted to the specified amount under the prevailing weather conditions. Structural fill shall have a maximum particle size of 3 inches and contain no more than 5 percent material by weight passing the No. 200 mesh sieve (fines) based on the weight of the 3/4-inch fraction. The gravel content shall range between 20 and 50 percent. The moisture content shall be near optimum to allow proper compaction. The fines shall be nonplastic. Recycled portland cement concrete rubble may be used as structural fill provided that it is properly crushed and screened to meet the gradation requirements of structural fill.
 - F. Gravel Borrow: Shall conform to the requirements of WSDOT, Paragraph 9-03.14(1).
 - G. Gravel Backfill for Walls: Shall conform to the requirements of WSDOT, Paragraph 9-03.12(2).
 - H. Gravel Backfill for Pipe Zone Bedding: Shall conform to the requirements of WSDOT, Paragraph 9-03.12(3).

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. Comply with requirements of Section 015700 Environmental Controls.
- B. Overexcavation: Where the undisturbed condition of natural soils is inadequate for support of the planned construction, the Developer shall overexcavate to provide adequate supporting soils. The excavated space shall be filled to the specified elevation with structural fill.

3.02 PLACEMENT AND COMPACTION OF FILL

- A. Soil Improvement by Dynamic Compaction
 1. Replace overexcavated soil with on-site soil in one-foot lifts up to the design footing subgrade elevations. Place all fill in accordance to Table A.

- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D 1557-00 (Modified Proctor).

TABLE A
PLACEMENT AND COMPACTION OF FILL

Material Type	Maximum Uncompressed Layer Depth (inches)	Minimum Relative Compaction (Percent)	General Application
Structural Fill	8 (6 inches for hand-operated mechanical compactors)	95	Foundation backfill, slab subgrade, Pavement subgrade, fill under pavements and sidewalks, preload, and pipeline backfill in paved areas.
Structural Fill	8 (6 inches for hand-operated mechanical compactors)	90	Pipeline backfill in unimproved/unpaved areas.
Bedding Material for Rigid Pipe	--	95	Bedding for rigid pipes.
Gravel Backfill for Pipe Zone Bedding	--	95	Bedding for thermoplastic pipes.
Excavated/Native Material	8	--	Fill in landscaped areas.
Crushed Surfacing Top and Base Course	4	95	Pavement base.
Aggregate for Gravel Base	8	95	Fill for trench overexcavation.

3.03 EARTHWORK FOR STRUCTURES

A. Structure excavation

1. If the excavation is carried below the lines and grades specified on the drawings, or if the bottom of the excavation is disturbed because of the Developer's operations and require overexcavation and backfill, the Developer shall backfill such excavated space to the proper elevation in accordance Section 3.06.A.4 at no additional expense to King County.

B. Structural Fill and Backfill

1. All fill under slab-on-grade, including backfill for utility excavations, and over excavated areas shall consist of structural fill.
2. Provide a capillary water break under floor slab. The capillary water break shall consist of drainage sand and gravel. Compact to a dense and unyielding condition, with at least 2 passes of a vibrating plate compactor or smooth drum roller.
3. No backfill material shall be deposited against concrete structures until the concrete has developed a strength of not less than 2,500 pounds per square inch in compression or until the concrete has been in place for 28 days, whichever occurs first.

4. Compaction of structure backfill shall be accomplished by using power-operated tampers, rollers, or vibratory equipment. Compaction within 2 feet of walls shall be performed with hand-operated vibratory compactors.

3.04 SUBGRADE FOR PAVEMENT

- A. Place structural fill in accordance with Table A. Compact to 95 percent of the maximum density.

3.05 SITE FILL

- A. Excavated onsite soils may be used as fill in landscaping areas only with approval of the Project Representative.

END OF SECTION

SECTION 321313

CONCRETE PAVING

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies portland cement concrete for driveways, transit area, sidewalks, curbs, and gutters on a prepared subgrade within the project limits.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specifications apply to the work of this Section.
- B. The following sections is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.03 REFERENCES

- A. This section incorporates by reference the latest revisions of the following documents:
 - 1. BCC Bellevue City Code
 - 2. AASHTO M33 Prefomed Expansion Joint Filler for Concrete (Bituminous)
 - 3. AASHTO M85 Portland Cement
 - 4. AASHTO M148 Liquid Membrane Forming Compounds for Curing Concrete
 - 5. AASHTO M154 Air Entraining Admixture for Concrete
 - 6. AASHTO M171 Sheet Material for Curing Concrete
 - 7. AASHTO M194 Chemical Admixtures for Concrete
 - 8. AASHTO M213 Prefomed Expansion Joint Filler for Concrete Paving and Structural Construction
 - 9. ASTM E1980, Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces
 - 10. WSDOT Washington State Department of Transportation (WSDOT) Standard Specifications 2012

1.04 SUBMITTALS

- A. Provide the following:
 - 1. Certified reports of mix designs for concrete used.
 - 2. Manufacturer's technical data:
 - a. Concrete Admixtures
 - b. Surface retarder
 - c. Curing compounds
 - d. Bonding and repair materials
 - e. Surface hardener
 - f. Joint materials

1.05 QUALITY ASSURANCE

- A. Testing
 - 1. Provide the services of an independent testing laboratory to verify quality of concrete placed and conformance to design.
- B. Basis for Determining Quality: Portland cement concrete pavement work shall conform to the requirements of ACI 316.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. King County Transit prefers that all admixtures shall meet the relevant VOC /emissions criteria.
- B. King County Transit prefers that the highest amount of recycled content materials, regional materials, rapidly renewable materials and FSC certified wood materials be used.

2.02 PORTLAND CEMENT CONCRETE

- A. Cement: Portland cement shall be ASTM C 150. Use Types I or III. Use only one brand of cement throughout the project.
- B. Aggregates
 - 1. Fine and coarse aggregates shall conform to WSDOT, Paragraph 9-03.1, and ASTM C 33, and with the requirements of WSDOT 9-03.1 superseding the requirements of ASTM C 33 in case of conflict.
 - 2. Fine Aggregate
 - a. When tested in accordance with ASTM C 136, gradation shall conform within the following units:

U.S. Standard Sieve Size	Percent by Weight Passing
3/8-inch	100
No. 4	95 - 100
No. 8	68 - 86
No. 16	47 - 65
No. 30	27 - 42
No. 50	9 - 20
No. 100	0 - 7
No. 200	0 - 2.5

Fine aggregate shall not exceed 40 percent by weight of combined aggregate total, except for concrete with coarse aggregate of less than maximum size 1/2 inch.

- 3. Coarse Aggregate
 - a. Coarse aggregate shall be crushed stone; processed from natural rock or stone, or washed gravel; either natural or crushed; all clean, uncoated, and containing

no clay, mud, loam, or foreign matter. The combined grading requirements for aggregates, tested in accordance with ASTM C 136, shall be as follows:

U.S. Standard Sieve Size	Percent by Weight Passing Primary Aggregate Nominal Sizes			
	Grading No. 2	Grading No. 4	Grading No. 5	Grading No. 6
1 1/2 inch	100	100	--	--
1 1/4 inch	95 - 100	90 - 100	--	--
1 inch	--	--	100	--
3/4-inch	40 - 70	0 - 20	80 - 100	100
1/2-inch	--	--	--	90 - 100
3/8-inch	5 - 20	0 - 2	10 - 40	40 - 90
No. 4	0 - 2	--	0 - 4	5 - 30
No. 200	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5

- b. Other tests shall be in accordance with WSDOT, Paragraph 9-03.1(3), and the following specifications:

Test	Test Method	Requirements
Amount of Material Passing No. 200 Sieve	ASTM C 117	0.5 percent maximum by weight.
Clay Lumps and Friable Particles	ASTM C 142	0.5 percent maximum by weight.
Soundness	ASTM C 88	10 percent maximum loss with sodium sulfate.
Abrasion	ASTM C 131	35 percent maximum loss after 500 revolutions in Los Angeles machine.
Reactivity	ASTM C 289	As specified in ASTM C 33, appendix.

C. Admixtures

- Admixtures shall conform to the requirements of WSDOT, Paragraph 6-02.3(3)
- Air-Entraining Admixture: Use air-entraining admixtures conforming to ASTM C 260 and AASHTO M 154 to produce concrete having within 4.0 percent to 6.0 percent air content at the point of placement.
- Water-Reducing Admixture: Water-reducing admixture shall conform to ASTM C 494, Type A, and shall be "Pozzolith 344N" by Master Builders or equivalent by Euclid Chemical Company or Grace.
- Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions shall not be permitted.

- D. Water: Water for washing aggregate, for mixing, and for curing shall be free from oil and deleterious amounts of acids, alkalis, and organic materials; shall conform to WSDOT Paragraph 9-25.1, containing no more than 2,500 parts per million of chlorides calculated as sodium chloride and no more than 1,000 parts per million of sulfates calculated as sodium sulfate. Water used for curing shall not contain an amount of impurities sufficient to discolor the concrete.

2.03 CONCRETE CHARACTERISTICS

A. Concrete Class, Mix Requirements and Use

1. Minimum Flexural Strength: 590 psi at the end of 28 days.
2. Minimum Compressive Strength: 4,000 psi at the end of 28 days for concrete paving. 3000 psi at the end of 28 days for sidewalks, curbs, and gutters.
 - a. No vehicular traffic shall be allowed before the concrete has attained the 590 psi flexural strength and 4,000 psi compressive. If opening to traffic before the 28th day is expected, different concrete mixes need to be used to obtain the 590 & 4,000 psi respectively.
3. Cement: ASTM C 150, Types I or III.
4. Minimum Cement Content to be no less than 565 pounds/cy of concrete.
5. Air-Entrainment: 4.0 percent minimum to 6.0 percent maximum.
6. Maximum Coarse Aggregate Size: 1-1/2" maximum coarse aggregate is allowed.
7. Use: Areas subject to vehicular traffic and sidewalks.

B. Concrete Slump: Proportions and design mixes shall result, when sampled per ASTM C 172 and tested per ASTM C 143, in a concrete slump at the point of placement of 2 inches.

C. Albedo: Pavement minimum solar reflectance shall be 0.35 when calculated in conformance with ASTM E1980.

2.04 STEEL REINFORCING BARS AND WIRE MESH

A. Dowel bars shall be plain steel bars. Comply with the chemical and physical properties of ASTM A 615, Grade 60 or higher, and AASHTO M183. Bars shall be epoxy-encapsulated as specified under 2.04D below.

B. Reinforcing bars shall be used to reinforce pavement around castings. Reinforcing bars shall be 1/2-inch round deformed steel bars in accordance with ASTM A 615, Grade 60, and shall be a minimum length of 1 1/2 times the diameter of the castings. Bars shall be epoxy-encapsulated as specified under 2.04D below.

C. Wire mesh for concrete reinforcement shall comply with the requirements of the Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement (ASTM A 185) or the Standard Specifications for Welded Deformed Steel Wire Fabric for Concrete Reinforcement (ASTM A 497).

D. Where specified, bars shall be epoxy-encapsulated. Bars that are cut shall have the ends re-encapsulated with epoxy; bars with exposed metal shall not be acceptable. The epoxy encapsulant material shall meet the requirements of AASHTO M254 and M284, ASTM A775, and shall be one of the following, or approved equal:

1. Scotchkkote 213, or 214, or 413, by the Minnesota Mining and Manufacturing Company, Inc.
2. Epoxy Power 720-A-009 by Velspar Corporation.
3. Corvel ECA-1440-Green-3169 by Morton International Powder Coating.

4. Epoxiplaste R-349 (Brown) and R-352 (Green) by the Armstrong Products Company.
5. Mobilox 1004-B-2 by Mobil Chemical Company.

2.05 SEALANTS AND JOINT FILLERS

- A. Joint Sealant: Shall be self-leveling, silicone joint sealant, delivered to the job site in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch, or lot number, accompanied by the manufacturer's certification of compliance with the specified requirements. Sealant shall be Dow Corning 890SL:
 1. Elongation of 1400 percent minimum when tested in accordance with ASTM D 412, Die C Modified.
 2. Joint modulus of 7 psi maximum at 50 percent elongation, 8 psi maximum at 100 percent elongation, and 9 psi maximum at 150 percent elongation.
 3. Adhesion to asphalt/concrete: elongation of 600 percent minimum elongation.
 4. No failure of product when tested in movement, 10 cycles, +100 percent and -50 percent, in accordance with ASTM C 719.
 5. No cracks, blisters, or bond loss under accelerated weathering at 5,000 hours.
- B. Backer Rod: Shall be cylindrical, closed cell, expanded polyethylene foam, or open cell with impervious skin.
- C. Premolded Joint Filler:
 1. Premolded joint filler, when called for on the drawings for use in control joints, shall be 1/2-inch in thickness and shall consist of a suitable asphalt mastic encased in asphalt-saturated paper or asphalt-saturated felt. It shall be sufficiently rigid for easy installation in hot weather and not too brittle for handling in cool weather. It shall also meet the requirements of ASTM D 994 or AASHTO M33.
 2. Premolded joint filler for expansion joints shall be of the dimensions shown on the drawings and shall conform to the requirements of ASTM D 1751 or AASHTO M213.

2.06 CURING MATERIALS

- A. Sheet materials for curing concrete shall meet the requirements of AASHTO M171, "Sheet Materials for Curing Concrete," except that only white reflective type shall be used.
- B. Liquid membrane forming compounds for curing concrete shall comply with the requirements of AASHTO M148 (ASTM C 309) Type 1D or 2, Class A or B, except that the moisture loss when tested in accordance with WSDOT, Test Method 814, shall be 2.5 grams maximum.

2.07 FORMS

- A. General: Shall conform to ACI 347 and shall be plywood, lumber, metal or other acceptable material. Lumber shall be dressed on at least 2 edges and 1 side for tight fit.

- B. Form Coating Compounds: Form coating compounds shall be of commercial formulation; shall not bond with, stain, or adversely affect the concrete surfaces; and shall not impair any subsequent concrete treatment.

2.08 BASE COURSE MATERIAL

- A. Shall conform with the requirements for crushed surfacing base course as specified in Section 9.03.9 (3) of the WSDOT Standard Specifications.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SUBGRADE

- A. Prior to placing base course material prepare the subgrade as follows:
 1. Scarify remaining material to a depth of 12 inches. Place and compact structural fill to bring the subgrade up to grade. Shape the entire subgrade to a uniform surface running true to the line, grade and cross-section indicated.
 2. Compact the subgrade to at least 95 percent of maximum density, as determined by the tests specified under Section 310000, "Earthwork." Compact to a width of at least 1-foot beyond the pavement edge or to a width that will accommodate the paving equipment without visible distortion of the subgrade. Thoroughly compact portions that are inaccessible to large compactor units with smaller compactor units or mechanical tampers. If the underlying material is too soft to permit proper compaction, loosen, aerate, and compact or excavate, remove and replace the subgrade material with structural fill until compaction can be obtained.

3.02 BASE COURSE

- A. Prior to placing portland cement concrete material prepare the base course as follows:
 1. Immediately following the placing and shaping, compact each layer of the base course to at least 95 percent of maximum density, as determined by the tests specified under Section 310000, "Earthwork." Maintain optimum moisture content for compacting material during placement and compaction operations. Thoroughly compact portions that are inaccessible to large compactor units with smaller compactor units or mechanical tampers.
 2. Protect the compacted base course from inclement weather and Contractor's operations at all times.
 3. Thoroughly wet down the base course with water 12 to 48 hours before the placing of concrete. Wet for a depth of at least 3 inches and for such additional depth as may be required to prevent hair-checking in the concrete just before the concrete is placed.

3.03 FORMS

- A. General
 1. Formwork shall conform to ACI 347. Forms shall be sealed and watertight.

3.04 STEEL REINFORCING BARS AND WIRE MESH

- A. Reinforcing bars shall be used to reinforce pavement around castings. A minimum of four (4) bars shall be installed around each casting, oriented parallel and perpendicular to the joints.
- B. Dowel bars shall be required for transverse joints and shall be installed at the midpoint of the thickness of the pavement, parallel to the surface of the pavement and perpendicular to the transverse joint.
- C. Wire mesh shall be installed at the midpoint of the thickness of the pavement, parallel to the surface of the pavement and perpendicular to the transverse joint.

3.05 CONCRETE

- A. General: Concrete shall be truck-mixed, ready-mixed concrete conforming to the applicable portions of ASTM C 94 and WSDOT, Paragraph 5-05.3(1-5).
- B. Delivery: Deliver concrete to the site and complete discharge within 1 hour after introduction of the water to the mixture.
- C. Conveying: Convey concrete from the mixer to the forms in accordance with ACI 304.
- D. Placing Concrete
 - 1. General
 - a. Concrete shall have a temperature of between 50 degrees F and 80 degrees F when placed.
 - b. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators.
 - 2. Concrete Placement with Wire Mesh
 - a. When wire mesh is called for on the drawings, place concrete in two courses. Strike-off the first course at the elevation established for the wire mesh. Immediately prior to placing the wire mesh, bring the concrete to a fairly even surface by means of a template conforming to the depth of the wire mesh. Place the wire mesh on the bottom course before the concrete attains initial set. Do not allow more than 45 minutes to elapse between mixing of the first course and placement of the second course.
 - 3. Concrete Placement in Hot or Cold Weather
 - a. In hot weather (more than 80 degrees F), place concrete in accordance with ACI 305.
 - b. In cold weather (less than 50 degrees F), place concrete in accordance with ACI 306.

3.06 SIDEWALKS

- A. Cement concrete sidewalks shall be constructed in conformance with WSDOT Section 8-14.

3.07 CONCRETE CURBS AND GUTTERS

- A. Cement concrete curbs and gutters shall be constructed in conformance with WSDOT, Section 8-04.3(1).
- B. Edging: Perform edging before the final texturing and before the concrete has taken the final set. Form a 1/2-inch radius at pavement edges, 1/4-inch radius at contraction joints, and a 1/2-inch radius at through or construction joints.
- C. Sidewalks: Screed and slope the concrete surfaces. After screeding, give the surfaces a coarse transverse scored texture by drawing a broom or burlap belt across the surface. Round edges to a radius of 1/2-inch. Groove joints to a radius and depth of 1/4-inch.
- D. Final Finish
 - 1. The pavement surface, after edging, shall be given a uniform, gritty texture true to grade and cross-section.
 - 2. The Contractor shall give the pavement a final finish surface by texturing with a comb and perpendicular to the centerline of the pavement. The comb shall produce striations approximately 0.015-foot in depth at approximately 1/2-inch spacing in the fresh concrete. The comb shall be operated mechanically, either singularly or in gangs, with several placed end to end. Finishing shall take place with the elements of the comb as nearly perpendicular to the concrete surface as is practical to eliminate dragging the mortar. If the pavement has a raised curb without a formed concrete gutter, the texturing shall end 2 feet from the curb line. This 2-foot untextured strip shall be hand-finished to form a light brush finish. Top of curb shall receive a broom finish.

3.08 JOINTS

- A. Formed Control Joints
 - 1. Transverse control joints shall be placed after compaction and finishing of concrete have been completed and before initial set. A groove shall be cut into the surface at the location of the joint using a tool provided with stops to prevent cutting the groove deeper than shown on the plans.
- B. Contraction Joints
 - 1. Construct joints by sawing a uniform 1/4-inch wide vertical groove in the hardened concrete before random cracks develop.
 - 2. Where curing membrane is used, respray the area disturbed by sawing of joints immediately upon completion of the sawing operation.
- C. Expansion Joints
 - 1. Construct expansion joints with full depth, premolded, expansion joint filler material.
 - 2. The finished joint shall be perpendicular to the paved surface.
- D. Construction Joints
 - 1. Place construction joints wherever the placing of concrete is suspended for more than 30 minutes.

3.09 JOINT SEALING

- A. Immediately after the pavement is cured and before opening to traffic, thoroughly clean the joint space of loose material, dust, and debris and begin the process of sealing the joints.

3.10 CONCRETE CURING

- A. Curing and Protection (Curing Compound)
 - 1. Apply the curing compound immediately after the concrete has been finished and after surplus water collected on the surface has disappeared.
- B. Curing and Protection (White Polyethylene Sheeting)
 - 1. Place the sheeting over the pavement immediately after finishing operations are completed.
- C. Curing in Cold Weather: When the air temperature is expected to reach the freezing point during the day or night, and the pavement has not reached 50 percent of its design strength or 2,500 psi, whichever is greater, the concrete shall be protected from freezing.

3.11 FIELD SAMPLING AND TESTING

- A. Field sampling and testing will be performed by the independent testing laboratory specified in Paragraph 1.05.A of this section. Samples of aggregates and concrete will be taken at random locations and at such times as required to represent the quality of the materials and work throughout the project.

END OF SECTION

SECTION 321713

PARKING BUMPERS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies the parking bumpers at parking stalls inside and outside the garage.

1.02 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections apply to this Section.
- B. The following related section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

PART 2 PRODUCTS

2.01 MANUFACTURERS/MATERIALS

- A. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used. King County Transit prefers that all interior and exterior adhesives and sealants, paints, and coatings shall meet the relevant VOC /emissions criteria.
- B. Parking Bumpers: Pacific Cascade - Parking Zone, Parking Stop #SC-CCPS-06-YX standard concrete bumper, 5-1/2 inches high by 72 inches long, by 6 inches thick with two 5/8 inch securing holes, Gray solid color throughout, for normal and handicapped parking stalls, or equal.
- C. Glue down adhesive suitable for application.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 321723

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies pavement marking consisting of furnishing and placing pavement markings for parking areas and streets, and raised pavement markers for delineation and channelization.

1.02 REFERENCES

- A. All work to be performed and materials to be used shall be in accordance with the Bellevue City Code, unless otherwise indicated herein.
- B. Washington State Department of Transportation (WSDOT) Standard Specifications 2012.
- C. ASTM D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- D. GS-11 Green Seal Standard for Paints and Coatings

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 1. Section 018113 Sustainable Building Requirements
 2. Section 017419 Construction Waste Management
 3. Section 018119 Construction Indoor Air Quality

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. A.: King County Transit prefers that all interior and exterior paints shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 RAISED PAVEMENT MARKERS

- A. Type 1 and Type 2 raised pavement markers shall conform to WSDOT, Paragraph 9-21 in the colors and locations as identified on the drawings.

2.03 PARKING AREA PAVEMENT STRIPING MATERIALS

- A. Pavement marking materials shall comply with the requirements of Paragraph 8-22.2 of WSDOT. Paint shall be one of the following types from the WSDOT Qualified Products List, as called for in the Drawings:
 - 1. 1. Recycled Content: Minimum 20 percent post-consumer recycled content for light colors; minimum 50 percent post-consumer recycled content for dark colors.
 - 2. 2. Low VOC solvent based paint: Comply with GS-11
 - 3. 3. Low VOC waterborne paint: Comply with GS-11

2.04 2.04 PAVEMENT ARROWS AND LETTERING

- A. Pavement arrows and lettering, or where indicated, shall be thermoplastic meeting requirements of Paragraph 8-22.2 of WSDOT.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 328000

IRRIGATION

PART 1 GENERAL

1.01 SUMMARY

- A. The underground irrigation system shall be constructed using the sprinkler heads, valves, piping, fittings, controllers, wiring, etc., of sizes and types as called for in these Specifications.

1.02 SCOPE OF WORK

- A. Furnish and install a complete underground sprinkler irrigation system to provide efficient and even irrigation (WITH MINIMUM OVERSPRAY ONTO SIGNS, PAVED OR NON-PLANTED AREAS AND NO OVERSPRAY ONTO BUILDINGS) of all planting areas shown on the Landscape Planting Drawings and as specified in the Specifications, complete and ready for operation.

1.03 SYSTEM PROTECTION

- A. As part of the guarantee under this contract, the Developer shall be responsible for the deactivating and draining of the system prior to the onset of the freezing season and for reactivating the system at the onset of the spring growing season.

1.04 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specifications apply to this Section.
- B. The following section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.05 TESTS

- A. Pressure Test
- B. Performance Coverage Tests

1.06 SUBMITTALS

- A. Developer shall submit manufacturer's "Catalog Cuts" of all materials.
- B. Developer shall submit As-Built Drawings; Keys; Tools; Permits; Water Schedule; Instructions; Maintenance/Operation Manuals; etc., as required per these Specifications.

1.07 GUARANTEE / WARRANTY

- A. The entire irrigation system shall be guaranteed by the Developer to give complete and satisfactory service as to materials and workmanship for a period of one (1) year from the date of contract acceptance of the work.

PART 2 PRODUCTS

2.01 GENERAL

- A. King County Transit prefers that all interior and exterior adhesives shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used

2.02 PLASTIC PIPE

- A. PVC pipe upstream of the control valves shall be Schedule 40 and conform to all requirements of ASTM D 2241.
- B. PVC pipe (zone lines) downstream of the control valves shall be Class 200 (pressure rated for 200 psi), and conform to all requirements of ASTM D 1785.
- C. PVC Pipe sleeving shall be Schedule 40 and conform to all requirements of ASTM D 2241.
- D. All fittings for lateral lines shall conform to the requirements of ASTM D 2466 SCHEDULE 40 PVC with exception to irrigation head riser assembly nipples and pipe risers, which shall be ASTM D 2464 SCHEDULE 80 PVC. All lateral line fittings shall be of the solvent weld type except where risers, valves, etc. require threaded transition fittings.
- E. All threaded fittings for mainlines shall conform to requirements of ASTM D 2464, SCHEDULE 80 PVC. All glued fittings for mainlines shall conform to the requirements of ASTM D 2466, Schedule 40 PVC.

2.03 AUTOMATIC SPRINKLER CONTROLLER

- A. Controller wiring that is above ground shall be installed in a conduit of painted galvanized steel.
- B. Electrical wiring shall be installed according to local code.

2.04 CONTROL WIRE FOR AUTOMATIC VALVE OPERATIONS

- A. Control wire must be insulated single strand copper designed for twenty (20) to fifty (50) volts and UL approved as Type U.F. (Underground Feeder).
- B. Copper conductor must meet or exceed ASTM B-3 requirements.

2.05 QUICK COUPLING VALVES

- A. Minimum one (1) inch valve and swing joint shall be used at "air-blow" connection to reduce air friction.
- B. Provide two (2) matching valve keys, two (2) cap keys and two (2) swivel hose ells.

2.06 VALVE BOXES

- A. All automatic valves and manual gate valves shall be enclosed in AMETEK Plymouth Valve Box of Superflexon with locking lid or approved equal.

- B. Manual drain valves shall be enclosed in a two (2) inch PVC pipe and covered with a Weathermatic 906L locking cap and PVC pipe.
- C. Backflow preventers shall be enclosed in a box as noted on Drawings.
- D. Provide two (2) lid keys and two (2) valve keys per Valve Box type to King County Metro.
- E. Size valve boxes as required to provide approximately three (3) inches clear between valve box and valve on all sides.

2.07 IRRIGATION WATER METER

- A. Water Meter shall be per Bellevue City Code.

2.08 BACKFILL MATERIALS

- A. Sump Gravel (For use under valve boxes only)
 - 1. Three-quarter (3/4) minus round, water worn, washed gravel.
- B. Sand (backfill soils around PVC pipe)
 - 1. Fine granular material naturally produced by rock disintegration and free from organic material, loam, clay, and other deleterious substances.
- C. Native Material (backfill soil around PVC pipe)
 - 1. Soil native to project site free of wood and other deleterious materials and rocks over one (1) inch diameter.
- D. Structural Fill (backfill soil around PVC pipe sleeve).
 - 1. Backfill for pipe sleeves shall be structural fill. See Division 31 Section 'Earthwork'.

2.09 OTHER SUPPLIES

- A. All flexible nipples or pipe joints shall be "Rainbird Swing Pipe," "Toro Funny Pipe," or "Triple Swing Joint Assembly".
- B. All electrical wire splices must be made watertight with sealing 3M Direct Burial Splice Kit.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

1.02 TRENCHING

- A. Trenches shall allow for a minimum of twelve (12) inches of cover over sprinkler head lateral lines, eighteen (18) inches of cover for irrigation main lines (see detail) and twenty-four (24) inches of cover for main supply line from point of connection to backflow preventer. Maintain a minimum clearance of three (3) inches between irrigation lines

within a common trench. Trenches for sleeves shall allow for a minimum of eighteen (18) inches of cover.

B. Pulling of pipe is not permitted.

3.02 INSTALLATION

A. Head Locations

1. Locate sprinkler heads nine (9) inches from building foundation. Heads immediately adjacent to walks, curbs, shrub bed edge, etc. shall have one (1) inch clearance between head and walks, curbs, shrub bed edge, etc.

B. Control Wire

1. All splices must be made watertight with sealing Rainbird ST-03UL/PT-55 Snap-Tile.
2. Splices will be permitted only at the valves and never between valves or valve and controller.
3. Minimum size of wire is to be determined strictly by the wire sizing chart provided by Rainbird.
4. The control wires shall by color coded as follows:
5. Ground Wire - White
6. Lead-In Wire - Red
7. Spare Wire - Yellow
8. Arrange valve stations to operate in sequence shown on "As-Built" Drawings.
9. Spare wire(s) shall be provided to all control valves. The spare wire(s) shall be shared by all the valves and shall complete the circuit back to the controller. Wire sizes shall be the same as the ground wire.

C. Risers

1. The pipe risers must have the same inlet size as the sprinkler and quick coupler heads.
2. Minimum riser size shall be the pipe size of the sprinkler head.

D. Automatic Controllers

1. Electrical wiring shall be installed according to local code.
2. A diagram or schedule sealed in a plastic cover shall be posted in the controller to facilitate the selection of the valves to be operated.

E. Backflow Preventer

1. Install in accordance with local plumbing code.
2. A manual shut-off valve shall be located upstream of Backflow Preventer to allow full isolation of system from water supply.

F. Automatic Valves

1. All automatic valves shall be enclosed in valve boxes set two (2) inches above finish grade in shrub beds where mulch is specified. Valve box extension may be required. Locate valve boxes in shrub and groundcover planting beds wherever possible and at points of easy access from paved areas.

2. Where valves occur adjacent to paved areas, install so that valve boxes will not be closer than twelve (12) inches to paving and perpendicular or parallel to it. Group boxes shall be spaced evenly to provide a neat appearance.

G. Quick Coupling Valves

1. Locate all quick couplers in shrub and groundcover planting beds wherever possible and at points of easy access from paved areas.

H. Irrigation Water Meter

1. All work shall be per code requirements.

I. Pipe Sleeves

1. All sleeves shall extend a minimum of twelve (12) inches beyond the edges of pavement.
2. Contractor shall provide and install pipe sleeves where irrigation lines cross walks, drives, parking lots or any other hard surface pavements.

J. Backfilling

1. Trenches or tunnels under roads or paved areas shall be backfilled and tamped with a mechanical tamper in successive six (6) inch lifts to at least ninety-five (95) percent density as determined by ASTM D 1557.

3.03 SYSTEM FAMILIARIZATION

- A. Upon acceptance of the system, the Developer shall provide the necessary keys and/or other tools necessary to operate/drain/activate the system and spend sufficient time with King County Metro to insure that system operation/maintenance/winterizing can continue after completion of the contract.

3.04 FINAL ACCEPTANCE

- A. Upon completion and approval of all tests, final acceptance of the system will be contingent upon Developer providing signed and approved sprinkler / plumbing / health /electrical permits as may be applicable in the area as well as reproducible Mylar As Built Drawings and three (3) three (3) ring binders of all catalog cuts/manufacturer's instructions/maintenance and operation information.

END OF SECTION

SECTION 329100

PLANTING PREPARATION

PART 1 GENERAL

1.01 SUMMARY

- A. The Developer shall submit a written "watering schedule" to King County Metro to ensure adequate watering (summer, fall, winter & spring) of all plant materials.

1.02 REFERENCES

- A. American Standard for Nursery Stock, ANSI Z60.1. American Nursery and Landscape Association, 1250 Eye Street NW, Suite 500, Washington, D.C. 20005.

1.03 SUBMITTALS

- A. Submit the following plant material documentation:
 - 1. List suppliers' names, addresses, and phone numbers.
- B. Soil Tests and Soil Supplier Certifications: See Paragraphs 2.01 and 2.03 of this Section.
- C. Watering Schedule: See Paragraph 1.01A of this Section.

1.04 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by King County Metro Transit.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization.
 - 2. Warranty Periods: From date of Substantial Completion
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
 - 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.

PART 2 PRODUCTS

2.01 EXISTING SUBGRADE SOIL

- A. Soil tests of the subgrade soil shall be made by the Developer to determine mechanical analysis (per USDA Particle Size and Organic Matter Test) and fertility analysis (to determine magnesium, nitrogen, potassium, and phosphorus levels; soluble salts/conductivity and pH). Developer shall send a minimum of three (3) representative samples of subgrade soil to an approved soil testing laboratory (state laboratory or recognized commercial laboratory). Test results and laboratory recommendations for ornamental plant growth must be submitted to King County Metro.

2.02 COMPOST

- A. Compost shall be a commercially available Recycled Plant Waste Compost product with 98% minimum material derived from the aerobic decomposition of recycled plant waste. It shall be free of viable weed seeds and other plant propagules and shall have a moisture content that has no visible free water or dust produced when handling the material. Compost shall also be free of Clopyralid herbicide. The material shall be comprised of fully composted and mature organic materials. Compost shall be produced at a permitted solid waste composting facility (Health Permit, Department of Ecology Storm Water Permit, Puget Sound Clean Air Agency Facility and Equipment Registration) and meet the following mechanical analysis:

Size	Sieve	Percent Passing
½-inch	ASTM E 11	100

2.03 PLANTING SOIL

- A. The Developer shall be responsible for the supply of all natural soil and soil additives required for the performance of this Contract. Soil shall be free of weeds, pests, toxic substances, and other undesirable material harmful to ornamental plant growth.
 - 1. Soil Sources: Soil sources shall be Red-E-Topsoil, Cedar Grove Compost, Pacific Topsoils Inc., Iddings Farm Service.
- B. Planting soil mix shall be a mixture of compost and sand.
 - 1. Sand shall be "Washed Building Sand" and meet the following chemical and mechanical analysis:

Size	Sieve	Percent Passing
No. 4	ASTM E 11	100
No. 270	ASTM E 11	0 - 2

- a. Salinity (millimhos per centimeter of saturation extract at 25 degrees C) Nil - 3.0
 - b. Boron (saturation extract concentration) Nil - 1.0 ppm
 - c. Sodium (sodium absorption ratio - SAR) Nil - 6.0
- C. Planting soil shall be a two-way mix soil consisting of forty (40) percent sand and sixty (60) percent compost by volume thoroughly mixed together. Mixed soil shall have pH range of 5.0 to 6.5 with dolomite limestone added as necessary to attain this range. Developer shall send minimum of one (1) representative sample of MIXED SOIL; to an approved soil testing laboratory (state or commercial laboratory) to determine

FERTILITY ANALYSIS (to determine magnesium, nitrogen, potassium, phosphorus levels, calcium, minor elements, soluble salts/conductivity and pH). The results shall be submitted to King County Metro (WITH TEST RESULTS AND LABORATORY RECOMMENDATIONS FOR ORNAMENTAL PLANT GROWTH). The Developer shall be responsible for whatever soil additives may be required, as recommended by the testing laboratory.

- D. Submit sand and planting soil laboratory tests and supplier's certification of material to King County Metro.

2.04 SAWDUST MANURE MULCH

- A. Sawdust Manure Mulch shall be "Steerco," "Comp-Mulch".

2.05 FERTILIZER

- A. Commercial Fertilizer "A" for trees, shrubs and groundcover during planting: AGRO "Transplanter" or equal.
- B. Fifty (50) percent of the nitrogen shall be derived from Nitroform "Blue Chip." Potash shall be derived from sulfate of potash. Fertilizer shall be standard free flowing.

2.06 LIME

- A. Lime shall be dolomitic limestone containing not less than eighty-five (85) percent of total carbonates. Limestone shall be ground to such fineness that one hundred (100) percent will pass a No. 20 sieve.

2.07 ANTI-DESICCANT

- A. Anti-desiccant shall be "Wilt-Pruf," delivered in Manufacturer's containers and used in accordance with Manufacturer's recommendations.

B. PLANTS

C. Trees, Shrubs, and Groundcover

1. All plants shall be nursery grown, or normal habit of growth, healthy, vigorous and free of disease, insect eggs, and larvae. Plants shall not be pruned prior to delivery. Plants shall have all leaders and buds intact. Grading of plant material and root ball/container sizes shall be in accordance with the code of standards of the American Association of Nurserymen.
2. No less than ten (10) percent of each variety and/or species of plant delivered to the project shall be accurately labeled. Plant material labels shall be durable, legible labels stating the correct plant name.
3. Plants are required to be from stock acclimated to Project Site environmental conditions, having been consistently cultivated and grown under these conditions.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 SUBGRADE - COMPOST AREAS

- A. Rototill or scarify all subgrade soils to a minimum depth of three (3) inches prior to placement of compost.
- B. Remove debris and rocks over one (1) inch in size.

3.02 SUBGRADE - PLANTING SOIL AREAS

- A. Rototill or scarify all subgrade soils to a minimum depth of six (6) inches prior to placement of planting soil.
- B. Remove debris and rocks over one (1) inch in size.

3.03 SOIL PREPARATION - COMPOST AREAS

- A. Provide and install compost to a three (3) inch compacted depth over all tree, shrub, and groundcover planting areas and rototill to a depth of three (3) inches into the subgrade.
- B. Finish Grading
 - 1. Compact finish grade to eighty-five (85) percent of maximum dry density as determined by ASTM: D 1557.
 - 2. After settling, finish grades in tree, shrubs, and groundcover planting areas shall be two (2) inches below all walks, curbs, and/or other hard surface edges.

3.04 SOIL PREPARATION – PLANTING SOIL AREAS

- A. Provide and install planting soil to a twelve (12) inch compacted depth over all shrub and groundcover planting areas.
- B. Finish Grading
 - 1. Compact finish grade to eighty-five (85) percent of maximum dry density as determined by ASTM: D 1557.
 - 2. After settling, finish grades in shrubs and groundcover planting areas shall be two (2) inches below all walks, curbs and/or other hard surface edges.

3.05 TREE, SHRUB, AND GROUNDCOVER INSTALLATION

- A. Backfill material for plantings is to be two-thirds (2/3) planting soil as specified with one-third (1/3) existing soil thoroughly mixed together. If the Contractor encounters clay soil or any unusual condition, which may be detrimental to the new planting, the removal and replacement of unsuitable materials is required.
- B. Apply Fertilizer per Manufacturer's recommendation to all trees, shrubs, and groundcover.
- C. Provide all planting areas with uniform two (2) inch compacted layer of sawdust manure mulch material over a properly cleaned and graded surface as noted on Drawings.
- D. As necessary, a follow-up fertilizer application for all planting beds shall be in accordance with recommendations from soil test fertility analysis.

3.06 GUARANTEE

- A. Guarantee work of this Specification section for one (1) year against all defects of materials and workmanship. Replace plants not in normal healthy growing condition at the end of guarantee period. Replace with plants with identical species and size.
- B. Any plant material that is thirty (30) percent or more dead or disfigured shall be considered dead and must be replaced. Plants shall be considered disfigured when excessive dead wood has been removed or when the symmetry, typical habit of growth, or sculptured form has been impaired by the removal of dead wood.
- C. The above guarantee shall be applicable to any growing conditions through which plants of like kind could be expected to survive, and any deformity or cause of death which could be attributed to, or affected by, the physiological condition of the plant shall be deemed replaceable cause; however, this would not apply to plant losses due to ABNORMAL WEATHER conditions such as floods, excessive wind damage, drought, severe freezing or abnormal rains, as determined by the National Weather Service.

3.07 MAINTENANCE

A. General

- 1. Subcontractor shall provide maintenance guarantee for one year. It is expressly understood that the Contractor will be responsible, during the one (1) year Guarantee Period, for normal landscape maintenance of the project. Maintenance of the landscape shall include, but not be limited to, watering, weeding, ivy removal, pruning, fertilizing, monitoring, and treating any disease and/or pest-problems, cultivating and any other maintenance requirements (per standard trade practices) to keep the plant materials in a normal healthy growing condition.
- 2. Contractor shall schedule weekly visits to site to determine conditions and perform work as required.

B. Watering

- 1. See "Watering Schedule" Paragraph 1.01A of this Section for the landscape/irrigation contractors' recommended watering schedule.

C. Pruning

- 1. All pruning shall be completed in such a manner to enhance the plant's natural growth and flowering characteristics.
- 2. All pruning shall be provided per International Society of Arboriculture standards.

D. Fertilizing

- 1. Trees, shrubs and groundcovers shall be fertilized in March and October with a commercially available shrub and groundcover fertilizer (6-10-8 or equivalent) as recommended by manufacturer.

E. Sawdust Manure Mulch

- 1. Maintain a two (2) inch depth of mulch in the planting beds that were originally mulched. If mulch is disturbed by maintenance staff or others, it shall be releveled or replaced to the two (2) inch depth.

2. Keep mulch loose and raked to maintain even coverage and appearance.

F. Litter and Debris Clean-Up

1. All litter or debris deposited within planting areas shall be removed and disposed of off-site.
2. All bark mulch or soil that may erode onto paved surfaces shall be removed from sidewalk surface.

G. Irrigation

1. The Contractor shall maintain the irrigation system in good operating condition. This includes cleaning and adjusting sprinkler heads, valves, and electric controllers, etc.
2. The system will be winterized by AIR BLOWING all irrigation lines in the dormant season to remove water from the pipe lines.

END OF SECTION

331000

WATER UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. The work includes the installation of potable water system pipe, fittings, valves, and appurtenances.

1.02 REFERENCES

- A. All work to be performed and materials to be used shall be in accordance with the Bellevue City Code unless otherwise indicated herein.
- B. Washington State Department of Transportation (WSDOT) Standard Specifications 2012.

1.03 SUBMITTALS

- A. Provide the following:
 - 1. Submit manufacturer's technical product data.
 - 2. Shop drawings for potable water system.
 - 3. Record drawings at project closeout.

1.04 DEVELOPER REQUIREMENTS

- A. Coordinate and schedule all water service work in the public right-of-way with the City of Bellevue Public Works Department.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials shall conform to the City of Bellevue Standards.
- B. King County Transit prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 INSTALLATION

- A. All work shall conform to the City of Bellevue City Code.
- B. Pipe installation shall meet the requirements of WSDOT, Section 7-08.

C. Depth of Cover: Provide 4-foot minimum cover over piping below finished grade.

3.02 FIELD QUALITY CONTROL

A. Hydrostatic Tests: Test pipeline in accordance with the requirements of the Bellevue City Code.

B. Disinfect and test installed water mains in accordance with City of Bellevue requirements.

END OF SECTION

SECTION 333000

SANITARY SEWERAGE UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes constructing sanitary sewer lines outside of buildings.

1.02 REFERENCED STANDARDS

- A. Work shall conform with the Bellevue City Code.
- B. ASTM D-3034-04 - Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fitting.
- C. 2006 UPC - 2006 Uniform Plumbing Code (UPC).
- D. IAMPO - International Association of Plumbing and Mechanical Officials (IAMPO) Standards.
- E. WSDOT - Washington State Department of Transportation (WSDOT) Standard Specifications 2012.

1.03 RELATED DOCUMENTS

- A. Design Criteria and other Performance Specification Sections apply to this Section.
- B. The following Section is applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SUBMITTALS

- A. Provide the following:
 - 1. Product data giving full description of the components proposed for the system.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. Meet the applicable requirements of City of Kirkland.

PART 2 PRODUCTS

2.01 GENERAL

- A. King County Transit prefers that all interior and exterior adhesives and sealants shall meet the relevant VOC /emissions criteria. King County Transit prefers that the highest

amount of recycled content materials, regional materials, and rapidly renewable materials be used.

2.02 PIPING MATERIAL

- A. Sewer pipe shall have flexible, gasketed, push-on joints and shall be PVC (Polyvinyl Chloride) SDR 35 conforming to ASTM D3034. Fittings shall be factory molded of PVC. All pipe and fittings shall be legibly and permanently marked with type and class.

2.03 CLEAN-OUTS

- A. Clean-outs shall be installed at locations to meet the requirements of the Bellevue City Code.

2.04 DETECTABLE MARKING TAPE

- A. Detectable marking tape, for non-metallic piping, shall consist of inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents, and solvents likely to be encountered in the soil, with a metallic foil core to provide the most positive detection and pipeline locators. The tape shall be color coded green and shall be imprinted continuously over its entire length, in permanent black ink. The message shall convey that a sewer line is buried below and shall also have the word "Caution" prominently shown. The width of the tape shall be as recommended by the manufacturer for the depth of installation.

2.05 OIL-WATER SEPARATOR

- A. Provide oil-water separator. Utility Vault 4484-GA, or equivalent.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. Construction shall conform to the requirements of WSDOT, 7-04.3.
- B. Cleaning and testing shall conform to the requirements of WSDOT, 7-04.3(1).

END OF SECTION

SECTION 334000

STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. This work shall consist of furnishing and installing drainage pipe and catch basins.

1.02 REFERENCES

- A. All work to be performed and materials to be used shall be in accordance with the Bellevue City Code (BCC) and details for Public Works Construction.
- B. Washington State Department of Transportation (WSDOT) Standard Specifications 2012.

1.03 RELATED SECTIONS

- A. The following related sections are applicable to this work
 - 1. Section 018113 Sustainable Building Requirements

1.04 SUBMITTALS

- A. The following shall be submitted.
 - 1. Product data, including catalog cuts and technical specifications, shall be provided for the following:
 - a. Catch Basins
 - b. Pipe
 - c. Pipe Joints
 - d. Frames and Grates

PART 2 PRODUCTS

2.01 GENERAL

- A. King County Transit prefers that all interior and exterior adhesives and sealants shall meet the relevant VOC/emissions criteria. King County prefers that the highest amount of recycled content materials, regional materials, and rapidly renewable materials be used, and prefers that other pipe material be used in lieu of PVC pipe, as specified herein..

2.02 MATERIALS

- A. Underdrain Pipe
 - 1. Perforated PVC underdrain pipe shall comply with the requirements of WSDOT, Section 9-05.2(6).
 - 2. PVC drain pipe shall meet the requirements of WSDOT, Section 9-05.1(5).

3. Perforated corrugated polyethylene pipe shall meet the requirements of WSDOT, Section 9-05.2(7).
 4. Corrugated polyethylene drainage tubing drain pipe shall meet the requirements of WSDOT, Section 9-05.1(6).
- B. Storm drain conveyance pipe shall be lined corrugated polyethylene (LCPE) pipe unless indicated otherwise and shall meet the requirements of WSDOT, Section 9-05.20.
- C. Catch Basins and Manholes
1. General: Materials shall comply with the provisions in WSDOT, Section 7-05.2.
 2. Catch basins and manholes shall be precast concrete structures.
 3. Mortar for jointing catch basins and inlets shall be one part portland cement, and not less than one part more than two parts plaster sand mixed with the least amount of water necessary to provide a workable mortar.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 TRENCH EXCAVATION AND BACKFILL

- A. Trenching in Public Right-of-Way: All trenching in public right-of-way, if required, shall be in accordance with the City of Bellevue standards.
- B. Compaction of Trench Backfill
1. Trench excavation may be used as backfill above the bedding material if the material conforms to the requirements of structural fill of Section 310000 Earthwork.

3.02 PIPE LAYING, JOINTING, AND TESTING

- A. General
1. General: Construction requirements for pipe laying and jointing shall conform to the applicable provisions of Section 7-08.3 of WSDOT.
- B. Pipe Jointing
1. All storm drain pipes shall have flexible gasketed joints.
- C. Pipe Testing
1. Exfiltration and Infiltration tests on Storm Sewer Pipe shall be as required in WSDOT, Section 7-04.3.

3.03 CATCH BASINS AND MANHOLES

- A. Pipe Connections
1. All rigid pipes entering or leaving the catch basin shall be provided with flexible joints within 1½ pipe diameters of the catch basin structure and shall be placed on firmly compacted bedding particularly within the area of the catch basin.

END OF SECTION

SECTION 335100

NATURAL GAS DISTRIBUTION

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies piping and components for underground gas distribution systems.

1.02 RELATED SECTIONS:

- A. Division 23 'Facility Liquefied Petroleum Gas Piping'.

1.03 REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents. They are part of this Section as specified and modified. In case of conflict between the requirements in this Section and those in the listed documents, the requirements in this Section shall prevail.

<i>Reference</i>	<i>Title</i>
(CFR) Title 49, Part 192	US Department of Transportation Pipeline Safety Regulations, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards".
ASME B31.1	American Society of Mechanical Engineers (ASME), Power Piping (ASME Code for Pressure Piping , B31)
ASTM D1248	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
ASTM D2513	Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
ASTM D2683	Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
ASTM D2837	Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.

Reference	Title
ASTM D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
ASTM F1055	Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
ASTM F1924	Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing.
PPI	The Plastics Pipe Institute, Inc. 1825 Connecticut Ave., NW, Suite 680 Washington, DC 20009
PPI TR-3	Policies and Procedures for Developing Hydrostatic Design Bases (HDB), Pressure Design Bases (PDB) and Minimum Required Strengths (MRS) for Thermoplastic Piping Materials or Pipe.
PPI TR-4	PPI Listing of Hydrostatic Design Bases (HDB), Pressure Design Bases (PDB) and Minimum Required Strengths (MRS) for Thermoplastic Piping Materials.
PPI TR-33	Generic Butt Fusion Joining Procedures for Polyethylene (PE) Gas Pipe.
NFPA 58	National Fire Protection Association, Storage and Handling Liquefied Petroleum Gas.

1.04 SYSTEM DESCRIPTION

- A. The natural gas distribution system shall consist of a flexible, fully retractable, polyethylene tubing carrier line inside a flexible, high density polyethylene conduit designed for underground installations.

1.05 SUBMITTALS

- A. Submit record of experience of personnel proposed for the installation of the type of piping specified in this Section.
- B. Submit data on all items to demonstrate compliance with the Specifications and the applicable codes and standards. Submit in conformance with Section 013300, and, as a minimum, include the following data on gas carrier piping:
 1. Evidence of piping manufacturer's compliance with the requirements in ASTM D2513 for an in-plant quality control program.

2. Evidence of piping manufacturer's compliance with a testing program performed in a qualified laboratory, registered under a recognized quality assurance program such as ISO 9000.
 3. Evidence that the manufacturer has a qualified joining procedure in accordance with the requirements of the US Department of Transportation Pipeline Safety Regulations (CFR) Title 49, Part 192, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards".
- C. Evidence of listing by the Washington Natural Gas Company as an accepted manufacturer of the gas carrier piping specified in this Section shall be an acceptable substitute for the evidence listed in 1.05 B., above.

PART 2 PRODUCTS

2.01 GENERAL

- A. Polyethylene pipe, tubing and fittings furnished under this Section for the natural gas carrier line shall conform to all applicable provisions and requirements of the latest revision of the US Department of Transportation Pipeline Safety Regulations (CFR) Title 49, Part 192, "Transportation of Natural or Other Gases by Pipeline: Minimum Federal Safety Standards, and, by inclusion, all appropriate standards referenced therein.
- B. Pipe, tubing and fittings for the carrier line shall be designed and fabricated for direct burial and reliner applications, and capable of sustaining H-20 loading when buried a minimum of 2 feet below cement concrete or asphalt concrete paved grade.
- C. High density polyethylene tubing used for carrier pipe conduit shall be designed and fabricated for direct burial and capable of sustaining H-20 loading when buried a minimum of 2 feet below cement concrete or asphalt concrete paved grade.

2.02 MATERIALS

- A. Carrier line in general:
 1. Requirements and test methods for material, dimensions and tolerances, hydrostatic burst strength, chemical resistance, and impact resistance of plastic pipe, tubing and fittings shall conform to ASTM D2513.
 2. Polyethylene compounds utilized in the manufacture of products furnished under this Section shall have a grade of PE24 or PE34, and minimum cell classification of PE213363 or PE334464, as defined in ASTM D3350.
 3. The ASTM D2513 hydrostatic design basis (HDB), for a temperature of 73°F, shall be 1250 psi for PE2406 and PE3406, and 1600 psi for PE3408. The HDB shall be substantiated in conformance with ASTM D2837.
- B. Carrier line for liquefied petroleum gas (LPG):
 1. Plastic material used for transportation of liquefied petroleum gas (LPG), must qualify for use through testing with LPG as the test medium, and have an HDB category of at least 1,000-psi at 73°F, as determined by ASTM D2837.

- C. Conduit tubing:
 - 1. Material for conduit tubing shall be high density polyethylene (HDPE) conforming to the requirements of ASTM D1248 for Type III or IV.

2.03 PIPE AND TUBING FOR CARRIER LINE

- A. Pipe and tubing furnished under this Section shall be manufactured using compounds complying with the requirements of 2.02, above, and the applicable requirements of Part 192 of the Minimum Federal Safety Standards.
- B. Dimensional and performance characteristics shall conform to the requirements of ASTM D2513.
- C. Pipe and tubing may be supplied in either coils or straight lengths.

2.04 FITTINGS AND VALVES FOR CARRIER LINE

- A. Polyethylene fittings and valves furnished under this specification shall be manufactured using compounds complying with the requirements of 2.02, above, the applicable requirements of Part 192 of the Minimum Federal Safety Standards, or NFPA 58 LP Gas Code, and the following:
 - 1. Socket type fittings shall comply with ASTM D2683.
 - 2. Butt fusion fittings shall comply with ASTM D3261.
 - 3. Electrofusion fittings shall comply with ASTM F1055.
 - 4. Plastic mechanical fittings shall comply with ASTM F1924, and shall be categorized for pullout resistance as stated in ASTM D2513 and identified as to the appropriate category.
 - 5. Transition fittings: For transition between polyethylene piping and tubing to metallic piping and tubing use only transition fittings that have been pre-assembled at the manufacturer's facility. Field assembly of transition fittings shall not be allowed.
 - 6. Plastic valves shall meet the requirements of ANSI Standard B16.40.
- B. Marking:
 - 1. Pipe and tubing shall be marked in accordance with ASTM D2513. Marking shall be legible and shall remain legible under normal handling and installation practices. Indent marking may be utilized provided that:
 - a. The marking does not reduce the wall thickness to less than the minimum value for the pipe or tubing
 - b. The manufacturer has demonstrated that these marks have no effect on the long term strength of the pipe or tubing
 - c. The marking will not provide leakage channels when approved elastomeric gasket compression fittings are used to make joints.
- C. Fusion fittings shall be marked on the body or hub. Marking shall be in accordance with ASTM D2513 or the standard to which the fitting is manufactured.
- D. Mechanical fittings shall be marked in accordance with the fitting standard to which it is manufactured or Part 192 of the Minimum Federal Safety Standard Section 192.63.

- E. Quality control: Quality Control shall be in accordance with the requirements given in ASTM D2513.
- F. Fusion qualification: The manufacturer of pipe, tubing and fittings supplied under this Section shall establish and certify heat fusion procedures for the joining of the materials supplied in accordance with the applicable section of (CFR) Title 49, Part 192 "Transportation of Natural and or Other Gases by Pipeline: Minimum Federal Safety Standards" paragraph 192.283. Qualified fusion procedures, with appropriate supporting data, shall be furnished to the purchaser upon request. Suitable generic fusion procedures are included in PPI TR-33, Generic Butt Fusion Joining Procedure for Polyethylene (PE) Gas Pipe.

2.05 CONDUIT TUBING

- A. HDPE flexible tubing for conduit shall be Environ GeoDuct, or Project Representative-approved equal from OPW, Total Containment, or other HDPE tubing manufacturer.

PART 3 EXECUTION

3.01 GENERAL

- A. Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.02 FLEXIBLE CARRIER PIPING IN GENERAL

- A. Install polyethylene piping and tubing in strict conformance with the applicable procedures outlined in the "PPI Handbook of Polyethylene Pipe" published by The Plastics Pipe Institute. Maintain a copy of the handbook at the site at all times during construction of the piping systems.
- B. Use experienced personnel, with a record of successful completion of work similar to the one specified in this Section and using the appropriate fusion machinery and equipment.
- C. Use tools and equipment in compliance with ASTM F1056 and bearing the "F1056" marking for verification of compliance by the Project Representative.

3.03 FLEXIBLE CONDUIT IN GENERAL

- A. Install in conformance with manufacturer's instructions.

3.04 FLEXIBLE CARRIER PIPING JOINING

- A. Carrier piping 3 inches in diameter and smaller: Use socket fittings and socket fusion joining procedures in conformance with the applicable requirements of PPI's "Polyethylene Joining Procedures". Use mechanical equipment for sizes larger than 2 inches in diameter.
- B. Carrier piping 4 inches in diameter and greater: Use butt fusion joining procedures in conformance with the applicable requirements of PPI's "Polyethylene Joining

Procedures". Use machinery and equipment specially developed for field-butt-fusion joining.

C. Electrofusion joining: Not used.

D. Mechanical connections: Not used.

E. Transition connections: Use transition fittings as specified in 2.04 A.5., above. Meet code and standards applicable to the different piping systems being connected, in conformance with the applicable Specification Sections of this Contract Document.

3.05 FLEXIBLE CARRIER PIPING UNDERGROUND

A. Install those sections of the carrier piping outside the conduit in strict conformance with the applicable requirements in PPI's "Underground Installation of Polyethylene Pipe".

3.06 TESTING

A. After completing installation of the underground system and before performing the pressure testing specified hereinafter, demonstrate to the satisfaction of the Project Representative that the carrier pipe can be fully retracted from the underground conduit from either the beginning and the end point of the underground system as shown on the Drawings.

B. After completing installation of the underground system and before executing the above ground connection with the natural gas system specified in Section 15140, test the carrier piping in strict conformance with the applicable requirements in PPI's "Inspections, Test and Safety Considerations"; ASME B31.1, Section 137, Pressure Tests, and the following:

1. Inspect the installation to ensure that connections are tight, necessary restraint are in place, and that the system is isolated and disconnected where it should. After determining that the system is ready for testing, provide a 72-hour written notice to the Project Representative.
2. Perform hydrostatic pressure testing in the presence of the Project Representative, and using clean water as the medium. To test with other media, submit a written request for authorization to change the specified medium and do not proceed until the Project Representative has authorized the change in writing.
3. Test at 1.2 times the maximum operating pressure of the system component with the lowest operating pressure rating. Test at this pressure even if the system will normally operate at a lesser pressure.
4. Complete an initial expansion phase, whereas the system is pressurized to the test pressure and sufficient makeup water is added at one-hour intervals for 3 hours, as necessary to keep the system at the testing pressure.
5. After completing the initial expansion phase, and 4 hours after initial pressurization, proceed with the actual test which shall last 3 hours. During the 3-hour actual testing period, the amount of water added to maintain the testing pressure shall not exceed the following allowances:
 - d. For piping 1-1/4 inches in diameter and less: 0.16 gallons per 100 feet of pipe.
 - e. For piping 1-1/2 inches in diameter: 0.17 gallons per 100 feet of pipe.
 - f. For piping 2 inches in diameter: 0.19 gallons per 100 feet of pipe.

- g. For piping 3 inches in diameter: 0.25 gallons per 100 feet of pipe.
 - h. For piping 4 inches in diameter: 0.40 gallons per 100 feet of pipe.
 - i. For piping larger than 4 inches in diameter: Refer to table III of PPI's "Inspections, Test and Safety Considerations".
6. Repair or replace piping failing the specified test at no additional cost to the County and to the satisfaction of the Project Representative. Re-test after repairs or replacement. Repeat, if necessary, until the system passes the test.

3.07 FINAL CONNECTION

- A. Coordinate for the final connection with the system specified in Section 231126 of these Specifications. Obtain written authorization from the Project Representative to perform the final connection.

3.08 TRENCH BACKFILLING

- A. Comply with Section 310000 of these Specifications and the recommendations of the manufacturers of the products used for the carrier piping and the conduit.

END OF SECTION

SECTION 337173

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.01 SUMMARY

- A. This specification establishes minimum standards and guidelines for providing complete and operational electrical installations on a Design-Build performance basis. It shall be the Electrical Contractor's responsibility to design and provide for furnishing, installing, testing and placing in successful operation all equipment and materials specified.
- B. Provide permanent service entrance complete and fully operational.
- C. Coordinate with Puget Sound Energy (PSE) and extend circuits from the interface point.

1.02 UTILITY CHARGES

- A. Contact PSE and determine any utility charges. Developer performing the work of Division 26 shall pay for and include these charges.

PART 2 PRODUCTS

2.01 SERVICE ENTRANCE EQUIPMENT

- A. Provide complete as required. See Section 262400 "Panelboards".

2.02 RACEWAYS, CONDUCTORS, ETC.

- A. Provide complete as required. Refer to applicable portions of this specification.

PART 3 EXECUTION

Sections under Part 3 are provided as recommendations to the Developer in order to achieve the desired results specified in the Design Criteria and Performance Specifications.

3.01 GENERAL

- A. Provide CT enclosure, current transformer space, meter bases and metering conductors per utility requirements. Determine PSE service requirements.

3.02 GROUNDING

- A. Provide service grounding and bonding per code. See Section 260526.

3.03 WORK BY PSE

- A. PSE will provide:
 - 1. Utility Poles
 - 2. Primary voltage conductors from existing PSE manhole to padmount transformer.

3. Padmount transformer.
4. Termination of service entrance conductors at padmount transformers.
5. Current transformers.
6. Meter.

3.04 WORK BY DEVELOPER

A. Developer shall provide:

1. All work not provided by PSE as required for a complete and fully operational electrical service.
2. Rebar-reinforced concrete-encased service entrance conduits and service entrance conductors from the PSE padmount transformer to the main switchboard.
3. Rebar-reinforced concrete-encased ductbank between the PSE point of connection to the padmount transformer.
4. Vault below the PSE padmount transformer sized per their requirements.
5. Grounding rods and service grounding per code.
6. All metering raceways and conductors per PSE requirements.
7. Current transformer enclosure per PSE requirements.
8. Meter base per PSE requirements.
9. Service entrance equipment.

B. Provide the service as required to totally conform with PSE requirements.

END OF SECTION

EXHIBIT C-1

Legal Description of Land

Certain real property situated in King County, Washington and more particularly described as follows:

All of Lot D of City of Kirkland Short Plat Number 78-8-1, recorded under King County Recording Number 7808281050, in King County, Washington, separated as follows:

PARCEL A:

APN 202505-9081-05 (Bellevue):

That portion of Lot D of City of Kirkland Short Plat Number 78-8-1, recorded under King County Recording Number 7808281050, in King County, Washington, lying within the Northwest quarter of the Northeast quarter of Section 20, Township 25 North, Range 5 East, W.M.

PARCEL B:

APN 202505-9230-05 (Kirkland):

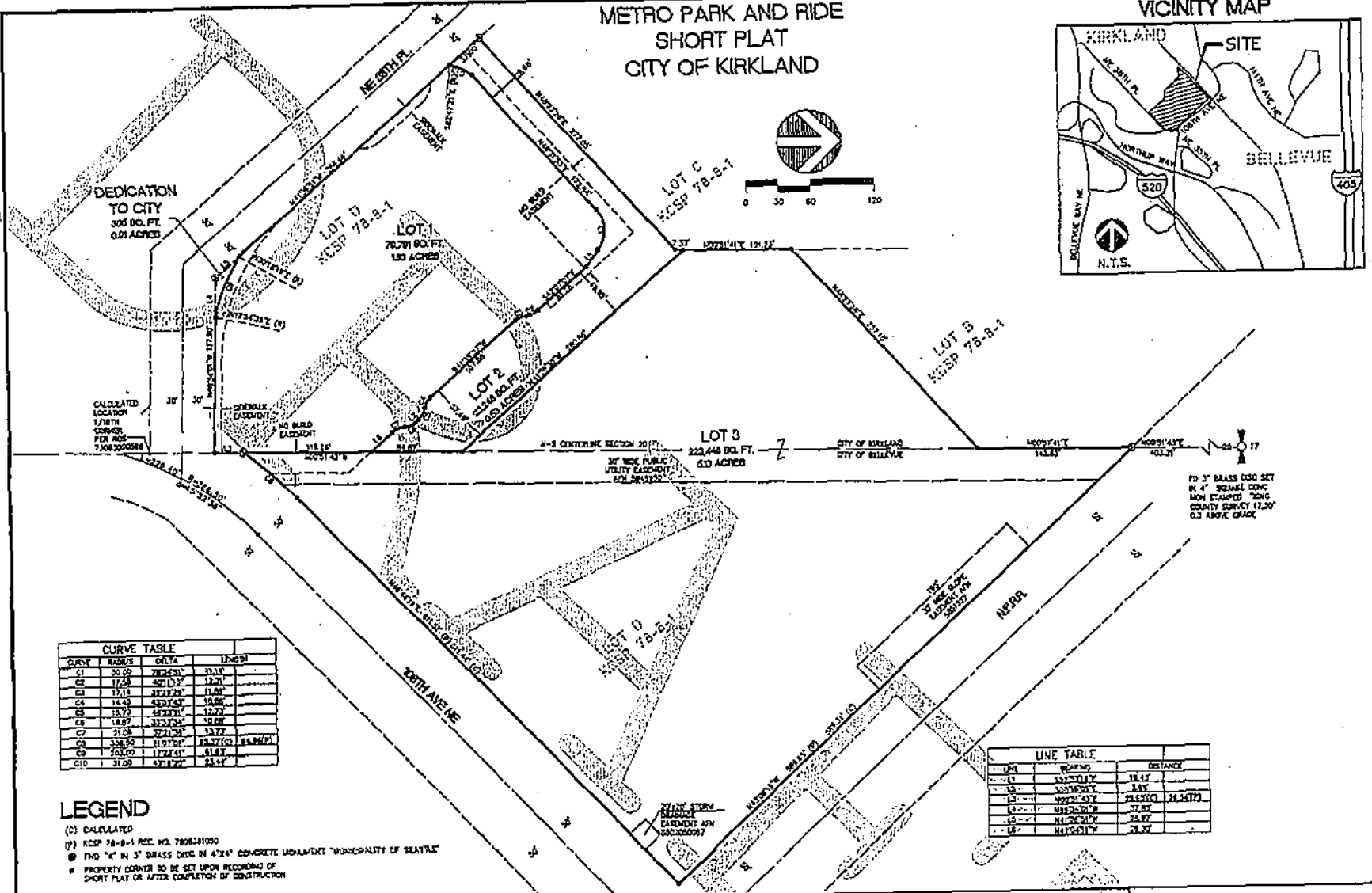
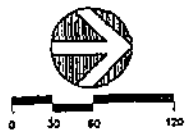
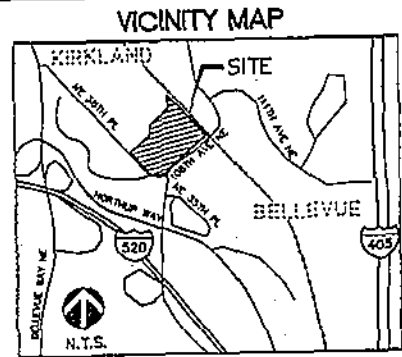
That portion of Lot D of City of Kirkland Short Plat Number 78-8-1, recorded under King County Recording Number 7808281050, in King County, Washington, lying within the Northeast quarter of the Northwest quarter of Section 20, Township 25 North, Range 5 East, W.M.

EXHIBIT C-2

Map of Land

(showing approximate location of Transit Center Land, Garage Land,
Housing Land and Housing Easements)

METRO PARK AND RIDE
SHORT PLAT
CITY OF KIRKLAND



CHY	RADIUS	CHY	CHY
C1	30.00	78.42°	31.14
C2	17.50	40.13°	12.31
C3	17.15	31.17°	11.80
C4	14.43	43.74°	10.86
C5	15.73	38.73°	12.77
C6	14.87	33.73°	10.68
C7	21.08	27.12°	13.77
C8	328.50	11.07°	18.77 (18.74)
C9	703.00	1.72°	41.87
C10	31.00	1.11°	21.14

LINE	BEARING	DISTANCE
1-2	S20°12'00"W	18.47
2-3	S20°12'00"W	1.87
3-4	N00°01'00"E	16.26 (16.2672)
4-5	S89°51'00"W	37.87
5-6	N10°01'00"E	25.87
6-7	N10°01'00"E	28.37

LEGEND

- (C) CALCULATED
- (P) KSP 78-8-1 REC. NO. 780210100
- TWO "x" IN 3" BRASS DISC IN 4"x4" CONCRETE UMBILICATOR "UNUSUALTY OF SEATTLE"
- PROPERTY CORNER TO BE SET UPON RECORDING OF SHORT PLAT OR AFTER COMPLETION OF CONSTRUCTION

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY, MADE BY ME OR UNDER MY DIRECTION, IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT AT THE REQUEST OF _____ ON _____ 20__.

SURVEYOR
CERTIFICATE NO. _____

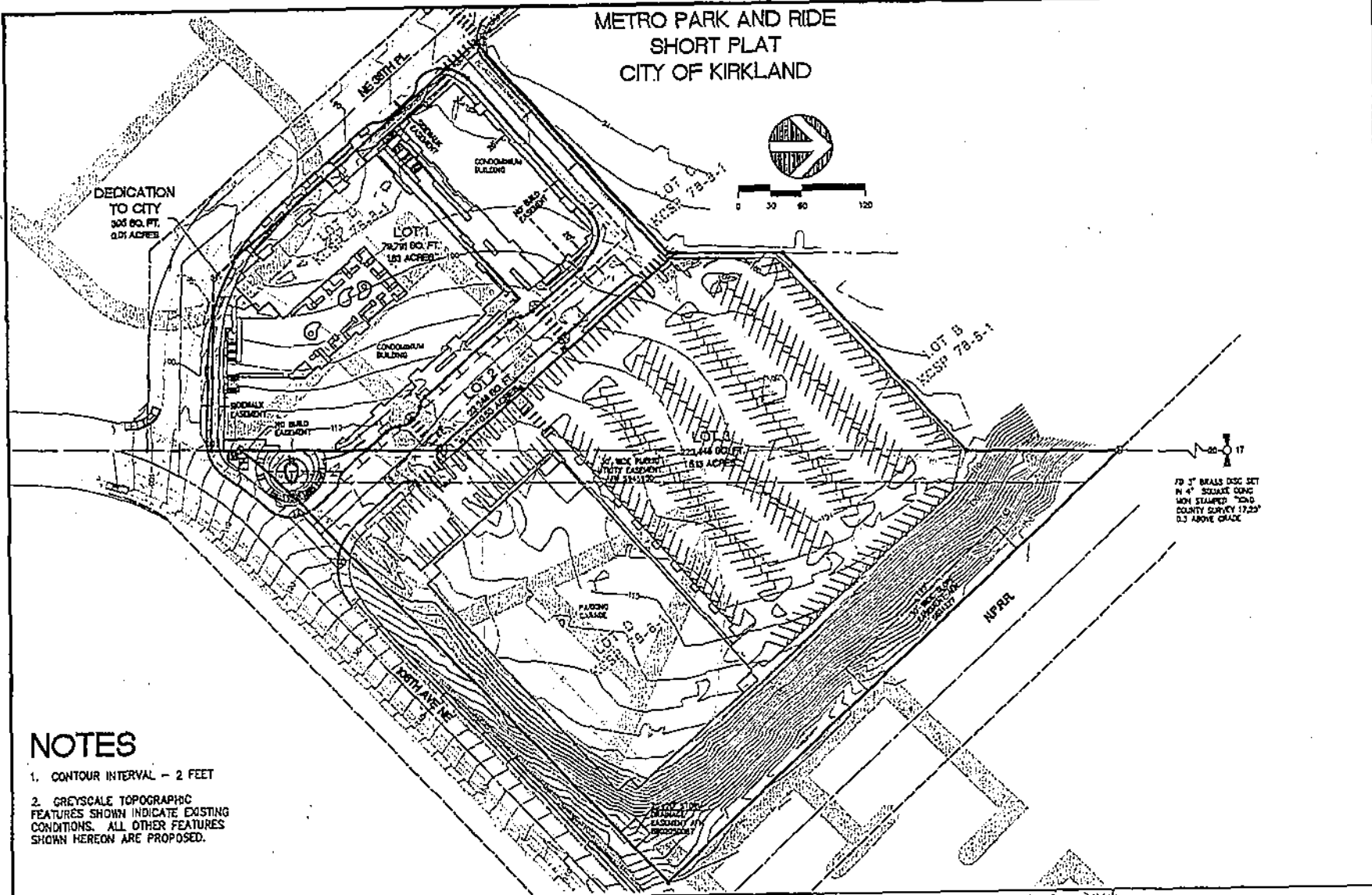


DAVID EVANS AND ASSOCIATES INC.
415 - 118th Avenue SE
Bellevue Washington 98005-3518
Phone: 425.519.8500

PORTION OF:
N 1/2, SEC. 20
T. 25 N. R. 5 E. W.M.

DWN. BY AAZ	DATE 05-10-12	JOB NO. KIRK000-0007
CHWD. BY DEV	SCALE 1" = 60'	SHEET 2 OF 3

METRO PARK AND RIDE
SHORT PLAT
CITY OF KIRKLAND



NOTES

1. CONTOUR INTERVAL - 2 FEET
2. GREYSCALE TOPOGRAPHIC FEATURES SHOWN INDICATE EXISTING CONDITIONS. ALL OTHER FEATURES SHOWN HEREON ARE PROPOSED.

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY, MADE BY ME OR UNDER MY DIRECTION, IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT AT THE REQUEST OF _____ ON _____ 20__.

SURVEYOR _____
CERTIFICATE NO. _____



DAVID EVANS AND ASSOCIATES INC.
416 - 118th Avenue SE
Bellevue Washington 98005-3518
Phone: 425.519.8500

PORTION OF:
N 1/2, SEC. 20
T. 25 N. R. 5 E. W.M.

DWN. BY AALA	DATE 05-10-12	JOB NO. KIRK000-0001
CHKD. BY DEV	SCALE 1" = 60'	SHEET 3 OF 3

EXHIBIT D

Legal Description of Transit Center Land

[To be attached to this Lease upon completion of
short plat of Land pursuant to Section 2.4 of the Transit Center Ground Lease]

EXHIBIT E

Legal Description of Garage Land

[To be attached to this Lease upon completion of
short plat of Land pursuant to Section 2.4 of Transit Center Ground Lease]

EXHIBIT F

Legal Description of Housing Land

[to be attached to this Lease upon completion of short plat of
Land pursuant to Section 2.4 of the Transit Center Ground Lease]

EXHIBIT G

[Form of South Kirkland T.O.D. Easements Agreement]

After Recording Return To:

Attn: _____

KIRKLAND T.O.D. EASEMENTS AGREEMENT

GRANTOR: KING COUNTY, a political subdivision of the State of Washington

GRANTEE: KIRKLAND PARK & RIDE L.L.C., a Washington limited liability company

Legal Description:

Abbreviated form:

Additional legal on page Exhibit A, C-E of document

Assessor's Property Tax Parcel Account Number(s):

Reference number(s) of Related Document(s):

KIRKLAND T.O.D. EASEMENTS AGREEMENT

THIS KIRKLAND T.O.D. EASEMENTS AGREEMENT (the "Easements Agreement") is executed this ___ day of _____, 2012 by KING COUNTY, a political subdivision of the State of Washington ("King County") in favor of KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company ("Developer") with reference to the following facts:

RECITALS

A. King County owns and operates a metropolitan public transportation system throughout the Seattle-King county metropolitan area (the "Transit System").

B. King County and Developer have entered into a series of agreements related to the phased development of the Kirkland T.O.D. Facility, on certain real property more particularly described on Exhibit A attached hereto and by this reference incorporated herein (the "Property") consisting of a transit center ("Transit Center") constructed on the Transit Land, expanded transit commuter parking consisting of a structured parking garage containing 523 parking stalls and surface parking for an additional 321 vehicles for a total of 853 parking stalls for use by transit commuters (the "Garage") constructed on the Garage Land and a housing project which when constructed will consist of a mixed use, mixed income residential development consisting of the development of a market rate rental community with a minimum of 177 units together with associated underground parking and commercial and retail uses on a portion of the Housing Land and an affordable housing community with a minimum of 58 units on a portion of the Housing Land (the "Housing Project"): (a) Transit Center Ground Lease dated as of _____, 2012 (the "Transit Center Ground Lease") between King County as ground lessor and Developer as ground lessee demising the Transit Center Land to Developer and Lease (with Option to Purchase - Transit Center) dated as of _____, 2012 (the "Transit Center Project Lease") between Developer as landlord and King County as tenant providing for the design, development, construction, financing and leasing of the Transit Center on the Transit Center Land, and (b) Garage Ground Lease dated as of _____, 2012 (the "Garage Ground Lease") between King County as ground lessor and Developer as ground lessee demising the Garage Land to Developer and Lease (with Option to Purchase - Parking Garage) dated as of _____, 2012 (the "Garage Project Lease") between Developer as landlord and King County as tenant providing for the design, development, construction, financing and leasing of the Garage to be constructed on the Garage Land.

C. Pursuant to the terms of the Garage Project Lease, upon Substantial Completion of the Garage, and the exercise by King County of its option to purchase the Garage, King County agreed to quitclaim the Housing Land and convey certain easements appurtenant to the Housing Land necessary to develop the Housing Land to Developer in part payment of the Option Price for the Garage, and in consideration of Developer's agreement to construct the Housing Project on the Housing Land pursuant to the Housing Covenants to be recorded concurrently herewith.

D. Following conveyance of the Housing Land and the Housing Easements to Developer, King County shall continue to own and operate the Transit Center and the Garage on the Transit Center Land and the Garage Land (collectively, the "Transit Center Improvements") and Developer shall own the Housing Land and shall construct, own and operate the Housing Project on the Housing Land and the Housing Easements pursuant to the terms of the Housing Covenants.

E. Developer has achieved Final Completion of the Transit Center and the Garage, King County has purchased the Transit Center and exercised its option to purchase the Garage, and all other conditions precedent to Developer's acquisition of the Housing Land and the Housing Easements have been met to the satisfaction of King County and the Developer.

F. King County has executed a quitclaim deed to the Housing Land (the "Housing Deed") in favor of Developer and desires to quitclaim Developer the Housing Easements subject to the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the foregoing recitals, the terms and conditions set forth in the Garage Project Lease and the Housing Deed and other good and valuable consideration in hand paid, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

AGREEMENT

1. Recitals Incorporated. Each recitals set forth above is incorporated into this Easements Agreement as though fully set forth. All capitalized terms not otherwise defined herein or in Schedule 1 annexed hereto shall have the same meaning as set forth in the Garage Project Lease or, if not defined therein, as defined in the Housing Deed.

2. Housing Easements. King County hereby establishes, grants and quitclaims to Developer for the benefit of the Housing Land, the following easements which easements shall constitute covenants running with the land appurtenant to the Housing Land:

(a) Access Easement. A permanent non-exclusive easement for vehicular ingress and egress (the "Access Easement") to and from the Housing Project to be constructed on the Housing Property and NE 38th Place and 108th Avenue NE using existing private driveways (the "Transit Center Driveways") over, across and through that portion of the Property as generally shown on the drawing attached hereto as Exhibit B (attached for reference purposes only) and legally described on Exhibit C attached hereto and by this reference incorporated herein (the "Access Easement Area").

(b) Storm Water Detention Facility Easement. A permanent non-exclusive underground easement (the "Storm Water Detention Easement") under, across and through that portion of the Property as generally shown on the drawing attached hereto as Exhibit B and legally described on Exhibit D attached hereto and by this reference incorporated herein (the "Storm Water Detention Easement Area") for the use, operation, maintenance, repair and replacement of an underground storm water management and detention facility for the Housing Project consisting of an underground vault and connections thereto including, but not limited to, underground pipelines, vents, drains, catch basins, manholes, service connections and associated equipment and appurtenances (collectively, the "Storm Water Detention Facility Improvements") together with rights to access the Storm Water Detention Easement Area as necessary for maintenance or repair subject to the conditions set forth in Section 5 below.

(c) Public Plaza Easement. A permanent non-exclusive easement (the "Public Plaza Easement") in, on, under, over, across and through that portion of the Property as depicted on the drawing attached hereto as Exhibit B and legally described on Exhibit E attached hereto and by

this reference incorporated herein (the "Public Plaza Easement Area") for the purpose of construction, use, operation, maintenance, repair, replacement and improvement of the Public Plaza Easement Area with a public plaza and associated amenities typically found in a public space including, but not limited to, decorative paving, benches and other seating areas, public art, lighting and landscaping (collectively the "Public Plaza Easement Improvements").

The Access Easement, the Storm Water Detention Easement and the Public Plaza Easement are hereinafter referred to collectively as the "Housing Easements". The Access Easement Area, the Storm Water Detention Easement Area and the Public Plaza Easement Area are hereinafter referred to collectively as the "Housing Easement Areas." All improvements now or hereafter constructed by Developer within the Housing Easement Areas are referred to collectively as the "Housing Easement Improvements".

3. "AS IS" Transfer of Housing Land and Housing Easement Rights. By its acceptance of the Housing Deed and execution of this Easements Agreement, Developer acknowledges and agrees that King County does not make any representations or warranties of any kind, either express or implied with respect to the Housing Land or the Housing Easements, including, but not limited to, the size, quality, character, use or condition of the Housing Land or the Housing Easements, compliance with applicable statutes, laws, codes, ordinances, regulations or requirements, zoning, subdivision, building, fire, safety, health or environmental matters. KING COUNTY SPECIFICALLY DISCLAIMS ANY REPRESENTATION, WARRANTY OR ASSURANCE WHATSOEVER TO DEVELOPER AND KING COUNTY MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND OR CHARACTER, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE MAINTENANCE, REPAIR, CONDITION, DESIGN OR MARKETABILITY OF ANY PORTION OF THE HOUSING LAND OR HOUSING EASEMENTS, INCLUDING BUT NOT LIMITED TO (A) ANY IMPLIED OR EXPRESS WARRANTY OF MERCHANTABILITY, (B) ANY IMPLIED OR EXPRESS WARRANTY OF FITNESS OR SUITABILITY FOR A PARTICULAR PURPOSE, (C) THE PRESENCE OR ABSENCE OF HAZARDOUS SUBSTANCES ON THE HOUSING LAND OR THE HOUSING EASEMENTS, (D) THE FINANCIAL CONDITION, SIZE, QUALITY, CHARACTER OR VALUE OF THE HOUSING LAND OR THE HOUSING EASEMENTS, OR (E) THE COMPLIANCE OR LACK THEREOF OF THE HOUSING LAND AND/OR THE HOUSING EASEMENTS WITH GOVERNMENTAL REGULATIONS, IT BEING THE EXPRESS INTENTION OF KING COUNTY AND DEVELOPER THAT THE HOUSING LAND AND HOUSING EASEMENTS ARE BEING CONVEYED AND TRANSFERRED TO DEVELOPER ON THE CLOSING DATE IN THEIR PRESENT CONDITION AND STATE OF REPAIR, "AS IS, WHERE IS" WITH ALL FAULTS. DEVELOPER REPRESENTS THAT IT IS A KNOWLEDGEABLE, EXPERIENCED AND SOPHISTICATED PURCHASER OF REAL PROPERTY SUCH AS THE HOUSING LAND AND HOUSING EASEMENTS AND THAT IT IS RELYING SOLELY ON ITS OWN EXPERTISE AND THAT OF ITS CONSULTANTS IN ACCEPTING TITLE TO THE HOUSING LAND AND HOUSING EASEMENTS. DEVELOPER HAS CONDUCTED SUCH INDEPENDENT INSPECTIONS OF THE HOUSING LAND AND HOUSING EASEMENTS AND RELATED MATTERS AS DEVELOPER DEEMS NECESSARY INCLUDING BUT NOT LIMITED TO THE PHYSICAL AND ENVIRONMENTAL CONDITION OF THE HOUSING LAND AND HOUSING EASEMENTS.

4. Use, Operation and Maintenance of Transit Center Driveways.

(a) Access to Transit Center Improvements and Housing Project. The Access Easement is intended to provide Developer, its successors and assigns and its contractors, agents, officers, employees, tenants, occupants and invitees with vehicular access to and from NE 38th Place and 108th Avenue NE and the Housing Project. The Transit Center Driveways will also be used by King County, its successors and assigns and its contractors, agents, officers, employees, invitees, guests and transit passengers, to provide free, open and continuous vehicular access (including access by busses and other public transportation vehicles) to and from the Transit Center Improvements, the entrances and exits thereto and the streets and public rights of way adjoining the Property on NE 38th Place and 120th Avenue NE using existing driveways now or hereafter located on the Property. Nothing contained in this Easements Agreements grants Developer, its successors and assigns and its contractors, agents, officers, employees, tenants and invitees any right to park on the Garage Land or in the Garage, all of which parking is reserved for use by King County.

(b) Signage and Traffic Circulation. King County shall have the right to install traffic and directional signage on the Access Easement Area and the Public Plaza Easement Area including the right to establish a traffic circulation plan for vehicles utilizing the Transit Center Driveways to access the Transit Center Improvements and the Housing Project. The number, location and design of such signs shall be negotiated by the parties with due regard to governmental requirements and King County's need that such signs be consistent with the signs utilized by King County or its successors or assigns in the operation of the Transit System. Developer acknowledges that the Transit Center Driveways are intended primarily to serve the Transit Center and King County's transit customers. Accordingly King County shall have the right to establish a traffic management plan that ensures priority use of the Transit Center Driveways by buses and other public transportation vehicles and the efficient and effective operation of the Transit Center, including the right in its sole and absolute discretion to modify, change or amend the traffic management plan from time to time and to establish rules and regulations for use of the Transit Center Driveways, including any short term parking spaces located within the Access Easement Area; provided, however that access to and from the Housing Project shall not be materially impaired. The initial traffic management plan is attached hereto as Exhibit F and by this reference incorporated herein.

(c) King County's Use of Transit Center Improvements. King County reserves the right in the reasonable exercise of its business judgment to change the number of bus routes which serve the Transit Center Improvements, its hours or method of operation, the number of buses that will access the Transit Center Improvements utilizing the Transit Center Driveways on a per hour and per day basis, based upon federal, state and local laws, rules and regulations applicable to operators of public transportation systems, ridership levels, public safety considerations, sources of funding and other factors.

(d) Prohibited Uses of the Transit Center Driveways. Developer shall not do or authorize anything to be done in or about the Housing Land or the Access Easement Area which will in any way obstruct or interfere with the rights of transit passengers or drivers of public transportation vehicles to enter or exit the Transit Center Improvements using the Transit Center Driveways. Developer shall not close access to the Transit Center Driveways or any other entrance or exit to the Property that provides pedestrian or vehicular access to or from the Transit Center Improvements, nor permit any vehicle (other than a public transportation, service or emergency

vehicle) to park in the Access Easement Area; provided, however, that residents and invitees of the Housing Project may park in the 8 short term parking spaces located on the easterly boundary between the Transit Center Land and the Housing Land as depicted on the map annexed hereto as Exhibit B, on a first-come, first-serve unreserved basis, subject to the King County traffic management plan. So as not to interfere with efficient pedestrian and vehicular traffic flow to and from the Transit Center Improvements, there shall be no sales conducted within [100] feet of the Transit Center or any entrances or exits to the Property, including, but not limited to the Access Easement Area and the Public Plaza Easement Area (except for the distribution of schedule information and sales of bus tickets and passes to transit passengers) and no kiosks, pushcarts or other merchandising units or equipment, structures or obstructions shall be installed or placed near the entrances or exits to the Transit Center Improvements without the prior written consent of King County. Except for the limitation set forth in the immediately preceding sentence, nothing contained herein shall restrict the right of either King County or Developer to lease or allow the use of the Property or the Housing Land for commercial or retail uses so long as such commercial or retail uses do not unreasonably interfere with operation of the Transit Center Improvements as a transit center.

(e) Maintenance and Repair of the Transit Center Driveways. King County shall maintain the Transit Center Driveway in good condition and repair consistent with the pavement "Serviceability Index" established in the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Payment Structures. King County reserves the right to modify such maintenance standards from time to time and shall provide a copy of such revised maintenance standards to Developer promptly following request. Except in the case of an emergency, King County shall notify Developer at least thirty (30) days in advance of any temporary closure of all or any portion of the Transit Center Driveways in connection with normal maintenance and in all other cases as soon as King County becomes aware of the need for temporary closure of the Transit Center Driveways. Developer acknowledges that Developer's use of the Access Easement may be temporarily interrupted or diminished by reason of (a) accident or the need to perform repairs, scheduled maintenance such as re-paving or other necessary alterations or improvements, or (b) any causes beyond the control of King County. In managing its response to any such events, King County shall work to ensure that any such interruption or disruption is mitigated or abated as promptly as commercially reasonable.

(i) Reimbursement of On-Going Maintenance and Repair Expenses. Developer agrees to reimburse King County for its pro rata share of the costs actually incurred by King County ("Developer's Pro Rata Share") in providing the on-going maintenance and repair of the Transit Center Driveways and shall reimburse King County for any damage to the Transit Center Driveways caused by Developer, its successors and assigns or any of its contractors, agents, offices, employees, tenants, occupants and invitees. Developer's agreement to reimburse King County for on-going maintenance and repair expenses will begin twenty-four (24) months after the date the Transit Center Improvements are open to transit passengers, which payment shall commence on the first day of the twenty-fifth (25th) month following the date on which the Transit Center Improvements are open to transit passengers. The Developer's Pro Rata Share shall be based upon the percentage of overall traffic use attributable to the Housing Land, which shall be based on a traffic study. King County shall provide notice of its intent to provide Developer with a traffic study eighteen (18) months after the date on which the Transit Center Improvements are open to transit passengers. Developer shall, within nineteen (19)

months of the date on which the Transit Center Improvements are open to transit passengers, provide notice to King County of its intent to commission its own traffic study to determine the Pro Rata Share. If Developer fails to provide notice of its intent to commission a traffic study to King County before the end of the twentieth (20th) month after the date on which the Transit Center Improvements are open to transit passengers it shall waive its right to contest King County's traffic study and begin payment of the Pro Rata Share as determined therefrom commencing on the first day of the twenty-fifth (25th) month after the date on which the Transit Center Improvements are open to transit passengers. In the event Developer has timely completed a traffic study, King County and Developer shall use the best efforts to negotiate Developer's Pro Rata Share based on the two respective traffic studies and nothing more. Should King County and Developer fail to agree on Developer's Pro Rata Share by the twenty-fifth (25th) month after the date on which the Transit Center Improvements are open to transit passengers, either King County or Developer may submit the matter for binding arbitration, in which case both parties shall diligently participate, by retaining the services of an arbitrator who shall, at minimum, be a retired judge of the superior court of King County with at least five years of experience and employment as an arbitrator at a professional dispute resolution firm located within the City of Seattle. King County and Developer shall each be bound by the decision of the arbitrator, Both King County and Developer agree that all non-mandatory provisions of RCW 7.04A are waived and that no formal hearing will be held, no witnesses will testify, and no attorneys will participate in the arbitration. Payments based on Developer's Pro Rata Share as determined by arbitration shall be retroactive to the first day of the twenty-fifth (25th) month after the date on which the Transit Center Improvements are open to transit passengers and shall accrue interest at the rate of 12 percent per annum for any payment not made within thirty (30) days following the date the arbitrator award or within five (5) days of the date due for any monthly payment due thereafter. King County and Developer shall divide the costs of arbitration equally and pay the same. The process for determining Developer's Pro Rata Share provided in this Section 4(e)(i) shall not be subject to Section 15 (Dispute Resolution).

The parties agree to review Developer's Pro Rata Share periodically once the Housing Project and all commercial and retail spaces therein have been occupied for sixty (60) consecutive months and Developer provides an updated traffic study reasonably acceptable to King County regarding the parties' respective use of the Transit Center Driveways. King County agrees to review the updated traffic study diligently and in good faith and shall further meet and confer with Developer in a good faith effort to resolve any disagreement over Developer's Pro Rata Share.

(ii) Payment of On-going Maintenance and Repair Expenses. King County shall provide Developer with a monthly invoice (together with such reasonable supporting documentation as Developer may reasonably request), of all on-going maintenance and repair expenses incurred by King County during the previous month. Developer agrees to reimburse King County within thirty (30) days after receipt of King County's invoice Developer's Pro Rata Share of such maintenance and repair expenses.

(iii) Adjustments in On-Going Maintenance and Repair. Developer and King County shall meet at least once every two (2) years or as they may otherwise

determine to review the maintenance standards and expenses associated with on-going maintenance and repair of the Transit Center Driveways.

5. Maintenance of Storm Water Detention Facilities. Developer acknowledges that the Storm Water Detention Easement Area is located within the Transit Center Land which is dedicated by King County to the provision of transit services to the public. The uninterrupted operation of the Transit Center is of paramount importance to King County and is the central feature of the development on the Transit Center Land, Garage Land and Housing Land. To minimize disruption of public transit services, Developer shall not have the right to access the Storm Water Detention Easement Area for the purpose of maintenance, repair, replacement or removal of the Storm Water Detention Facility Improvements located thereon, in whole or in part, unless it has first obtained a license or permit from King County which will be issued by King County in accordance with its standardized process for issuing licenses and permits to the public for similar work on King County property including compliance with any standard insurance and indemnification requirements. Developer shall at its sole cost and expense, upon completion of any such maintenance, repair, replacement or removal of the Storm Water Detention Facility Improvements, in whole or in part, remove all debris and restore the surface of the Transit Center Land and repair any of the Transit Center Improvements which may have been disturbed or damaged during Developer's activities within the Storm Water Detention Easement Area as nearly as possible to the condition in which it existed immediately prior to commencement of Developer's activities.

6. Construction of Public Plaza Easement Improvements.

(a) Prior to its entry onto the Public Plaza Easement Area, Developer shall, at its sole cost and expense, submit to King County for its review and approval, which approval shall not be unreasonably withheld, copies of the plans and specifications for the Public Plaza Easement Improvements and detailing any significant trees of greater than 6" caliper and curbing to be removed. Any trees and curbing marked for removal shall be completely removed and any holes in the paving patched and filled to provide a safe and level surface for pedestrian and vehicular use so as not to interfere with continued use of the Property as a transit center with transit commuter parking. King County shall have ten (10) Business Days following receipt thereof to approve the plans and specifications for the Public Plaza Easement Improvements (or any modification thereof) in writing or the same will be deemed approved. If objections or comments are submitted within the time period set forth above, Developer shall make changes to the plans and specifications consistent with the objections or comments and shall resubmit the same for further review until the submittals have been approved.

(b) Developer shall secure at its sole cost and expense all building and other permits, licenses, permissions, consents and approvals required to complete the Public Plaza Easement Improvements within the Public Plaza Easement Area in accordance with all Requirements of Law. The Public Plaza Easement Improvements shall be completed by Developer, at no cost or expense to King County, and shall be constructed in a good and workmanlike manner and in compliance with all Requirements of Law. Developer shall use its best efforts to minimize the impact on the remainder of the Property and not damage any part of the Property or any vehicles that may be parked on the Property (outside of the Public Plaza Easement

Area) from time to time. Developer shall take all appropriate measures to protect the safety of persons and property on adjoining land while constructing the Public Plaza Easement Improvements. All construction work once commenced shall be prosecuted diligently and continuously to completion. Upon completion of the Public Plaza Easement Improvements, Developer shall remove all construction debris, materials, equipment and vehicles from the Public Plaza Easement Area and thereafter operate and maintain the Public Plaza Easement Improvements as a public plaza open to the members of the public, including transit passengers using the Transit Center Improvements.

(c) Developer shall, at its sole cost and expense, maintain the Public Plaza Easement Area in good condition and repair throughout the term of this Easements Agreement. Developer: (i) shall not commit or suffer any waste upon the Public Plaza Easement Area or the Property; (ii) shall not do or permit anything to be done in, on or about the Property or the Public Plaza Easement Area that is illegal or unlawful; and (iii) shall comply with all environmental, health and safety requirements imposed by the permitting jurisdictions or other governmental authorities and all Requirements of Law (including all Environmental Laws) that may be applicable to the Public Plaza Easement Area. Developer shall, at its sole cost and expense repair any damage to the Public Plaza Easement Area or the Public Plaza Easement Improvements and restore the Public Plaza Easement Area and the Public Plaza Easement Improvements to substantially the same condition it was in immediately prior to such damage or destruction; provided, however that Developer shall not be obligated to repair any damage to the extent caused by the negligence or willful misconduct of King County's officers, officials or employees acting within the scope of their employment or office.

7. King County's Use of Property and Housing Easement Areas. King County reserves the right to use the Property and the Housing Easement Areas for any purpose not inconsistent with the easements herein granted to Developer; provided, however, that King County shall not erect, place or construct any buildings in, on, over, under or within the Housing Easements Areas or which intrude into the Housing Easement Areas (other than the Transit Center Improvements presently located on the Property and constructed on top of a portion of the Storm Water Detention Easement Area as of the date of this Easements Agreement) which would unreasonably interfere with the easement rights granted Developer under this Easements Agreement. King County reserves the right to grant other persons licenses or easement rights in the Housing Easement Areas so long as such easement rights do not unreasonably interfere with the easement rights granted Developer under this Easements Agreement.

8. Developer's Use of Housing Easement Areas.

(a) Ownership, Maintenance and Repair of Housing Easement Improvements. Developer shall own any Housing Easement Improvements it constructs within any Housing Easement Area. With the exception of the Transit Center Driveways which shall be maintained by King County in accordance with the provisions of Section 4, Developer shall, at its sole cost and expense, maintain the Housing Easement Improvements and the Housing Easement Areas in good condition and repair.

(b) Compliance with all Requirements of Law. Developer shall comply with all Requirements of Law now or hereafter in effect that apply to the Housing Easement Improvements and the Housing Easement Areas. If King County learns or discovers that

Developer's use of the Housing Easement Improvement or the Housing Easement Areas might constitute a violation of any such Requirements of Law, Developer shall, at its sole cost and expense, promptly take all steps to obtain all necessary permits, licenses, permissions, consents and approvals as may be required to bring Developer's use of Housing Easement Improvements and the Housing Easement Areas into compliance with all Requirements of Law, or cease the violative activity. Developer shall not use or authorize the use of the Housing Easement Improvements or the Housing Easement Areas for any unlawful or objectionable purpose, nor shall Developer cause, maintain or authorize any nuisance, or suffer or commit any waste in, on or about the Housing Easement Areas or the Property. Developer shall, not do or permit anything to be done in, on or about the Property or the Housing Easement Areas that is illegal or unlawful and shall comply with all environmental, health and safety requirements imposed by the permitting jurisdictions or other governmental authorities including all Environmental Laws.

(c) Permits. Developer shall obtain and maintain at its sole cost and expense any permits required by the City of Kirkland, the City of Bellevue or any other agency with jurisdiction over the Housing Easement Areas, to construct and thereafter operate and maintain the Housing Easement Improvements within the Housing Easement Areas and shall pay any permit fees associated with Developer's intended use of the Housing Easement Areas. King County shall have five (5) business days to review and approve any permit application Developer intends to submit, which approval shall not be unreasonably withheld, conditioned or delayed, and Developer shall provide King County with reasonable notice and an opportunity to participate in any and all permit or other authorization processes. King County's failure to object to the terms or conditions of a permit application shall not be construed as approval of the same. To the extent permitted by law, and subject to such approval by the King County Council as may be required by law, King County shall join in, or otherwise assist Developer with the application for such permits or approvals wherever such joinder is required; provided however, that King County shall incur no expense or liability in connection therewith.

(d) Compliance with Transit Center Rules and Regulations. Developer acknowledges that certain of the Housing Easement Areas are used by others, including, but not limited to, King County's employees, transit riders, visitors and contractors. Developer's exercise of its rights under this Easements Agreement shall not unreasonably interfere with use of the Housing Easement Areas by such other parties. Developer shall comply with such reasonable rules and regulations for the use of the Transit Center Improvement and the Property that King County establishes from time to time, which may include, limitations on use of the entrances, exits, driveways (including, but not limited to the Transit Center Driveways) and pedestrian access ways; short term parking spaces; stairwells, elevators; hours of use; towing requirements; vehicle size or weight limitations; and safety or security programs developed by King County or required by law.

(e) No Damage to Transit Center Improvements or Property. Developer shall not undertake any digging, tunneling or other forms of construction activities on the Housing Easement Areas or on the Housing Land which would damage the Transit Center Driveways or any Transit Center Improvements or disturb the compaction or unearth, damage or puncture any underground utility or other improvements located on the Property or endanger the lateral support to any underground utility lines or other improvements located with the Housing Easement Areas or the Property.

(f) Restrictions on Future Development. Neither Developer nor any of its contractors, tenants or subtenants, nor any of their respective successors and assigns, shall engage in any excavation, construction, alteration, remodeling, maintenance, repair expansion or other development on the Housing Land or Housing Easement Areas (collectively, "Development Work"), which will interfere, disturb or endanger the Transit Center Improvements, impair the continued structural integrity of the Transit Center Improvements, create a public safety risk or otherwise hinder or restrict King County's operation of the Transit Center Improvements on the Property. Developer agrees to consult or cause its contractors, tenants and subtenants, to consult with Developer in the preparation of final plans and specifications of any such proposed Development Work and to submit plans and specifications of any such proposed Development Work in sufficient detail to permit King County to determine whether the foregoing criteria have been satisfied. Any such approval by King County shall be strictly limited to the Development Work as shown on the plans and specifications and shall in no event constitute or be construed as a certification of the accuracy, sufficiency or engineering adequacy of said plans and specifications and in no event shall King County be liable for any injury or damage to any person whomsoever resulting from any construction activity undertaken by Developer, its contractors, tenants, subtenants or any of their respective successors and assigns.

(g) Compliance with Environmental Laws.

(i) Developer shall operate and maintain the Housing Project on the Housing Land and the Housing Easement Improvements located within the Housing Easement Areas in compliance with all Environmental Laws. Developer shall not cause or permit any violation of Environmental Laws in, on, under, or about the Transit Center Improvements, the Housing Easement Areas or the Property, or arising from Developer's exercise of its rights under this Easements Agreement.

(ii) Developer shall not, without first obtaining King County's prior written approval, use, generate, Release, handle, spill, store, treat, deposit, transport, or dispose of any Hazardous Substances in, on, or about the Housing Land, Housing Easement Areas, the Transit Center Improvements or Property, or transport any Hazardous Substances to or from the Housing Easement Areas or the Property. In the event, and only in the event that King County approves any of the foregoing, Developer agrees that such activity shall occur safely and in strict compliance with all applicable federal, state, and local laws, ordinances and regulations, including the Environmental Laws.

(iii) Developer and King County shall establish points of contact available 24 hours a day, 7 days a week for communications regarding Hazardous Substances. Developer shall promptly provide all information regarding any activity of Developer related to Hazardous Substances on or about the Housing Land, Housing Easement Areas and the Property that is requested by King County, including inspection or inquiry by governmental authorities charged with enforcing Environmental Laws with respect to Developer's use of the Housing Land and the Housing Easement Areas. Developer shall immediately notify King County of any Release of Hazardous Substances that occur or are detected during or in connection with Developer's exercise of its rights under this Easements Agreement, including but not limited to any Release of automotive fluids and materials. Developer shall, at its sole cost and expense, promptly respond to and perform all Remedial Work to the Housing Land, the Housing Easement Areas or the

Property necessary to comply with then applicable Environmental Laws and taking into consideration the residential use of the Housing Land and the public transit use of the Property. Developer shall also give King County notice of all measures undertaken on behalf of Developer to investigate, remediate, respond to or otherwise remediate such Release or cure such violation and shall provide to King County copies of all reports and/or data regarding any investigations or Remedial Work performed on the Housing Land, Housing Easement Area(s) and/or the Property. Developer shall reimburse King County for King County's costs and expenses in responding to and cleaning up any such Release, including, but not limited to, all costs and expenses of any long-term remediation or mitigation and any reporting, administrative or legal process required by or brought under any law or regulation.

9. Insurance.

(a) Liability Insurance. Developer shall maintain, and cause any consultant, contractor or subcontractor hired to provide work or services in connection with the development of the Housing Easement Improvements to maintain the following minimum insurance: (a) commercial general liability insurance in an amount not less than \$5,000,000 combined single limit per occurrence covering any claim, personal injury or property damage, including coverage for contractual liability, arising in connection with the presence of Developer or its officers, agents, employees, consultants, contractors, subcontractors or any of their respective officers, agents or employees on the Property or the Housing Easement Areas; (b) business automobile liability (owned, hired or non-owned) covering the risks of bodily injury (including death) and property damage, including coverage for contractual liability, with a limit of not less than \$1,000,000 per occurrence; (c) employer's liability insurance with limits of not less than \$1,000,000 per occurrence; and (d) worker's compensation insurance (as required by law). All such insurance shall: (i) be endorsed to name King County as an additional insured; (ii) be endorsed to provide that it is primary with and non-contributing with, any insurance maintained by King County; (iii) contain a severability of interest provision in favor of King County; (iv) contain a waiver of any rights of subrogation against King County; and (v) be issued by an insurance company authorized to do business in the State of Washington with a Best's rating of not less than A:VIII. The insurance coverage and limits set forth herein shall be deemed to be minimum coverage and limits and shall not be construed in any way as a limitation on Developer's duty to carry adequate insurance or liability for losses, claims, liabilities or damages arising under this Easements Agreement. Developer shall deliver copies of all relevant insurance policies or certificates of insurance verifying such coverage to King County prior to Developer's entry onto the Housing Land or the Housing Easements Areas.

(b) Property Insurance. At all times during the term of this Easements Agreement Developer shall maintain, or cause to be maintained, property insurance on the Housing Easement Areas and the Housing Easement Improvements in an amount not less than the full insurable replacement cost of the Housing Easement Improvements (exclusive of the cost of excavations, foundations and footings below the lowest basement floor) insuring against loss or damage by fire or such other risks as may be covered from time to time by a "special cause of loss" form policy.

(c) Insurance Policy Requirements. All insurance required under this Easements Agreement shall: (i) be issued by insurance companies authorized to do business in the State of

Washington with a rating reasonably satisfactory to King County; (ii) be issued as a primary policy in the case of insurance obtained by Developer pursuant to Section 9(b), (iii) contain a waiver of subrogation against King County for any loss or damage to their property or the property of others resulting from perils for which property insurance coverage is provided, or required to be provided herein and releases King County from any such claim or liability regardless of the cause of such loss or damage, and (iv) contain an endorsement requiring thirty (30) days' prior written notice from the insurance company to Developer and King County before cancellation (ten (10) days prior written notice for non-payment of premiums) or change in the coverage, scope or amount of any policy. Each policy or a certificate of the policy shall be deposited with King County on or before the effective date of this Easements Agreement, and as reasonably available upon replacement or renewal of each policy.

10. Indemnification. Developer shall protect, defend, indemnify and hold King County and its officers, employees and agents harmless (except to the extent caused by the negligence or willful misconduct of King County or any such officer, official or employee acting within the scope of such person's employment or office) from and against any and all claims, demands, losses, liabilities, damages, expenses and costs (including reasonable attorney's fees and costs) of every kind and description and for any personal injury or loss to or damage or destruction of property suffered by King County arising out of Developer's exercise of its rights under this Easements Agreement including, but not limited to, the construction, use, operation, maintenance or repair of the Transit Center Driveways or the Housing Easement Improvements by Developer or Developer's officers, employees, agents, tenants, occupants, invitees, consultants, contractors or subcontractors of all tiers or any of their respective officers, employees or agents. The foregoing indemnification is specifically and expressly intended to include, but is not limited to, all claims against King County by an employee or former employee of Developer or its tenants, invitees, consultants, contractors and subcontractors and Developer expressly waives as respect King County only, all immunity and limitation on liability under any industrial insurance act including Title 51 RCW, to the extent necessary to provide King County with a complete indemnity for the actions of Developer's officers, agents, employees, tenants, invitees, consultants, contractors, subcontractors or any of their respective officers, agents or employees. This indemnification has been the subject of specific negotiation between the parties and this indemnification shall survive the expiration or termination of this Easements Agreement.

11. Default. In the event either party fails to make a payment when due or to perform any other obligation hereunder and shall failure continues for a period of thirty (30) days after written notice of such failure, which with respect to non-monetary failure shall specify the steps required to cure the failures) such party shall be in default hereunder. In the event the failure cannot reasonably be cured within such thirty (30) day period, and the party obligated to correct the failure is proceeding diligently and in good faith, such party shall have a further reasonable time (not to exceed a total of 90 days) in which to correct or cure such failure.

12. Remedies. In the event of a default by a party under this Easements Agreement, the other party hereto shall be entitled to any and all remedies available at law or in equity including but not limited to the equitable remedies of specific performance or mandatory or prohibitory injunction issued by a court of appropriate jurisdiction. Notwithstanding the foregoing, any party seeking damages for a breach of this Easements Agreement shall have the right to recover actual damages only and by execution of this Easements Agreement each of the parties waive any right it may have to claim or recover any special, indirect, incidental, consequential or

punitive damages of any kind or nature. No default under this Easements Agreement shall terminate the easements granted under this Easements Agreement; provided, however, that this limitation shall not affect any other right of remedy that the non-defaulting party may have by reason of any default by the defaulting party under this Easements Agreement.

13. Protection of Lenders. The notices required to be given under Section 11 above shall not be effective unless such notice is also given to any lender who has a security interest in the Property or any of the Housing Easement Areas (or any portion thereof) and who has given the other party written notice of its right to receive such notice and the address at which such notice should be sent. Such lender shall be authorized to cure such default or failure within the applicable cure periods set forth in this Easements Agreement and the parties agree to accept such cure directly from such lender.

14. Liens. Developer shall not suffer or permit any lien, charge, security interest or encumbrance (collectively, "Liens") arising under this Easements Agreement or from construction, use, operation, maintenance, repair, replacement or removal of any Housing Easement Improvement(s) on any of the Housing Easement Areas to be filed against the Property or any of the Housing Easement Areas. If any such Lien is filed, Developer shall within thirty (30) days following the attachment of same, remove and discharge any and all such Liens. Developer reserves the right to contest the validity or amount of any such Lien in good faith provided that within thirty (30) days after the filing of any such Lien, Developer discharges such Lien of record or records a bond which eliminates said Lien as an encumbrance against the Property and such Housing Easement Areas. Developer shall indemnify, protect, defend and hold King County harmless from and against all liabilities, losses, damages, expenses and costs (including reasonable attorneys' fees and costs) incurred in connection with any such Liens, which indemnification shall survive the expiration or termination of this Easements Agreement.

15. Dispute Resolution. The parties will work collaboratively in accordance with the following steps to resolve disagreements arising under this Easements Agreement. Disagreements will be resolved promptly and at the lowest level of authority. King County and Developer shall each designate a representative to resolve disputes under this Easements Agreement (each, a "Designated Representative") within thirty (30) days following execution of this Easements Agreement. The Designated Representatives shall use their best efforts to resolve disputes and issues arising out of or related to this Easements Agreement. Each Designated Representative shall notify the other in writing of any problem or dispute the Designated Representative believes needs formal resolution. This written notice shall include: (1) a description of the issue to be resolved; (2) a description of the difference between the parties on the issue; and (3) a summary of steps taken by Designated Representatives to resolve the issue. The Designated Representatives shall meet within three (3) business days of receiving the written notice and attempt to resolve the dispute. In the event the Designated Representatives cannot resolve the dispute (and that dispute is not subject to some other formal appeal process), the managing member of Developer or his/her designee and the Manager, Design & Construction, Metro Transit Division of King County or his/her designee shall meet within seven (7) business days of receiving notice from a Designated Representative and engage in good faith negotiations to resolve the dispute.

The parties agree that they shall have no right to seek relief under this Easements Agreement in a court of law (other than injunctive relief or as necessary to protect human health or safety) until and unless each of these procedural steps is exhausted. If any applicable statute of

limitations will or may run during the time that that may be required to exhaust the procedural steps set forth above, the parties agree to seek an order to suspend any proceeding filed in a court of law while the procedural steps set forth above are satisfied.

16. Miscellaneous Provisions.

(a) Captions. The captions and paragraph headings contained in this Easements Agreement are for convenience of reference only and in no way limit, describe, extend or define the scope or intent of this Easements Agreement nor the intent of any of the provisions hereof. As used in this Easements Agreement, the masculine shall include the feminine and neuter, the feminine shall include the masculine and neuter, the neuter shall include the masculine and feminine, the singular shall include the plural and the plural shall include the singular, as the context may require.

(b) Entire Agreement. This Easements Agreement, together with the Ground Leases, the Project Leases, the Housing Deed, the Housing Covenants and the exhibits hereto and thereto, constitute the entire agreement between the parties with respect to the easements granted under this Easements Agreement and supersede all prior and contemporaneous agreements and understanding between the parties hereto relating to the subject matter hereof.

(c) Amendments; Waivers. No modification or amendment of this Easements Agreement may be made except by written agreement approved by King County ordinance or as otherwise may be provided in this Easements Agreement. No failure by King County or Developer to insist upon the strict performance of any covenant, duty, agreement or condition of this Easements Agreement or to exercise any right or remedy consequent upon a breach thereof shall constitute a waiver of any such breach of any other covenant, agreement, term or condition. Any party hereto, by notice and only by notice as provided in Section 16 of this Easements Agreement may, but shall be under no obligation to, waive any of its rights or a condition to its obligations hereunder, or any duty, obligation or covenant of the other party hereto. No waiver shall affect or alter this Easements Agreement and each and every covenant, agreement, term and condition of this Easements Agreement shall continue in full force and effect with respect to any other than existing or subsequent breach thereof.

(d) Fair Construction. The provisions of this Easements Agreement shall be construed as a whole according to its common meaning, not strictly for or against any party and consistent with the provisions contained herein in order to achieve the objectives and purposes of this Easements Agreement. Each party hereto and its counsel has reviewed and revised this Easements Agreement and agrees that the normal rules of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be construed in the interpretation of this Easements Agreement.

(e) No Partnership or Joint Venture. It is not intended by this Easements Agreement to, and nothing contained in this Easements Agreement shall create any partnership, joint venture or other arrangement between King County and Developer except that of parties to easements. No term or provision of this Easements Agreement is intended to be, or shall be, for the benefit of any person, firm, organization or corporation not a party hereto, and no such other person, firm, organization, or corporation shall have any right or cause of action hereunder.

(f) Severability. In case any one or more of the provisions contained in this Easements Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision hereof, and this Easements Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

(g) Estoppel Certificates. Each party shall, within fifteen (15) days of a request from the other party, execute and deliver to the requesting party, a written statement confirming the status of matters under this Easements Agreement, whether all payments are current, whether any party is in default in its obligations under this Easements Agreement and such other matters as the requesting party may reasonably request. It is intended that any such statement may be relied upon by lenders providing financing with respect to any of the properties benefited or burdened by this Easements Agreement.

(h) Force Majeure. Notwithstanding anything contained in this Easements Agreement to the contrary, any delay in the performance of any obligation under this Easements Agreements (other than the payment of money) shall be excused, if and so long as the performance of the obligation is prevented, delayed or otherwise hindered by acts of God, fire, earthquake, flood, explosion, actions of the elements, war, riots, mob violence, inability to procure labor, equipment, facilities, materials or supplies in the open market, failure of transportation, strikes, lockouts, actions of labor unions, condemnation, court orders, orders of governmental or military authorities or any other causes, whether similar or dissimilar to the foregoing, not within the control of such party (other than lack or inability to procure money to fulfill its commitments and obligations under this Easements Agreement).

(i) Notices. All notices, demands, requests, consents and approvals which may, or are required to be given by either party to the other party hereunder shall be in writing and shall be deemed to have been duly given if delivered personally, sent by nationally recognized overnight delivery service or by facsimile transmission, or if mailed or deposited in the United States mail and sent by registered or certified mail, return receipt requested, postage prepaid as follows:

If to Developer:

Kirkland Park & Ride, L.L.C.
11624 SE 5th Street., Suite 200
Bellevue, WA 98005
Attn: Derek Straight
Facsimile: (425) 688-0500

With a copy to:

Imagine Housing
10604 NE 38th Place, Suite 215
Kirkland, WA 98003
Attn: Eric Evans
Facsimile: (425) 576-5194

If to King County:

King County Property Services Division
500 King County Administration Building
500 Fourth Avenue
Seattle, WA 98104
Facsimile: (206) 205-5070

With a copy to:

Manager, Design and Construction
King County Metro Transit Division
King Street Center
Mail Stop KSC-TR-0435
201 Jackson Street
Seattle, WA 98104
Facsimile: (206) 684-1803

or to such other addresses as either party hereto may from time to time designate in writing and deliver in a like manner. All notices shall be deemed given three (3) business days following the date when mailed or one (1) business day following the date when delivered or faxed (provided the fax machine has issued a printed confirmation of receipt).

(j) Payment on Default. If under this Easements Agreement any party is required to pay any sum or money or do any acts that require the payment of money by reason of the other party's failure or inability to perform any of the provisions of this Easements Agreement to be performed by such party, the defaulting party shall promptly upon demand reimburse the non-defaulting party for such sums together with interest thereon at the rate of twelve (12%) per annum from the date of expenditure until the date of reimbursement.

(k) Binding Effect. The easements granted under this Easements Agreement and the rights duties, covenants, restrictions, agreements, limitations and obligations herein created shall constitute covenants running with the land, shall burden the Property and the Housing Land, and such covenants shall be binding upon, and inure to the benefit of the parties hereto and their respective successors, assigns, mortgagees, lessees, sublessees, and each and every person who shall at any time have a fee, leasehold, mortgage or other interest in the Property or the Transit Center Improvements or the Housing Land, Housing Easement Areas or the Housing Easement Improvements and, with respect to King County, any successor owner or operator of the Transit Center or the Transit System within the Seattle-King County metropolitan area.

(l) Counterparts. This Easements Agreement may be executed in counterparts, each of which shall constitute an original and all of which shall together constitute but one original.

(m) Dedication. Nothing contained herein shall be deemed to be a gift or dedication of all or any part of the Property or the Access Easement to the general public.

(n) Priority of Easements Agreement. This Easements Agreement and the rights, privileges and easements of the parties hereunder shall in all events be superior and senior to any liens placed upon all or any part of the Housing Easement Areas or the Housing Land, including the liens of any mortgages. Any amendments or modifications hereof, when made, shall

be deemed superior and senior to any all liens including the liens of any mortgages, to the same extent as if the same had been executed concurrently herewith.

(o) Non Waiver of Governmental Rights. Nothing contained in this Easements Agreement shall require King County to take any discretionary action relating to development of the Housing Project on the Housing Land or the Housing Easement Improvements on the Housing Easement Areas, including, but not limited to zoning and land use decisions, permitting, design review, the exercise of the power of eminent domain or any other governmental right or approval.

(p) Time is of the Essence. Time is of the essence in the performance of the obligations under this Easements Agreement.

(q) Attorney's Fees. If any party brings an action to enforce the terms of this Easements Agreement, in any such action the substantially prevailing party shall be entitled to an award of its reasonable attorneys' fees and reasonable costs. Said costs and attorneys' fees shall include, without limitation, costs and attorneys' fees incurred in any appeal or in any proceedings under any present or future federal bankruptcy, forfeiture or state receivership or similar law.

(r) Governing Law. This Easements Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Washington. In the event of any litigation to enforce or interpret the right, duties and obligations of the parties set forth in this Easements Agreement, venue of any such legal action shall be in King County, Washington.

(s) Authority. The parties signing below represent and warrant that they have the requisite authority to bind the entities on whose behalf they are signing.

IN WITNESS WHEREOF, this Easements Agreement has been executed as of the date and year first hereinabove set forth.

DEVELOPER:

KIRKLAND PARK & RIDE, L.L.C.,
a Washington limited liability company

By: KTOD DEVELOPER , L.L.C., a Washington
limited liability company, Its Manager

By _____
Name _____
Title _____

KING COUNTY:

APPROVED AS TO FORM:

KING COUNTY, a political subdivision of the
State of Washington

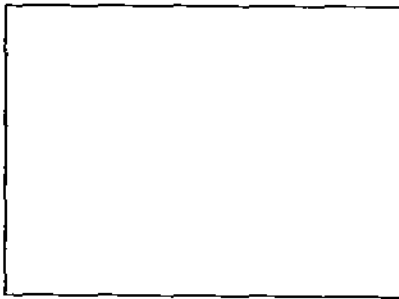
By _____
Senior Deputy Prosecuting Attorney

By _____
Name _____
Title _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the _____ of KTOD DEVELOPER L.L.C., a Washington limited liability company, Manager of KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

GIVEN UNDER MY HAND AND OFFICIAL SEAL this ____ day of _____, 2012.



(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

Exhibit A

Legal Description of Property

Exhibit B

Composite Easement Sketch

(Map showing approximate location of Access Easement for reference purposes only (including short term parking spaces), Storm Water Detention Easement and Public Plaza Easement)

Exhibit C

Legal Description of Access Easement Area

Exhibit D

Legal Description – Storm Water Detention Easement Area

Exhibit E

Legal Description – Public Plaza Easement Area

Exhibit F
Traffic Management Plan*

* King County reserves the right to modify or amend at any time.

Schedule I

Definitions

For the purposes of this Easements Agreement, the following terms shall have the following meanings:

“Environmental Law or Laws” means, as amended from time to time, the Federal Resource Conservation and Recovery Act of 1976, 42 U.S.C. Section 6901 et seq., Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Section 9601 et seq., Federal Hazardous Materials Transportation Control Act of 1980, 42 U.S.C. Section 1801 et seq., Federal Clean Air Act, 42 U.S.C. Section 7401 et seq., Federal Water Pollution Control Act, Federal Water Act of 1977, 93 U.S.C. Section 1251 et seq., Federal Insecticide, Fungicide and Rodenticide Act, Federal Pesticide Act of 1978, 7 U.S.C. Section 136 et seq., Federal Toxic Substances Control Act, 15 U.S.C. Section 2601 et seq., Federal Safe Drinking Water Act, 42 U.S.C. Section 300f et seq., Washington Water Pollution Control Act, RCW Chapter 90.48, Washington Clean Air Act, RCW Chapter 70.94, Washington Solid Waste Management Recovery and Recycling Act, RCW Chapter 70.95, Washington Hazardous Waste Management Act, RCW Chapter 70.105, Washington Hazardous Waste Fees Act, RCW Chapter 70.95E, Washington Model Toxics Control Act, RCW Chapter 70.105D, Washington Nuclear Energy and Radiation Act, RCW Chapter 70.98, Washington Radioactive Waste Storage and Transportation Act, RCW Chapter 70.99, Washington Underground Petroleum Storage Tanks Act, RCW Chapter 70.148, and any regulations promulgated thereunder from time to time.

“Hazardous Substances” shall include pollutants or substances defined as “hazardous waste,” “hazardous substances,” “hazardous materials,” “pollutants,” “contaminants” or “toxic substances” in the Comprehensive Environmental Response Compensation and Liability Act of 1980, 42 U.S.C. § 9601 et seq. (“CERCLA”), as amended by the Superfund Amendments and Reauthorization Act of 1986 (PL 99-499) (“SARA”); the Hazardous Materials Transportation Act, 49 U.S.C. Section 1801, et seq.; the Toxic Substance Control Act, 15 U.S.C. Section 2601, et seq.; the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. Section 6901 et seq. (“RCRA”); the Clean Water Act, 33 U.S.C. Section 1251 et seq.; the Washington State Environmental Policy Act, RCW 43.21 et seq.; the Water Pollution Control Act, RCW 90.48.010 et seq.; the Hazardous Waste Management Statute, RCW 70.105 et seq.; the Washington Toxic Substance Control Act, RCW 70.105B et seq.; and the Model Toxics Control Act, RCW 70.105D et seq.; and in the rules or regulations adopted and guidelines promulgated pursuant to said laws and any material, waste or substance which is asbestos, petroleum, polychlorinated biphenyls, flammable explosives, radioactive materials, lead or lead-based paint, radon gas, coal combustion byproducts, urea formaldehyde foam insulation, toxic mold, automotive fluids and materials, including but not limited to fuel, oil, grease, battery acid, de-icer, wiper fluid, refrigerant, coolant, antifreeze, mercury switches, airbag inflator propellant, and electric or hybrid vehicle batteries or other substances which are deemed dangerous or injurious to human health.

“Release” shall mean releasing, spilling, leaking, pumping, pouring, flooding, emitting, emptying, discharging, injecting, escaping, leaching, disposing or dumping Hazardous Substances in, on, under, about or around the Housing Land, Housing Easements Area or the Property or in or into the air, soil, surface water or groundwater in, on, about or under the Housing Land, Housing

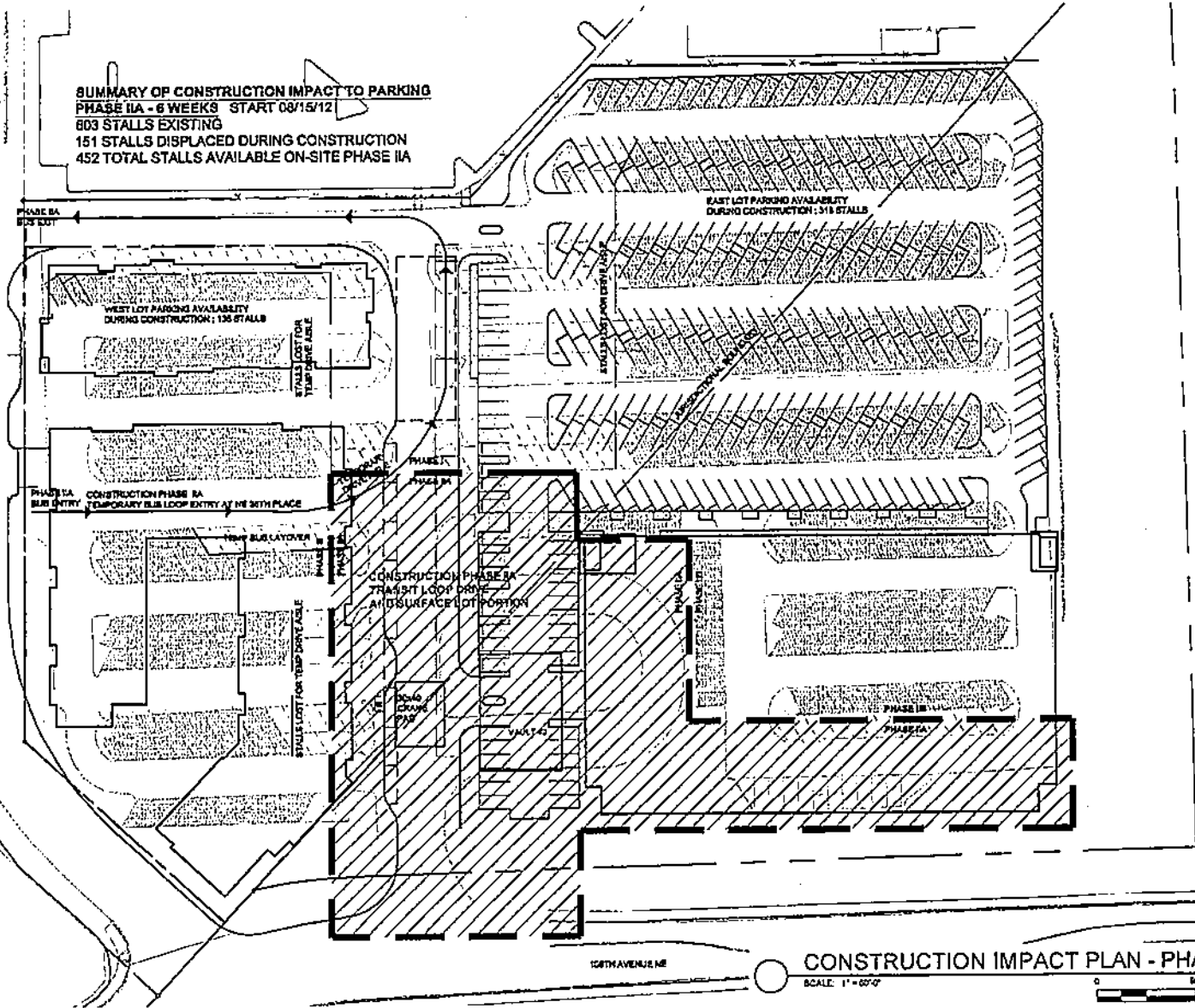
Easements Area or the Property including the migration of Hazardous Substances to or from the Housing Land, Housing Easements Area or the Property and adjoining property.

“Remedial Work” means all activities performed in connection with the investigation, assessment, cleanup, removal, mitigation, monitoring or containment of Hazardous Substances in, on, about or under the Housing Land, Housing Easement Areas or the Property (collectively, the “Affected Property”) or any portion thereof to meet the requirements of any Environmental Laws (including common law) relating to the cleanup or remediation of Hazardous Substances (in light of the reasonably intended use of the Affected Property or any portion thereof at the time the Remedial Work commences) or as ordered by any court or any other federal or state governmental agency. Remedial Work includes all costs reasonably necessary to comply with then applicable Environmental Laws in connection with the presence, suspected presence, release or suspected release of a Hazardous Substance in or into the air, soil, groundwater, surface water or soil vapor, at, on or within the Affected Property or any portion thereof. The term “Remedial Work” also includes the defense or prosecution of any proceedings before a federal or state court, administrative judge or tribunal or federal or state governmental agency, and any and all negotiations with any federal or state governmental agency or its employees or consultants, relating to the foregoing activities and any fines or penalties assessed against the Developer or King County, as applicable, in connection therewith.

“Requirements of Law” means all requirements relating to land and building construction (including those specifically applicable to Developer’s contemplated use of the Housing Easement Areas for the purposes described elsewhere in this Easements Agreement), including, without limitation, planning, zoning, subdivision, platting, environmental, air quality, flood hazard, fire safety, accessibility, and other governmental approvals, permits, licenses and/or certificates as may be necessary from time to time to comply with all the foregoing, and other applicable statutes, rules, orders, regulations, laws, ordinances, and covenants, conditions and restrictions, which now apply to and/or affect the design, construction, existence, intended use, operation and/or occupancy of the Housing Easement Improvements or the Housing Easement Areas or any part thereof.






EXHIBIT H
Construction Phasing Plan

SUMMARY OF CONSTRUCTION IMPACT TO PARKING
PHASE IIA - 6 WEEKS START 08/15/12
 803 STALLS EXISTING
 151 STALLS DISPLACED DURING CONSTRUCTION
 452 TOTAL STALLS AVAILABLE ON-SITE PHASE IIA



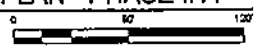
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KEY

-  CONSTRUCTION BOUNDARY
-  CIRCULATION ROUTES
-  NEW PARKING
-  EXISTING PARKING
-  PARKING AVAILABLE DURING CONSTRUCTION

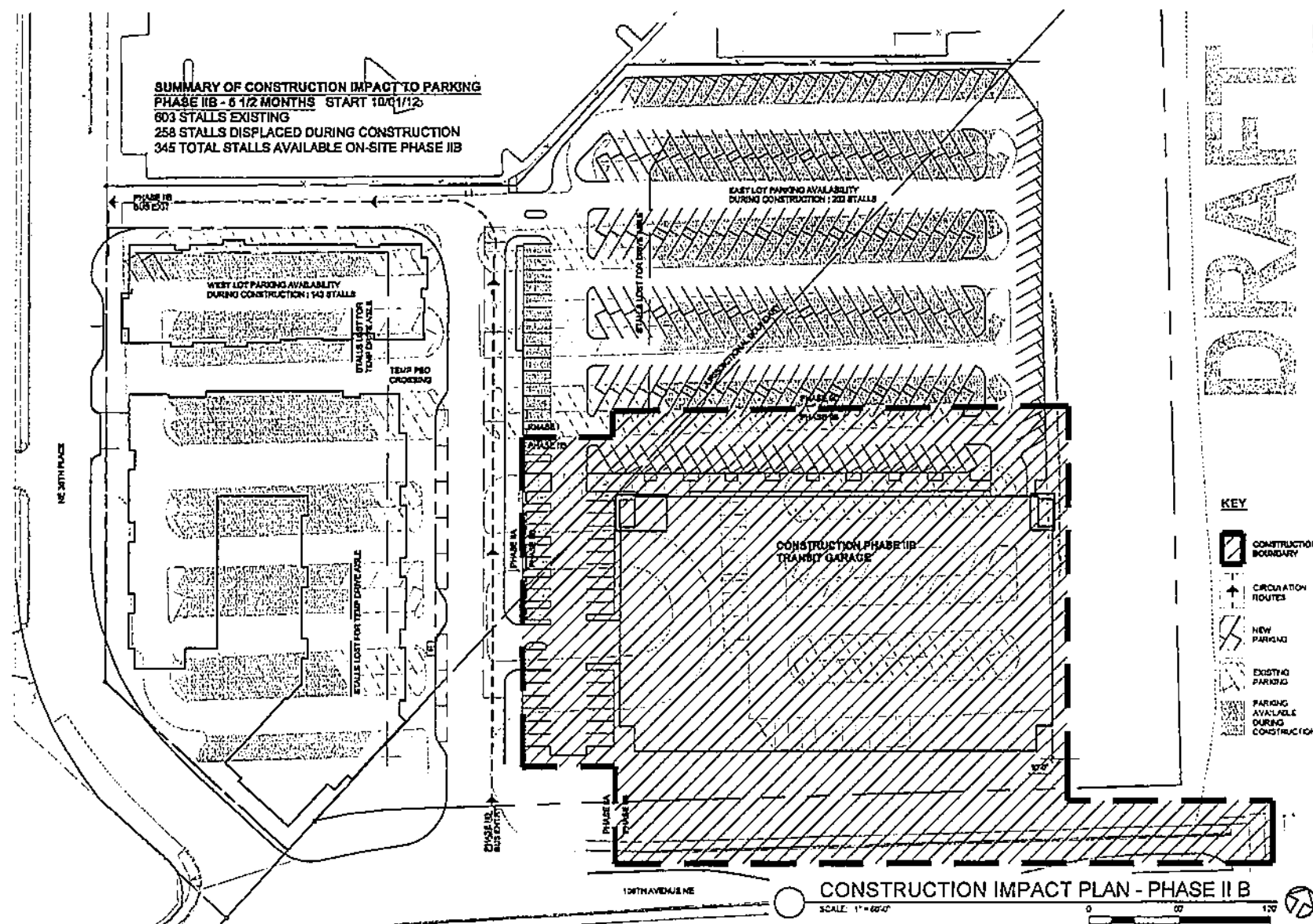
CONSTRUCTION IMPACT PLAN - PHASE II A

SCALE: 1" = 60'-0"



225 Terry Ave N, Suite 200, Seattle WA, 98103
 1205 341 8200 1205 740 5205
 PROJECT NAME **SO. KIRKLAND P&R TRANSIT ORIENTED DEVELOPMENT**
 SHEET TITLE **CONSTRUCTION IMPACT PLAN - PHASE II A**
 SHEET NO. **A 1.10-B**
 ISSUE 01/12
 ICD COUNCIL EXHIBIT
 REF. SHEET
 PROJECT NO. 11-000
 11-000
 WEBER THOMPSON
 11-000

SUMMARY OF CONSTRUCTION IMPACT TO PARKING
PHASE IIB - 6 1/2 MONTHS START 10/01/12
 803 STALLS EXISTING
 258 STALLS DISPLACED DURING CONSTRUCTION
 345 TOTAL STALLS AVAILABLE ON-SITE PHASE IIB



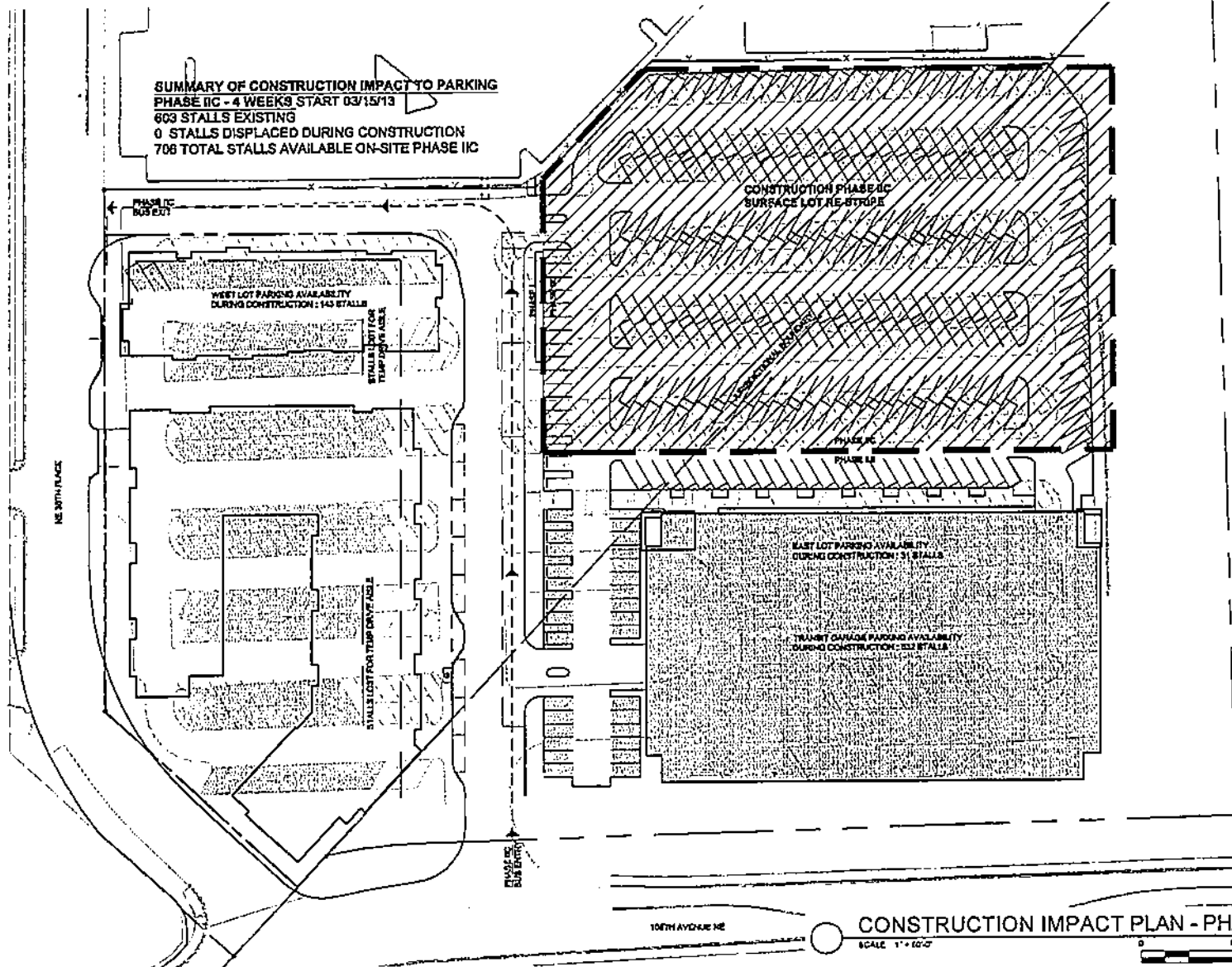
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- KEY**
- CONSTRUCTION BOUNDARY
 - CIRCULATION ROUTES
 - NEW PARKING
 - EXISTING PARKING
 - PARKING AVAILABLE DURING CONSTRUCTION

CONSTRUCTION IMPACT PLAN - PHASE II B
 SCALE: 1" = 60'-0"
 0 20 40 60

1301-341 6700 1 200 740 0030
 225 Terry Ave N, Suite 200, Seattle, WA 98109
 PROJECT NAME: **SO. KIRKLAND P&R TRANSIT ORIENTED DEVELOPMENT**
 SHEET TITLE: **CONSTRUCTION IMPACT PLAN - PHASE IIB**
 ISSUE: 5/11/12
 AC COUNCIL EXHIBIT: **A 1.10-C**
 SHEET NO.:
 REF. SHEET:
 PROJECT NO.: 114009
 WEBER THOMPSON

SUMMARY OF CONSTRUCTION IMPACT TO PARKING
PHASE IIC - 4 WEEKS START 03/15/13
 603 STALLS EXISTING
 0 STALLS DISPLACED DURING CONSTRUCTION
 706 TOTAL STALLS AVAILABLE ON-SITE PHASE IIC



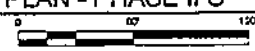
DRAFT

- KEY**
- CONSTRUCTION BOUNDARY
 - CIRCULATION ROUTES
 - NEW PARKING
 - EXISTING PARKING
 - PARKING AVAILABLE DURING CONSTRUCTION

10TH AVENUE NE

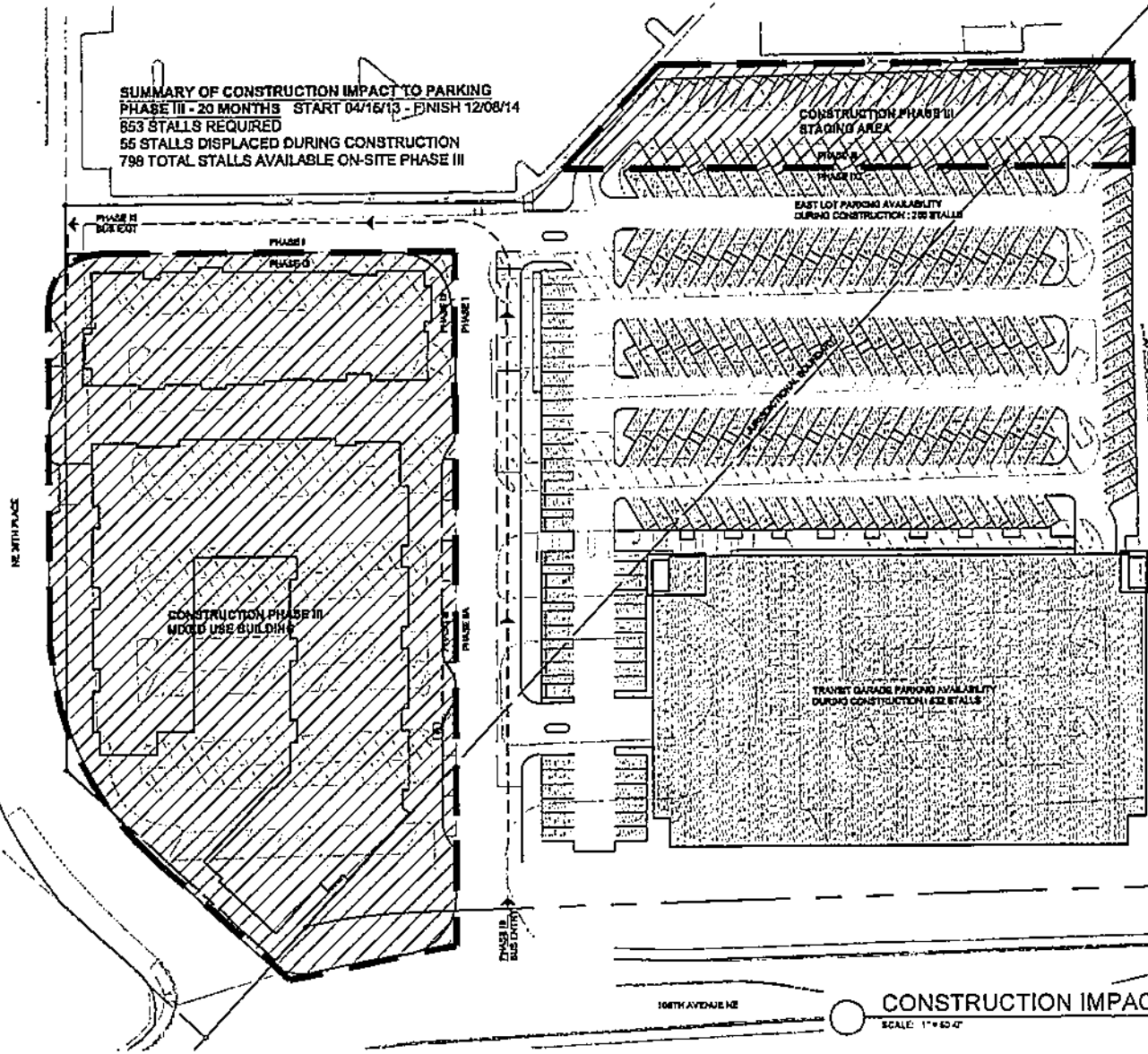
CONSTRUCTION IMPACT PLAN - PHASE II C

SCALE 1" = 60'-0"








225 Terry Ave N, Suite 200, Seattle, WA 98109
 PROJECT NAME: SO. KIRKLAND P&R TRANSIT ORIENTED DEVELOPMENT
 SHEET TITLE: CONSTRUCTION IMPACT PLAN - PHASE II C
 SHEET NO.: A 1.10-D
 ISSUE: 01/15/12
 PROJECT NO.: 11496
 REF. SHEET:
 1206 344 6700 1206 749 5005
 SO. KIRKLAND P&R TRANSIT ORIENTED DEVELOPMENT
 CONSTRUCTION IMPACT PLAN - PHASE II C
 WEBER THOMPSON
 1206 344 6700 1206 749 5005

SUMMARY OF CONSTRUCTION IMPACT TO PARKING
 PHASE III - 20 MONTHS START 04/16/13 - FINISH 12/08/14
 853 STALLS REQUIRED
 55 STALLS DISPLACED DURING CONSTRUCTION
 799 TOTAL STALLS AVAILABLE ON-SITE PHASE III



DRAFT

- KEY**
-  CONSTRUCTION BOUNDARY
 -  CIRCULATION ROUTES
 -  NEW PARKING
 -  EXISTING PARKING
 -  PARKING AVAILABLE DURING CONSTRUCTION

160TH AVENUE NE

CONSTRUCTION IMPACT PLAN - PHASE III

SCALE: 1" = 60' 0"



225 Terry Ave N, Suite 200, Seattle, WA 98109
 PROJECT NAME: SO. KIRKLAND P&R TRANSIT ORIENTED DEVELOPMENT
 SHEET TITLE: CONSTRUCTION IMPACT PLAN - PHASE III
 ISSUE: 07/15/13
 REF. SHEET: A 1.10-E
 PROJECT NO.: 11-009
 SHEET NO.: 11-009
 © COPYRIGHT 2013 WEBER THOMPSON

EXHIBIT I
Project Schedule

Exhibit I

Phase I:

Construction of first phase of Transit Center and storm water vault

Approximate Commencement Date: July 1st, 2012

Approximate Completion Date: August 15th, 2012

Phase IIA:

Construction of second phase of Transit Center and City of Bellevue right of way improvements.

Approximate Commencement Date: August 15th, 2012

Approximate Completion Date: October 1st, 2012

Phase IIB:

Construction of Metro Transit Parking Garage on Bellevue Property.

Approximate Commencement Date: October 1st, 2012

Approximate Completion Date: March 15th, 2013

Phase IIC:

Re-striping of existing surface lot.

Approximate Commencement Date: March 15th, 2013

Approximate Completion Date: April 15th, 2013

Phase III:

Construction of Mixed-Use, Mixed-Income project on Housing Land.

Approximate Commencement Date: April 15th, 2013

Approximate Completion Date: December 8th, 2014

EXHIBIT J

**Confirmation of Commencement Date and Expiration Date
(Garage Project)**

In accordance with the provisions of Section 3 of the Lease as of this ____ day of _____, 20__, Landlord and Tenant acknowledge, agree and confirm the following:

The Commencement Date of the Lease is: _____.

The Expiration Date of the Lease is: _____.

The foregoing agreement and confirmation shall be binding upon Landlord and Tenant and shall supersede and control over any other provision in the Lease regarding the Commencement Date and Expiration Date which might be construed other than as set forth in this Confirmation.

AGREED the day and year first above written.

LANDLORD:

KIRKLAND PARK & RIDE, L.L.C.,
a Washington limited liability company

By: **KTOD DEVELOPER, L.L.C.,**
a Washington limited liability company,
Its Manager

By: _____
Name: _____
Title: _____

Date _____, 20__

TENANT:

APPROVED AS TO FORM:

KING COUNTY, a political subdivision of the
State of Washington

By: _____
Senior Deputy Prosecuting Attorney

By: _____
Name: _____
Title: _____

Date _____, 20__

Date _____, 20__

EXHIBIT K

DISPUTE RESOLUTION PROCEDURE

Landlord and Tenant shall act in good faith and deal fairly in performing their respective duties under the Lease in order to accomplish their mutual objectives and avoid disputes. If a dispute arises with respect to design or construction of the Project including, without limitation, the calculation of Additional Rent, the parties agree to utilize the dispute resolution process contained herein, which will be non-binding but a condition precedent to having such dispute decided in court by a judge or jury.

1. Mediation. In the event a dispute arises between Tenant and Landlord with respect to (i) design or construction of the Project or (ii) the calculation of Additional Rent, the parties shall proceed in good faith to resolve such dispute as expeditiously as possible. In particular, the parties shall cooperate so that the progress of the design and construction of the Project is not delayed. If, however, the parties are unable to resolve the dispute within three (3) Business Days, either party may refer the dispute to the Mediator named below.

1.1 Mediator. For any dispute arising during construction of the Project which cannot be resolved by the parties, the mediator hereunder ("Mediator") shall be a mediator designated by Tenant from the JAMS panel of neutrals located in Seattle, Washington, a mediation panel which Landlord and Tenant have mutually designated to resolve such dispute, or, if at the time the dispute exists, JAMS or the JAMS panel of neutrals in Seattle, Washington no longer exists or is not available, Tenant shall designate a reputable independent mediator with at least seven (7) years of experience in the Pacific Northwest in design and construction of parking garages comparable to the Project. The Mediator is to act impartially and independently in the consideration of facts and conditions surrounding any dispute presented by Tenant and Landlord; however, the Mediator's recommendations concerning any such dispute are advisory only. The Mediator's recommendations shall be based on the pertinent Lease provisions, and the facts and circumstances involved in the dispute. The Mediator's recommendations shall be furnished in writing to the parties.

1.2 Tenant Responsibility. Tenant shall furnish the Mediator one copy of all documents it might have, other than those furnished by Landlord, which are pertinent to the performance of the Mediator's duties hereunder.

1.3 Landlord Responsibility. Landlord shall furnish the Mediator one copy of all Contract Documents, including but not limited to the Preliminary Plans and Outline Specifications, applicable contracts, interpretative reports, progress schedule and updates, monthly progress reports, and other documents pertinent to the performance of the Lease and necessary to the performance of the Mediator's duties hereunder.

1.4 Term. Following execution of the Lease, the Mediator shall have authority to act hereunder upon written request from either Landlord or Tenant and such authority shall terminate upon notice to the Mediator by the parties.

1.5 Payment. The fees charged by the Mediator shall be shared equally by the parties. The Mediator's compensation shall include compensation for all materials, supplies,

travel, office assistance and support and incidentals necessary to provide the services described herein. Payment for services rendered by the Mediator will be at the Mediator's standard hourly rate as approved by Landlord and Tenant prior to commencement of the dispute resolution proceeding.

1.6 Legal Relationship. The Mediator, in the performance of the duties described herein, is acting in the capacity of an independent agent and not as an employee of either Tenant or Landlord. The Mediator is absolved of any personal or professional liability arising from the recommendations made hereunder, unless due to gross negligence or willful malfeasance.

EXHIBIT L

**FORM OF NOTICE OF EXERCISE
OF OPTION TO PURCHASE**

[date]

To: Landlord

You are hereby notified that King County, a political subdivision of the State of Washington has elected to exercise on [date of payment] its option to purchase the Garage ("Premises") currently leased by Tenant, pursuant to the Lease Agreement (with Option to Purchase-Parking Garage) ("Lease") by and between Landlord and Tenant dated as of _____, 2012. This purchase option is being exercised pursuant to Section 21 of the Lease. The purchase price of the Premises shall be an amount equal to the Option Price (as defined in the Lease) less the amount of all Monthly Rent paid under the Lease to the date of Closing, plus an option exercise fee of one dollar (\$1.00).

TENANT:

APPROVED AS TO FORM:

KING COUNTY, a political subdivision of
the State of Washington

By: _____
Senior Deputy Prosecuting Attorney

By: _____
Name: _____
Title: _____
Date _____

EXHIBIT M

After Recording Return To:
King County
Property Service Division
500 King County Administration Building
500 Fourth Avenue
Seattle, Washington 98104

**SUBORDINATION, NONDISTURBANCE
AND ATTORNMENMENT AGREEMENT
Lease (with Option to Purchase-Parking Garage)**

- GRANTORS:
1. KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company (Landlord)
 2. KING COUNTY, a political subdivision of the State of Washington (Tenant)

GRANTEE: [LENDER] (Beneficiary)

Legal Description:

Abbreviated form:

Additional legal on page _____ of document

Assessor's Property Tax Parcel Account Number(s):

Reference number(s) of Related Document(s):

(Additional on page ____ of document)

**SUBORDINATION, NONDISTURBANCE
AND ATTORNMENMENT AGREEMENT**

NOTICE: THIS AGREEMENT RESULTS IN THE LEASE BECOMING SUBJECT TO AND OF LOWER PRIORITY THAN THE LIEN OF SOME OTHER OR LATER SECURITY INSTRUMENT.

THIS AGREEMENT is made as of [●], 2012, by and among Landlord, Tenant and Beneficiary and affects the Property described in Exhibit A attached hereto. The terms "Tenant," "Landlord," "Beneficiary," "Premises," "Garage Ground Lease," "Lease," "Property," "Loan" and "Mortgage" are defined in the Schedule of Definitions attached hereto as Exhibit B. This Agreement is entered into with reference to the following facts:

RECITALS

- A. Landlord and Tenant have entered into the Lease with respect to the Premises.
- B. Beneficiary has made the Loan to Landlord secured by the Mortgage on the Premises.
- C. It is a condition precedent to the effectiveness of the Lease that Tenant is assured of continued occupancy of the Premises and its rights under the Lease (including its option to purchase the Premises) under the terms of the Lease.
- D. Beneficiary is willing to assure Tenant of continued occupancy of the Premises and its rights under the Lease (including its option to purchase the Premises) pursuant to the terms of the Lease as stated in this Agreement.

NOW, THEREFORE, in consideration of the mutual benefits accruing to the parties and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, it is agreed:

AGREEMENT

- 1. Beneficiary hereby consents to and approves the Lease including Tenant's option to purchase the Premises on the terms and conditions contained therein.
- 2. Tenant's interest in the Lease and all rights of Tenant thereunder shall be subject and subordinate to the Mortgage encumbering the Premises (provided that all condemnation awards and insurance proceeds paid or payable with respect to the Premises and received by Beneficiary shall be applied to the repair and restoration of the Premises or disbursed to Tenant as and to the extent provided in the Lease, subject however to such reasonable protective measures as may be required by Beneficiary for disbursement of such funds and as are described in the Mortgage). Nothing contained in this Agreement is

intended to constitute a subordination of the Tenant's interest as the fee owner of the Property demised to Landlord under the terms of the Garage Ground Lease.

3. If Beneficiary causes a foreclosure of the Mortgage, Beneficiary will not name or join Tenant as a party to any foreclosure action except as required by law, nor will Beneficiary name or join Tenant as a party in any suit, action or proceeding to enforce any rights under the Mortgage.

4. Tenant's possession of the Premises and Tenant's rights in the Premises (including its option to purchase the Premises) shall not be interrupted, disturbed, affected or impaired by, nor will the Lease or the term of the Lease or Tenant's option to purchase the Premises on the terms and conditions set forth in the Lease be terminated or otherwise affected by, any default by Landlord under the Mortgage or any suit, action or proceeding upon the Mortgage or for the foreclosure of the Mortgage by Beneficiary or the enforcement of any rights under the Mortgage or any other documents held by the Beneficiary, or by any judicial sale or execution or other sale of the Premises, or by any deed given in lieu of foreclosure, or by the exercise of any other rights given to the Beneficiary by any other documents or as a matter of law. This nondisturbance provision shall apply with respect to Tenant's continued occupancy of the Premises pursuant to an exercise of its rights under Bankruptcy Code Section 365(h).

5. So long as Tenant is not in default under any of the terms, covenants or conditions of the Lease after the expiration of all cure, notice or grace periods provided in the Lease for Tenant's defaults: The Lease shall continue in full force and effect, the Lease shall not be terminated, and Tenant's use, possession and enjoyment of the Premises (including its option to purchase the Premises) shall be recognized and shall not be interfered with. If the Beneficiary takes possession of the Premises or starts collecting rent or becomes the owner of the Premises by reason of foreclosure of the Mortgage or otherwise, or if the Premises shall be sold as a result of any action or proceeding to foreclose the Mortgage or by a deed given in lieu of foreclosure, the Lease shall continue in full force and effect, without necessity for executing any new Lease, as a direct lease between Tenant and the Beneficiary or the then owner of the Premises as landlord upon all of the same terms, covenants and provisions contained in the Lease, (including, but not limited to Tenant's option to purchase the Premises), and in that event the Beneficiary or such new owner shall be bound to Tenant under all of the terms, covenants and provisions of the Lease (including, but not limited to Tenant's option to purchase the Premises) for the remainder of the term of the Lease which terms, covenants and provisions the Beneficiary or new owner agrees to assume and perform. Tenant agrees, after receipt by Tenant of notice from Beneficiary of any foreclosure of the Mortgage or any conveyance in lieu of foreclosure, to attorn to Beneficiary or its successor and accept the Beneficiary or any such successor owner as landlord under the Lease, and to be bound by and perform all of the obligations imposed upon Tenant by the Lease. Beneficiary or any such successor owner of the Property shall be bound by, assume and agree to perform all of the obligations imposed by the Lease upon Landlord (including but not limited to the

obligation to complete construction of the Garage on the terms and conditions set forth in the Lease) and Tenant shall have the same remedies against Beneficiary or a successor owner for breach of the Lease that Tenant may have had under the Lease against Landlord.

6. Insurance and condemnation proceeds shall be disposed of in accordance with the Garage Ground Lease and the Lease, respectively, and not in accordance with the Mortgage.

7. Landlord and Beneficiary each acknowledges and agrees that all trade fixtures, equipment and other property owned by Tenant located or installed in or on the Premises, if any, regardless of the manner of attachment, shall be and remain the property of Tenant and may be removed by Tenant at any time. In no event (including a default under the Lease or Mortgage) shall either Landlord or Beneficiary have any liens, rights or claims in Tenant's property, and Beneficiary expressly waives all rights of lien, levy, distraint or execution with respect to Tenant's property.

8. Beneficiary and Tenant agree that so long as the Lease is in full force and effect, no exercise by Tenant of its rights under the Lease shall constitute a default under the Mortgage or require Beneficiary's consent, and that except for the rights, privileges and benefits of Landlord and Tenant expressly set forth herein, any conflict between the terms of the Lease and the terms of the Mortgage shall be resolved in favor of the Lease. In furtherance of and not as a limitation on the foregoing, Tenant may, without causing a default to occur under the Mortgage and without Beneficiary's consent, to the extent expressly permitted by the Lease: (a) make alterations and improvements to the Premises; (b) contest legal requirements claimed to be applicable to the Premises and defer compliance with such legal requirements pending the determination of any such contest; (c) exercise its right to issue certificates of participation in rent payments to be made under the Lease; (d) exercise its option to purchase the Premises; and (e) remove fixtures, improvements and/or personal property that it owns from the Premises.

9. All notices hereunder shall be deemed to have been duly given if mailed by United States registered or certified mail, with return receipt requested, postage prepaid, or by United States express mail or other comparable overnight courier service or by facsimile transmission to the parties at the following address or addresses (or at such other address or addresses, written notice of which have been given as herein provided) and shall be deemed given when so delivered, two (2) business days after being deposited in the United States mail postage prepaid or delivered to the overnight courier service or on the date when faxed (provided the fax machine has issued a printed confirmation of receipt):

Landlord: Kirkland Park & Ride, LLC
11624 SE 5th Street, Suite 200
Bellevue, WA 98005
Attn: Gary A. Young
Facsimile: (425) 586-7700

With copies to: Oseran Hahn Spring Straight & Watts, P.S.
10900 NE 4th Street, Suite 1430
Bellevue, WA 98004
Attn: Matthew B. Straight
Facsimile: (425) 455-9201

Imagine Housing
10604 NE 38th Place, Suite 215
Kirkland, WA 98033
Attn: Eric Evans
Facsimile: (425) 576-5194

Beneficiary: _____

Tenant: King County
Property Services Division
500 King County Administration Building
500 Fourth Avenue
Seattle, WA 98104

These addresses may be changed from time to time by a party serving notice of the changes as provided above. Notices shall be deemed given upon receipt or attempted delivery where delivery is not accepted.

10. This Agreement, and each of the provisions hereof, shall inure to the benefit of or bind as the case may require, and be enforceable by the parties hereto and their respective heirs, personal representatives, successors and assigns, including without limitation, any purchaser at any foreclosure sale of the Mortgage or any transferee of a deed in lieu of foreclosure; provided, however, that the interest of any party under this Agreement may not be assigned or transferred except together with an assignment or transfer of such party's interest under the Ground Lease and the Lease, or the Mortgage, as applicable.

11. Landlord, as landlord under the Lease and grantor under the Mortgage, acknowledges and agrees for itself and its successors and assigns that: (a) this Agreement does not constitute a waiver by Beneficiary of any of its rights against Landlord under the

Mortgage and/or in any way release Landlord from its obligation to comply with all of the terms, provisions, conditions, covenants, and agreements set forth in the Mortgage; and (b) this Agreement does not constitute a waiver by Tenant of any of its rights under the Garage Ground Lease or the Lease and/or in any way release Landlord from its obligation to comply with all of the terms, provisions, conditions, covenants and agreements set forth in the Garage Ground Lease and the Lease.

12. This Agreement may not be modified other than by an agreement in writing signed by the parties hereto or by their respective successors in interest. This Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Washington.

13. Landlord and Beneficiary acknowledge that the Tenant is the fee owner of the real property legally described in the Garage Ground Lease which it has leased to Landlord pursuant to the terms of the Garage Ground Lease. Nothing contained in this Agreement is intended to modify the rights, duties and obligations of the Tenant in its capacity as landlord under the Garage Ground Lease or the Landlord as tenant under the Garage Ground Lease. This Agreement does not subordinate the Garage Ground Lease to the lien of the Mortgage. This Agreement does not subordinate the fee interest of the Tenant in the real property demised to Landlord under the Garage Ground Lease. This Agreement is intended only to subordinate the interest of the Tenant as the tenant under the Lease. Nothing contained in this Agreement is intended to constitute a consent to a merger of the fee title to the Property and the leasehold estate of the Landlord as the tenant therein created under the Garage Ground Lease with the leasehold interest of the Tenant created under the Lease.

14. In the event any term or provision of this Agreement or the application thereof to any person or circumstance shall, for any reason and to any extent be invalid or unenforceable, the remaining terms and provisions of this Agreement shall not be affected thereby, but rather shall be enforceable to the fullest extent permitted by law.

15. This document may be executed in counterparts, each of which shall constitute an original and all of which shall together constitute one original.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the date and year first above written.

BENEFICIARY:

TENANT:

KING COUNTY, a political subdivision of the State of Washington

By: _____
Name: _____
Title: _____

By: _____
Name: _____
Title: _____

LANDLORD:

Approved as to Form:

KIRKLAND PARK & RIDE, L.L.C.,
a Washington limited liability company

By: **KTOD DEVELOPER L.L.C.**,
a Washington limited liability company,
Its Manager

By: _____
Name: _____
Title: _____

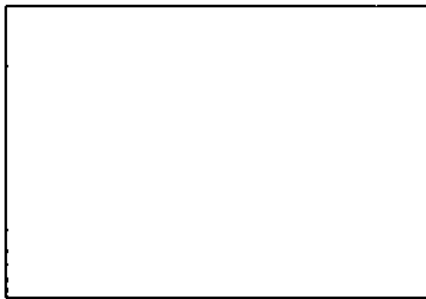
By: _____
Senior Deputy Prosecuting Attorney

Date: _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that s/he signed this instrument, on oath stated that s/he was authorized to execute the instrument and acknowledged it as the _____ of KING COUNTY, a political subdivision of the State of Washington, and acknowledged it to be the free and voluntary act and deed of said entity for the uses and purposes mentioned in the instrument.

DATED _____.



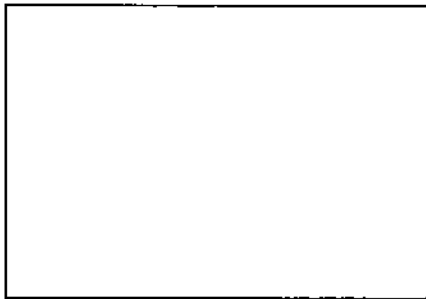
(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that s/he signed this instrument, on oath stated that s/he was authorized to execute the instrument and acknowledged it as the _____ of KTOD DEVELOPER L.L.C., a Washington limited liability company, Manager of KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company, and acknowledged it to be the free and voluntary act and deed of said entity for the uses and purposes mentioned in the instrument.

DATED _____.



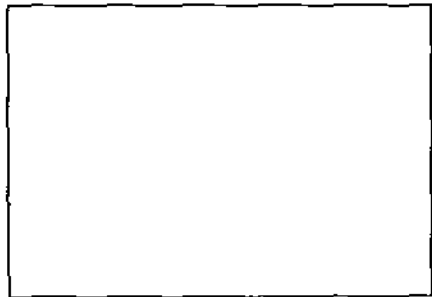
(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that s/he signed this instrument, on oath stated that s/he was authorized to execute the instrument and acknowledged it as a _____ of _____, and acknowledged it to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED _____.



(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

Exhibit A

Legal description of the Property

Exhibit B

Definitions

“Beneficiary” shall mean [name of Lender] having an address at [address of Lender].

“Garage Ground Lease” shall mean that certain Ground Lease with an Effective Date of _____, 2012, executed by King County, in its capacity as fee owner of the Property, as ground lessor, and Landlord, as ground lessee, as such Ground Lease is now or hereafter amended.

“Landlord” shall mean Kirkland Park & Ride, L.L.C., a Washington limited liability company, having an address at 11624 SE 5th Street, Suite 200, Bellevue, WA 98005, Attn: Gary A. Young.

“Lease” shall mean that certain Lease Agreement (with Option to Purchase-Parking Garage) with an Effective Date of _____, 2012, by and between Landlord and Tenant, as such Lease is now or hereafter amended.

“Loan” shall mean that certain loan in the amount of \$[•] made by Beneficiary to Landlord to finance construction of the Garage to be constructed on the Property pursuant to the Lease.

“Mortgage” shall mean a first lien Construction Leasehold Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing dated as of [•], 2012, encumbering the Premises, executed by Landlord, as grantor, in favor of Beneficiary, securing repayment of the Loan to be recorded in the county in which the Property is located.

“Premises” shall mean the Landlord’s leasehold interest in the Property created under the Garage Ground Lease together with all improvements now or hereafter located on the Property.

“Property” shall mean the real property described in Exhibit A hereto.

“Tenant” shall mean King County, a political subdivision of the State of Washington having an address at King County Property Services Division, 500 King County Administration Building, 500 Fourth Avenue, Seattle, WA 98104.

EXHIBIT N

After Recording Return To:
King County
Property Service Division
500 King County Administration Building
500 Fourth Avenue
Seattle, Washington 98104

**MEMORANDUM OF LEASE AGREEMENT
(With Option to Purchase-Parking Garage)**

GRANTOR: KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company (Landlord)

GRANTEE: KING COUNTY, a political subdivision of the State of Washington (Tenant)

Legal Description:
Abbreviated form:
Additional legal on page Exhibit A of document

Assessor's Property Tax Parcel Account Number(s):

THIS MEMORANDUM OF LEASE (the "Memorandum") is dated for reference purposes as of _____, 2012 between KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability company ("Landlord"), and KING COUNTY, a political subdivision of the state of Washington ("Tenant").

1. Lease. Landlord has leased to Tenant the Premises described in Exhibit A attached hereto and by this reference incorporated herein (the "Premises") at a rent and on the terms and conditions set forth in that certain Lease Agreement (With Option to Purchase-Parking Garage) dated _____, 2012 by and between Landlord and Tenant (the "Lease"). The Lease is for a term expiring on the earlier of: (i) the date which is twenty-five (25) years after the Commencement Date, or (ii) the date the Garage Ground Lease is terminated as a result of payment or defeasance in full of all Monthly Rent as set forth on Exhibit A to the Lease, unless sooner terminated pursuant to the terms of the Lease; provided, however, that Tenant's duty to pay Monthly Rent shall not commence until the Commencement Date.

2. Definition of Terms. All capitalized terms not otherwise defined herein shall have the same meaning as set forth in the Lease.

3. Tax Exemption. In accordance with RCW 36.34.205 and RCW 35.42.090, the Lease shall be exempt from any taxes imposed under the authority of RCW Ch. 82.45, RCW 82.04.040 or RCW 82.08.090.

4. Lien Notice. Notice is hereby given that Tenant will not be liable for any labor, services, materials or equipment furnished or to be furnished to Landlord, General Contractor or anyone holding an interest in the Premises (or any part thereof) through or under Landlord or General Contractor, and that no construction or other liens for any such labor, services, materials or equipment shall attach to or affect the interest of Tenant in the Premises.

5. Option to Purchase. Landlord has granted Tenant an option to purchase the Premises (consisting of the entirety of the Garage to be constructed on the Garage Land, together with Landlord's leasehold interest in the Garage Land pursuant to the Garage Ground Lease and as further defined in the Lease) at a price and on the terms and conditions set forth in the Lease.

6. Purpose of Memorandum. This Memorandum is prepared for purposes of recordation only and does not set forth all of the terms and conditions set forth in the Lease. In the event there is any conflict between the terms and conditions of the Lease and this Memorandum, the Lease shall control.

DATED the date first above written.

LANDLORD:

KIRKLAND PARK & RIDE, L.L.C.,
a Washington limited liability company

By: **KTOD DEVELOPER, L.L.C.,**
a Washington limited liability company,
Its Manager

By: _____

Name: _____

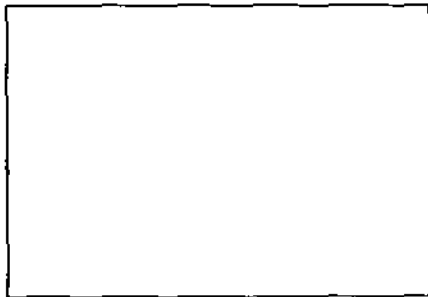
Title: _____

Date _____, 2012

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that s/he signed this instrument, on oath stated that s/he was authorized to execute the instrument and acknowledged it as the _____ of KING COUNTY, a political subdivision of the State of Washington, and acknowledged it to be the free and voluntary act and deed of said entity for the uses and purposes mentioned in the instrument.

Given Under My Hand And Official Seal this ____ day of _____, 2012.



(Use this space for notarial stamp/seal)

Notary Public
Print Name _____
My commission expires _____

EXHIBIT A

PREMISES

Certain real property situated in King County, Washington, and more particularly described as follows:

EXHIBIT O

FEDERAL TRANSIT ADMINISTRATION (FTA) REQUIREMENTS

I-1 Disadvantaged Business Enterprise (DBE) Participation

- A. Nondiscrimination 49 CFR part 26. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of United States Department of Transportation assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy, as the County deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).
- B. DBE Program. The DBE requirements of 49 CFR Part 26 apply to this Contract. King County has determined that no DBE goal will be established for this Contract. However, the County requires that the Contractor report any actual DBE participation on this Contract to enable the County to accurately monitor DBE program compliance.
- C. Efforts to Increase DBE Participation. Even though this Contract has no DBE goal, the County still encourages Contractors to pursue opportunities for DBE participation. To that end, Contractors are encouraged to:
1. Advertise opportunities for subcontractors and suppliers ("subcontractors") in a manner reasonably designed to provide DBEs capable of performing the work with timely notice of such opportunities. All advertisements should include a provision encouraging participation by DBE firms and may be done through general advertisements (e.g., newspapers, journals, etc.) or by soliciting proposals directly from DBEs.
 2. Utilize the services of available minority community organizations, minority consultant groups, local minority assistance offices and organizations that provide assistance in the recruitment and placement of DBEs and other small businesses.
 3. Establish delivery schedules, where requirements of the contract allow and encourage participation by DBEs and other small businesses.
 4. Achieve DBE attainment through joint ventures.
- D. DBE Listing. A current list of DBE firms accepted as certified by the Washington State Office of Minority and Women's Business Enterprises (OMWBE) is available from that office at (360) 753-9693. For purposes of this Contract, a DBE firm must be certified by OMWBE as of the date of contract award.
- E. Procedure Applicable when DBEs Are Utilized. Concurrent with the use of any DBE subcontractor or supplier the Contractor shall provide notice of such use in writing to the King County Office of Business Development and Contract Compliance (BDCC). Upon receipt of said notice, BDCC shall provide the Contractor with the applicable procedures for counting DBE participation. Assistance with this Section is available from BDCC at (206) 684-1330. Notice referenced herein should be delivered to the following address:

King County Department of Finance
Office of Business Relations and Economic Development
701 Fifth Avenue, Suite 2000
Bank of America Tower
Seattle, WA 98104-7097
Phone: (206) 205-0711
Fax: (206) 205-0719

1-2 Federal Changes

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between the County and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

1-3 No Federal Government Obligations to Third Parties

The Contractor acknowledges and agrees that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of this Contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this Contract and shall not be subject to any obligations or liabilities to the Contractor or any other party (whether or not a party to this Contract) pertaining to any matter resulting from this Contract.

The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

1-4 Civil Rights

The following requirements apply to the underlying contract:

(A) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(B) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:

(1) Race, Color, Creed, National Origin, Sex - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 *et seq.*, (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including

apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(2) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. §§ 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

1. (C) Information and Reports - The Contractor shall provide all information and reports required by the regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the County or the Federal Transit Administration (FTA) to be pertinent to ascertain compliance with such regulations, orders and instructions. The Contractor shall maintain all required records for a least three (3) years after the County makes final payment and all other pending matters are closed. Where any information is required and it is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the County or the Federal Transit Administration, as appropriate, and shall set forth efforts made to obtain the information.
2. (D) Sanctions for Noncompliance - In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the County shall impose such contract sanctions as it or the FTA may determine to be appropriate, including, but not limited to:
 3. Withholding of payments to the Contractor under the Contract until the Contractor complies, and/or,
 4. Cancellation, termination or suspension of the Contract, in whole or in part.

(E) Incorporation of Provisions - The Contractor shall include the provisions of paragraphs A through E of this section in every subcontract, including procurements of materials and leases of equipment, unless exempt by the regulations or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the County or the FTA may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, however, that, in the event the Contractor becomes involved in or is threatened with litigation with a subcontractor or supplier as a result of such direction, the Contractor may request the County to enter into such litigation to protect the interests of the County, and in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

1-5 Labor Provisions - Non-Construction Contracts

The Contractor agrees to comply, and assures the compliance by each subcontractor or subconsultant at any tier with any applicable employee protection requirements for non-construction employees of Section 102 of the Contract Work Hours and Safety Standards Act, as amended, 40 U.S.C. Sections 327 - 332, and U.S. DOL regulations, "Labor Standards Provisions Applicable to Contracts Governing Federally Financed and Assisted Construction (also Labor Standards Provisions Applicable to Nonconstruction Contracts Subject to the Contract Work Hours and Safety Standards Act)," 29 C.F.R. Part 5. These include but are not limited to the following:

5. A. Overtime Requirements

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any work week in which he or she is employed on such work to work in excess of forty (40) hours in such work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half (1.5) times the basic rate of pay for all hours worked in excess of forty (40) hours in such work week. (29 CFR § 5.5(b)(1)).

6. B. Violation: Liability for Unpaid Wages: Liquidated Damages

In the event of any violation of the clause set forth in paragraph A of this section, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such district or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of paragraph A of this section in the sum of ten (\$10) dollars for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty (40) hours without payment of the overtime wages required by paragraph A of this section. (29 CFR § 5.5(b)(2)).

7. C. Withholding for Unpaid Wages and Liquidated Damages

The Department of Transportation or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such contract or any other federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in paragraph B of this section. (29 CFR § 5.5(b)(3)).

8. D. Payrolls and Basic Records

The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three (3) years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made and actual wages paid. Further, the records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying or transcription by authorized representatives of the Department of Transportation and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job. (29 CFR § 5.5(c)).

9. E. Subcontracts

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs A through E of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs A through E of this section. (29 CFR § 5.5(b)(4)).

I-6 Davis Bacon Act and Copeland Anti-Kickback Act Requirements

A. **Minimum Wages**

1. All laborers and mechanics employed or working upon the site of the work (or under the U. S. Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project) will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act, 29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor as set forth in Section 00130 of the Contract Documents and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers and mechanics, subject to subparagraph A(4) below of this provision 10.12, Davis-Bacon Act also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.
2. Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
3. If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
4. Classifications and disputes determined as follows:
 - a. The County shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. King County shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:
 - (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

- (ii) The classification is utilized in the area by the construction industry; and
 - (iii) except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination, and
 - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- b. If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and King County agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by King County to the Administrator of the Wage and Hour Division, Employment Standards Administration, U. S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise King County or will notify King County within the 30-day period that additional time is necessary.
 - c. In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and King County do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), King County shall refer the questions, including the views of all interested parties and the recommendation of King County, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise King County or will notify King County within the 30 day period that additional time is necessary.
 - d. The wage rate, (including fringe benefits where appropriate) determined pursuant to subparagraphs A(4)(b) or A(4)(c) of this provision, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

B. Withholding

The County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the U. S. Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the FTA assisted project), all or part of the wages required by the Contract, the County may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

C. Payrolls and Basic Records

1. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the U. S. Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project). Such records shall contain the name, address and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
2. The Contractor shall comply with the following requirements for submission of payrolls:
 - a. The Contractor shall submit weekly, for each week in which any Contract Work is performed, a copy of all payrolls to the County for transmittal to the FTA. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U. S. Government Printing Office, Washington, D.C. 20402 The Contractor is responsible for the submission of copies of payrolls by all subcontractors.
 - b. Each payroll submitted shall be accompanied by a "Statement of Compliance" signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:
 - (i) that the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5, and that such information is correct and complete;
 - (ii) that each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the wages earned, other than permissible deductions as set forth in 29 CFR Part 3; and
 - (iii) that each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

- c. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph C(2)(b) of this provision.
 - d. The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.
3. The Contractor or subcontractor shall make the records required under subparagraph C(1) of this provision available for inspection, copying, or transcription by authorized representatives of King County, the FTA or the federal Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, King County or the FTA may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

D. Apprentices and Trainees

1. Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U. S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a state apprenticeship agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a state apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a state apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

2. Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U. S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job-site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
3. Equal Employment Opportunity. The utilization of apprentices, trainees and journeymen shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

E. Compliance with Copeland Act Requirements

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

F. Subcontracts

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraphs A through E above and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in 29 CFR 5.5(a)(1) through (10) and such other clauses as the FTA may by appropriate instructions require, and also a clause requiring subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

G. Contract Termination – Debarment

A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

H. Compliance with Davis-Bacon and Related Acts Requirements

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3 and 5 are incorporated herein by reference in this Contract.

1. **Disputes Concerning Labor Standards**

Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the County, the FTA, the U.S. Department of Labor, or the employees or their representatives.

J. **Certification of Eligibility**

1. By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm which has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
2. No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
3. The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

1-7 **Bonding**

A. **Bond Requirements (Construction)**

1. **Bid Security**

A Bid Bond must be issued by a fully qualified surety company acceptable to the and listed as a company currently authorized under 31 CFR, Part 223 as possessing a Certificate of Authority as described thereunder.

2. **Rights Reserved**

In submitting this Bid, it is understood and agreed by bidder that the right is reserved by the County to reject any and all bids, or part of any bid, and it is agreed that the Bid may not be withdrawn for a period of ninety (90) days subsequent to the opening of bids, without the written consent of the County.

It is also understood and agreed that if the undersigned bidder should withdraw any part or all of his bid within ninety (90) days after the bid opening without the written consent of the County, shall refuse or be unable to enter into this Contract, as provided above, or refuse or be unable to furnish adequate and acceptable Performance Bonds and Labor and Material Payments Bonds, as provided above, or refuse or be unable to furnish adequate and acceptable insurance, as provided above, he shall forfeit his bid security to the extent of the County damages occasioned by such withdrawal, or refusal, or inability to enter into an agreement, or provide adequate security therefor.

It is further understood and agreed that to the extent the defaulting bidder's Bid Bond, Certified Check, Cashier's Check, Treasurer's Check, and/or Official Bank Check (excluding any income generated thereby which has been retained by the County as provided in (Item x "Bid Security" of the Instructions to Bidders) shall prove inadequate to fully recompense the County for the damages occasioned by default, then the undersigned bidder agrees to indemnify the County and pay over to the County the difference between the bid security and the County's total damages, so as to make the County whole.

The undersigned understands that any material alteration of any of the above or any of the material contained on this form, other than that requested, will render the bid unresponsive.

B. Performance and Payment Bonding Requirements (Construction)

The Contractor shall be required to obtain performance and payment bonds as follows:

1. Performance bonds

- a. The penal amount of performance bonds shall be 100 percent of the original contract price, unless the County determines that a lesser amount would be adequate for the protection of the County.
- b. The County may require additional performance bond protection when a contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price. The County may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

2. Payment bonds

- a. The penal amount of the payment bonds shall equal:
 - (i) Fifty percent of the contract price if the contract price is not more than \$1 million.
 - (ii) Forty percent of the contract price if the contract price is more than \$1 million but not more than \$5 million; or
 - (iii) Two and one half million if the contract price is more than \$5 million.
- b. If the original contract price is \$5 million or less, the County may require additional protection as required by subparagraph 1 if the contract price is increased.

C. Performance and Payment Bonding Requirements (Non-Construction)

The Contractor may be required to obtain performance and payment bonds when necessary to protect the County's interest.

1. The following situations may warrant a performance bond:

- a. The County's property or funds are to be provided to the contractor for use in performing the contract or as partial compensation (as in retention of salvaged material).
- b. A contractor sells assets to or merges with another concern, and the County, after recognizing the latter concern as the successor in interest, desires assurance that it is financially capable.
- c. Substantial progress payments are made before delivery of end items starts.
- d. Contracts are for dismantling, demolition, or removal of improvements.

2. When it is determined that a performance bond is required, the Contractor shall be required to obtain performance bonds as follows:
 - a. The penal amount of performance bonds shall be 100 percent of the original contract price, unless the County determines that a lesser amount would be adequate for the protection of the County.
 - b. The County may require additional performance bond protection when a contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price. The County may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.
3. A payment bond is required only when a performance bond is required, and if the use of payment bond is in the County's interest.
4. When it is determined that a payment bond is required, the Contractor shall be required to obtain payment bonds as follows:
 - a. The penal amount of payment bonds shall equal:
 - (i) Fifty percent of the contract price if the contract price is not more than \$1 million;
 - (ii) Forty percent of the contract price if the contract price is more than \$1 million but not more than \$5 million; or
 - (iii) Two and one half million if the contract price is increased.

D. Advance Payment Bonding Requirements

The Contractor may be required to obtain an advance payment bond if the contract contains an advance payment provision and a performance bond is not furnished. The County shall determine the amount of the advance payment bond necessary to protect the County.

E. Patent Infringement Bonding Requirements (Patent Indemnity)

The Contractor may be required to obtain a patent indemnity bond if a performance bond is not furnished and the financial responsibility of the Contractor is unknown or doubtful. The County shall determine the amount of the patent indemnity to protect the County.

F. Warranty of the Work and Maintenance Bonds

1. The Contractor warrants to the County, the Architect and/or Engineer that all materials and equipment furnished under this Contract will be of highest quality and new unless otherwise specified by the County, free from faults and defects and in conformance with the Contract Documents. All work not so conforming to these standards shall be considered defective. If required by the [Project Manager], the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.
2. The Work furnished must be of first quality and the workmanship must be the best obtainable in the various trades. The Work must be of safe, substantial and durable construction in all respects. The Contractor hereby guarantees the Work against defective materials or faulty workmanship for a minimum period of one (1) year after Final Payment by the County and shall replace or repair any defective materials or

equipment or faulty workmanship during the period of the guarantee at no cost to the County. As additional security for these guarantees, the Contractor shall, prior to the release of Final Payment [as provided in Item X below], furnish separate Maintenance (or Guarantee) Bonds in form acceptable to the County written by the same corporate surety that provides the Performance Bond and Labor and Material Payment Bond for this Contract. These bonds shall secure the Contractor's obligation to replace or repair defective materials and faulty workmanship for a minimum period of one (1) year after Final Payment and shall be written in an amount equal to ONE HUNDRED PERCENT (100%) of the CONTRACT SUM, as adjusted (if at all).

1-8 Seismic Safety

The Contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41, now or as hereinafter amended, and will certify to compliance to the extent required by the regulation. The Contractor also agrees to ensure that all work performed under this Agreement including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the Project.

1-9 Conformance with ITS Architecture

The Contractor agrees to conform, to the extent applicable, to the National Intelligent Transportation Systems (ITS) Architecture and Standards as required by section 5206(e) of TEA-21, 23 U.S.C. § 502 note, and comply with FTA Notice, "FTA National ITS Architecture Policy on Transit Projects" 66 Fed. Reg. 1455 *et seq.*, January 8, 2001, and other Federal requirements that may be issued. The Contractor agrees to include the above language in any sub-contractors or sub-agreements entered into in the performance of this agreement.

1-10 Cargo Preference - Use of U.S. Flag Vessels

The contractor agrees:

- a. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels;
- b. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.)
- c. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

1-11 Fly America Requirements

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the

extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

1-12 Audit and Inspection of Records

Access to Records - The following access to records requirements apply to this Contract:

- A. Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C.F.R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.
- B. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at \$100,000.
- C. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.
- D. Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.
- E. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
- F. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

G. FTA does not require the inclusion of these requirements in subcontracts.

1-13 Buy America

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification in Attachment H with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

1-14 FTA Protest Procedures

Bidders are hereby notified that if this Contract is funded in whole or in part by the Federal Department of Transportation, the Federal Transit Administration (FTA) may entertain a protest that alleges that the County failed to have or follow written protest procedures. Bidders must file a protest with the FTA not later than 5 working days after the County renders a final decision or 5 working days after the Bidder knows or has reason to know that the County has failed to render a final decision. The protesting party must notify the County if it has filed a protest with the FTA. After 5 days, the County will confirm with FTA that FTA has not received a protest. Protests to the FTA must be filed in accordance with FTA Circular 4220.1F (as periodically updated).

The County will not award a contract for 5 working days following its decision on a Bid protest or while a protest to the FTA is pending unless the County determines that: (1) the items to be procured are urgently required; (2) delivery of performance will be unduly delayed by failure to make the award promptly; or (3) failure to make prompt award will otherwise cause undue harm to the County or the Federal Government.

1-15 Privacy

Should the Contractor, or any of its subcontractors, or their employees administer any system of records on behalf of the Federal Government, the Privacy Act of 1974, 5 USC § 552a, imposes information restrictions on the party administering the system of records.

For purposes of the Privacy Act, when the Agreement involves the operation of a system of records on individuals to accomplish a government function, the recipient and any contractors, third party contractors, subcontractors and their employees involved therein are considered to be government employees with respect to the government function. The requirements of the Act, including the civil and criminal penalties for violations of the Act, apply to those individuals involved. Failure to comply with the terms of the Act or this provision of this contract will make this contract subject to termination.

The Contractor agrees to include this clause in all subcontracts awarded under this Contract, which involve the design, development, operation, or maintenance of any system of records on individuals subject to the Act.

1-16 Certification Regarding Debarment, Suspension and Other Responsibility Matters

Pursuant to Executive Order 12549 and 12689, "Debarment and Suspension," 31 USC § 6101 note and federal regulations in 49 CFR 29, entities and individuals who are debarred or suspended by the federal government are excluded from obtaining federal assistance funds under this contract. To assure that such entities and individuals are not involved as participants on this FTA-financed contract, if the contract exceeds \$25,000, each Bidder shall complete and submit, as part of its Bid, the certification contained in Attachment K for itself, its principals and its subcontractor(s) for any subcontract in excess of \$25,000. The inability of a Bidder to provide a certification in Attachment K will not necessarily result in denial of consideration for contract award. A Bidder that is unable to provide a certification must submit a complete explanation attached to the certification form. Failure to submit a certification or explanation shall disqualify the Bidder from participation under this Bid. The County, in conjunction with FTA, will consider the certification or explanation in determining contract award. No contract will be awarded to a potential third-party contractor submitting a conditioned debarment or suspension certification, unless approved by the FTA.

The certification is a material representation of fact upon which reliance is placed in determination of award of contract. If at any time the Bidder or Contractor learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances, it shall immediately provide written notice to the County. If it is later determined that the Bidder knowingly rendered an erroneous certification, or failed to notify the County immediately of circumstances that made the original certification no longer valid, the County may disqualify the Bidder. If it is later determined that the Contractor knowingly rendered an erroneous certification, or failed to notify the County immediately of circumstances which made the original certification no longer valid, the County may terminate the contract, in addition to other remedies available including FTA suspension and/or debarment.

1-17 Subcontractors' Certification Regarding Debarment, Suspension or Ineligibility

By submitting a Bid for this Contract, the Bidder agrees that should it be awarded the Contract, it shall not knowingly enter into any subcontract exceeding \$25,000 with an entity or person who is debarred, suspended, or who has been declared ineligible from obtaining federal assistance funds; and shall require each subcontractor to complete the certification provided in Attachment L.

Each subcontract, regardless of tier, shall contain a provision that the subcontractor shall not knowingly enter into any lower tier subcontract with a person or entity who is debarred, suspended or declared ineligible from obtaining federal assistance funds, and a provision requiring each lower-tiered subcontractor to provide the certification set forth in Attachment L.

The Contractor shall require each subcontractor, regardless of tier, to immediately provide written notice to the Contractor if at any time the subcontractor learns that its, or a lower-tier certification was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor may rely upon the certifications of the subcontractors unless it knows that a certification is erroneous. The Contractor's knowledge and information regarding any subcontractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business.

1-18 Disclosure of Lobbying Activities

Bids in excess of \$100,000 require Attachment I, "Certification Regarding Lobbying," and Attachment J, "Disclosure of Lobbying Activities" (if appropriate), be completed and submitted to the County with the proposal, as required by 49 CFR Part 20, "New Restrictions on Lobbying."

The Contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by the Byrd Anti-Lobbying Amendment,

31 USC § 1352. The Contractor shall disclose the name of any registrant under the Lobbying Disclosure Act of 1995, codified at 2 USC § 1601 et seq., who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 USC § 1352. Such disclosures are to be forwarded to the County.

The Contractor will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of \$100,000 shall certify and disclose accordingly.

1-19 Anti-Kickback

The County and contractors are required to comply with the Anti-Kickback Act of 1986, 41 USC §§ 51 et seq. Under state and federal law, it is a violation for County employees, bidders, contractors or subcontractors to accept or offer any money or benefit as a reward for favorable treatment in connection with the award of a contract or the purchase of goods or services.

“Kickback” as defined by Federal Acquisition Regulation (FAR) 52.203-7, and 41 USC § 52(2), means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind that is provided directly or indirectly to any prime Contractor, prime Contractor employee, subcontractor or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract.

1-20 False or Fraudulent Statements or Claims

(A) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. and U.S. DOT regulations, “Program Fraud Civil Remedies,” 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(B) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(C) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

1-21 Conservation

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the State Energy Conservation plan issued in compliance with the Energy Policy and Conservation Act, 42 USC §§ 6321 et seq.

The Contractor agrees to include this clause in all subcontracts awarded under this Contract.

1-22 Environmental Requirements

The Contractor agrees to comply with all applicable standards, orders or requirements as follows:

10. A. Environmental Protection

The Contractor agrees to comply with the applicable requirements of the National Environmental Policy Act of 1969, as amended, 42 USC §§ 4321, et seq., consistent with Executive Order No. 11514, as amended, "Protection and Enhancement of Environmental Quality," 42 USC § 4321 note. FTA statutory requirements on environmental matters at 49 USC § 5324(b); Council on Environmental Quality regulations on compliance with the National Environmental Policy Act of 1969, as amended, 42 USC § 4321 et seq. and 40 CFR Part 1500 et seq.; and joint FHWA/FTA regulations, "Environmental Impact and Related Procedures," 23 CFR Part 771 and 49 CFR Part 622.

11. B. Air Quality

The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act, as amended, 42 USC §§ 7401, et seq. The Contractor agrees to report each violation to the County and understands and agrees that the County will, in turn, report each violation as required to assure notification to FTA and the appropriate U.S. Environmental Protection Agency (EPA) Regional Office.

The Contractor agrees to include this clause in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

12. C. Clean Water

The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 USC §§ 1251 et seq. The Contractor agrees to report each violation to the County and understands and agrees that the County will, in turn, report each violation as required to assure notification to FTA and the appropriate Environmental Protection Agency (EPA) Regional Office.

The Contractor agrees to protect underground sources of drinking water consistent with the provisions of the Safe Drinking Water Act of 1974, as amended, 42 USC §§ 300h et seq. The Contractor agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

13. D. Use of Public Lands

The Contractor agrees that no publicly owned land from a park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance as determined by the federal, state or local officials having jurisdiction thereof, or any land from a historic site of national, state, or local significance may be used for the Project unless the FTA makes the specific findings required by 49 USC § 303.

14. E. Historic Preservation

The Contractor agrees to assist the Federal Government in complying with section 106 of the National Historic Preservation Act, as amended, 16 USC § 470f, Executive Order No. 11593, "Protection and Enhancement of the Cultural Environment," 16 USC § 470 note, and the

Archaeological and Historic Preservation Act of 1974, as amended, 16 USC §§ 469a-1 et seq. involving historic and archaeological preservation as follows:

1. The Contractor agrees to consult with the State Historic Preservation Officer about investigations to identify properties and resources listed in or eligible for inclusion in the National Register of Historic Places that may be affected by the Project, in accordance with Advisory Council on Historic Preservation regulations, "Protection of Historic and Cultural Properties," 36 CFR Part 800, and notifying FTA of those properties so affected.
2. The Contractor agrees to comply with all federal requirements to avoid or mitigate adverse effects on those historic properties.

15. F. Mitigation of Adverse Environmental Effects

The Contractor agrees that if the Project should cause adverse environmental effects, the Contractor will take all reasonable steps to minimize those effects in accordance with 49 USC § 5324(b), and all other applicable federal laws and regulations, specifically, the procedures of 23 CFR Part 771 and 49 CFR Part 622.

1-23 Preference for Recycled Products

Recovered Materials - The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

1-24 Termination Provisions Required

All contracts and subcontracts in excess of \$10,000 shall contain contractual provisions or conditions that allow for termination for cause and convenience by the County including the manner by which it will be effected and the basis for settlement.

(Required by FTA Circular 4220.1F, Page IV-12).

1-25 Breach Provisions Required

All contracts in excess of \$100,000 shall contain contractual provisions or conditions that will allow for administrative, contractual, or legal remedies in instances where the Contractor violates or breaches the terms of this Contract, including sanctions and penalties as may be appropriate. The Contractor agrees to include this provisional requirement in all subcontracts in excess of \$100,000 awarded under this Contract.

(Required by FTA Circular 4220.1F, Page IV-12).

1-26 Incorporation of FTA Terms

The preceding provisions include, in part, certain Standard Terms and Conditions required by the U.S. Department of Transportation, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by the U.S. Department of Transportation, as set forth in FTA Circular 4220.1F, dated November 1, 2008, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Contract. The Contractor agrees not to perform any act, fail to perform any act, or refuse to comply with any County requests that would cause the County to be in violation of the FTA terms and conditions.



ATTACHMENT A

Personnel Inventory Report

Legal name of business _____ Telephone No: _____

dba (if applicable) _____

Street address _____ City _____ State _____ Zip Code _____

16. Submitted by: _____ Title _____ Date _____

17. IRS Employer Identification Number: _____

18. Do you have any employees? No ___ Yes ___

If yes, list on the Employment Data Chart below the total number of employees for all businesses located in (1) King County. If none, list the total number of employees for all businesses located in (2) Washington State. If none, list the total number of employees for all businesses located in the (3) United States. Indicate which locale (1,2,3) report covers _____. This report covers Business Location(s) in (circle one): [King County, Washington State, Other States] for the Payroll Period ending (Month/Day/Year): _____.

Do any of your employees belong to a union and/or do you use an employee referral agency? No ___ Yes ___

If yes, list the unions and/or employee referral agencies with whom you have agreements: _____

_____ If you expect to do more than \$10,000 worth of public Work (construction) or, more than \$25,000 worth of business with King County, the unions or employee referral agencies must submit a statement of compliance with King County Code Chapter 12.16.

Job Categories	Whites		African Americans		Asians		Native Americans		Hispanics		Disabled		Minority Subtotal		Disabled Subtotal	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Managerial																
Professional																
Technical																
Clerical																
Sales																
Service																
Labor																
On-Job Trainees																
Apprentice																
Skilled Craft*																
Subtotal																

* Journey worker: List by classification on reverse, e.g., carpenter, plumber, etc.

Total number of employees reported above: _____ If no employees, write "0."



Personnel Inventory Report

SUPPLEMENTAL FORM

Use this form as necessary to report the total Work force.

Legal name of business _____ Telephone _____
 Submitted by: Title _____ Date _____

Job Categories	Whites		African Americans		Asians		Native Americans		Hispanics		Disabled		Minority Subtotal		Disabled Subtotal	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Managerial																
Professional																
Technical																
Clerical																
Sales																
Service																
Labor																
On-Job Trainees																
Apprentice																
Skilled Craft*																
Subtotal																

Contact the King County Procurement and Contract Services Section at (206) 684-1681 or the King County Department of Finance, Business Development and Contract Compliance Division (206) 684-1330 if you have any questions concerning completion of this form.



ATTACHMENT B

Affidavit and Certificate of Compliance

with King County Code Chapter 12.16, Discrimination and Affirmative Action
in Employment by Contractors, Subcontractors and Vendors

The undersigned, being first duly sworn, on oath states, s/he is authorized by the Contractor, and on the Contractor's behalf, affirms and certifies as follows:

Definitions: "Contractor" Shall mean any Contractor, vendor or Contractor who supplies goods and/or services. "Contract" Shall mean any Contract, purchase order or agreement with King County Government, hereinafter called the COUNTY.

- A. Contractor recognizes that discrimination in employment is prohibited by federal, state and local laws. Contractor recognizes that in addition to refraining from discrimination, affirmative action is required to Provide equal employment opportunity. Contractor further recognizes that this Affidavit establishes minimum requirements for affirmative action and fair employment practices and implements the basic nondiscrimination provisions of the general Contract Specifications as applied to service, Contractor, and vendor Contracts exceeding \$25,000, or public Work Contracts exceeding \$10,000. Contractor herein agrees that this Affidavit is incorporated as an addendum to its general Contract, and recognizes that failure to comply with these requirements may constitute grounds for application of sanctions as set forth in the general Specifications, King County Code Chapter 12.16 ("Chapter") and this Affidavit. PROVIDED FURTHER, that in lieu of this Affidavit, the Executive may accept a statement pledging adherence to an existing Contractor affirmative action plan where the provisions of the plan are found by the Executive to substantially fulfill the requirements of the Chapter.
- B. Contractor Shall give notice to their supervisors and employees of the requirements for affirmative action to be undertaken prior to the commencement of Work.
- C. This Person has been designated to represent the Contractor and to be responsible for securing compliance with and for reporting on the affirmative actions taken:
- D. Contractor Will cooperate fully the MAVBE and Contract Compliance Division and appropriate County agents while making every reasonable "good faith" effort to comply with the affirmative action and nondiscrimination requirements set forth in this Affidavit and in King County Code Chapter 12.16.
- E. Reports: The Contractor agrees to complete and submit as required such additional reports and records that may be necessary to determine compliance with the Affidavit and to confer with the County Compliance Officer at such times as the County Shall deem necessary. The information required by the Chapter includes but is not limited to the following reports and records:
1. **Personnel Inventory Report:** This report Shall include a breakdown of the employer workforce showing race, sex and handicapped and other minority data.
 2. **Monthly Utilization Report:** This report Shall apply to construction Contractors and Subcontractors and Shall Provide the number of hours of employment for all employees, including minority, women and disabled employees by craft and category.
3. **Statement from Union or Worker Referral Agency:** This statement affirms that the signer's organization has no practices and policies which discriminate on the basis of race, color, creed, religion, sex, age, marital status, sexual orientation, nationality or the presence of sensory, mental or physical disability.
- The information required in this section Shall be submitted on forms provided by the County unless otherwise specified.
- F. **Subcontractors:** For public works projects and Contracts of ten thousand dollars (\$10,000) or more, and for all other Contracts and agreements of twenty-five thousand (\$25,000) dollars or more, the prime Contractor Shall be required to submit to the County, along with its qualifying documents under the Chapter, employment profiles, Affidavits and Certificates of Compliance, Reports and Union Statements from its Subcontractors in the same manner as these are required of the prime Contractor. Reporting requirements of the prime Contractor during the Contract period Will apply equally to all Subcontractors.
- G. **Employment Goals for Minorities, Women and Persons with Disabilities:** No specific levels of utilization of minorities and women in the workforce of the Contractor Shall be required, and the Contractor is not required to grant any preferential treatment on the basis of race, sex, color, ethnicity or national origin in its employment practices. Notwithstanding the foregoing, any affirmative action requirements set forth in any federal regulations, statutes or rules included or referenced in the Contract documents Shall continue to apply.
- H. **Affirmative Action Measures:** Contractor agrees to implement and/or maintain reasonable good faith efforts to comply with King County Code Chapter 12.16. The evaluation of a Contractor's compliance with the Chapter shall be based upon the Contractor's effort to achieve maximum results from its affirmative action measures. The Contractor shall document these efforts and shall implement affirmative action steps at least as extensive as the following:
1. **Policy Dissemination:** Internal and external dissemination of the Contractor's equal employment opportunity policy; posting of nondiscrimination policies and of the requirement of the Chapter on bulletin boards clearly visible to all employees; notification to each subcontractor, labor union or representative of workers with which there is a collective bargaining agreement or other Contract, Subcontract, or understanding of the Contractor's commitments under the Chapter. Inclusion of the equal opportunity policy in advertising in the news media and elsewhere.
 2. **Recruiting:** Adopt and implement recruitment procedures designed to increase the representation of women, minorities and persons with disabilities in the pool of applicants for employment: including, but not limited to establishing and maintaining a current list of minority, women and disabled recruitment sources, providing these sources written notification of employment opportunities and advertising vacant positions in newspapers and

- periodicals which have minority, women and/or disabled readership.
3. **Self-Assessment and Test Validation:** Review of all employment policies and procedures, including tests, recruitment, hiring and training practices and policies, performance evaluations, seniority policies and practices, job classifications and job assignments to assure that they do not discriminate against, or have a discriminatory impact on, minorities, women and persons with disabilities and validate all tests and other selection requirements where there is an obligation to do so under state or federal law.
 4. **Record Referrals:** Maintain a current file of applications of each minority, women and persons with disabilities who are applicants or referrals for employment indicating what action was taken with respect to each such individual and the reasons therefor. Contact these people when an opening exists for which they may be qualified. Names may be removed from the file after twelve months have elapsed from their last application or referral.
 5. **Notice to Unions:** Provide notice to labor unions of the Contractor's nondiscrimination and affirmative action obligations pursuant to King County Code Chapter 12.16. Contractors shall also notify the M/WBE and Contract Compliance Division if labor unions fail to comply with the nondiscrimination or affirmative provisions.
 6. **Supervisors:** Ensure that all supervisory personnel understand and are directed to adhere to and implement the nondiscrimination and affirmative action obligations of the Contractor under King County Code Chapter 12.16. Such direction shall include, but not be limited to, adherence to, and achievement of, affirmative action policies in performance appraisals of supervisory personnel.
 7. **Employee Training:** When reasonable, develop on-the-job training opportunities which expressly include minorities, women, and persons with disabilities and sponsor and/or utilize, training/educational opportunities for the advancement of women, minorities and persons with disabilities employed by the Contractor, subject to Acceptance by the County.
 8. **Responsible Person:** Designate an employee who shall have the responsibility for implementation of the Contractor's affirmative action measures.
 9. **Progress Reporting:** Prepare as part of the affirmative action plan an analysis and report on the progress made toward eliminating the underrepresentation of minorities, women, and persons with disabilities in the Contractor's workforce on an annual basis.
- I. During the performance of this Contract, neither the Contractor nor any party Subcontracting under the authority of this Contract shall discriminate nor tolerate harassment on the basis of race, color, sex, religion, nationality, creed, marital status, sexual orientation, age, or the presence of any sensory, mental or physical disability in the employment or application for employment or in the administration or delivery of services or any other benefits under this Contract.
 - J. Contractor agrees to Provide reasonable access upon request to the premises of all places of business and employment, relative to Work undertaken in this Contract, and to records, files, information and employees in connection therewith, to the M/WBE and Contract Compliance Division or agent for purposes of reviewing compliance with the provisions of this Affidavit and agrees to cooperate in any compliance review.
 - K. Should the M/WBE and Contract Compliance Division find, upon complaint investigation or review, the Contractor not to be in good faith compliance with the provisions contained in this Affidavit, it shall notify the County and Contractor in writing of the finding fully describing the basis of non-compliance. Contractor may request withdrawal of such notice of noncompliance at such time as the compliance office has notified in writing the Contractor and the County that the noncompliance has been resolved.
 - L. The Contractor agrees that any violation of any term of this Affidavit, including reporting requirements, shall be deemed a violation of King County Code Chapter 12.16. Any such violation shall be further deemed a breach of a material provision of the Contract between the County and the Contractor. Such breach may be grounds for implementation of any sanctions provided for in the Chapter, including but not limited to, cancellation, termination or suspension, in whole or part, of the Contractor by the County; liquidated damages; or disqualification of the Contractor PROVIDED, that the implementation of any sanctions is subject to the notice and hearing provisions of King County Code Chapter 12.16.110.

Contractor: _____
Company Name Street Address City State Zip

I have read and understood the foregoing; and am authorized on behalf of the Contractor to agree to the terms and conditions of this and Affidavit and Certificate of Compliance and therefore, execute the same.

Authorized Signer: _____
Name (type or print) Title Phone Signature

VALID ONLY IF NOTARIZED

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____ DAY OF _____, 2002.

(Signature of notary public)

(Printed name of notary public)

Notary Public in and of the state of _____

My appointment expires:

ATTACHMENT C

BUY AMERICA CERTIFICATE

CONTRACT NO. _____

Certificate Of Compliance With Section 165(a)

The vendor hereby certifies that it will comply with the requirements of Section 165(a) of the Surface Transportation Assistance Act of 1982, as amended, and the regulations in 49 CFR Part 661.

Date: _____

Company Name: _____

Signature: _____

Title: _____

OR

Certificate Of Noncompliance With Section 165(a)

The vendor hereby certifies that it cannot comply with the requirements of Section 165(a) of the Surface Transportation Assistance Act of 1982, as amended, but it may qualify for an exception to the requirement pursuant to Section 165(b)(2) or (b)(4) of the Surface Transportation Assistance Act of 1982 and regulations in 49 CFR Part 661.7.

Date: _____

Company Name: _____

Signature: _____

Title: _____

It is important to remember that this Bid is funded in part by the FEDERAL TRANSIT ADMINISTRATION (FTA). In accordance with FTA requirements, each vendor shall complete this Attachment H and submit it to the County with and as a part of their Bid.

Par. 661.5 GENERAL REQUIREMENTS FOR STEEL AND MANUFACTURED PRODUCTS.

- (a) Except as provided in Part 661 no funds may be obligated by FTA for a grantee project unless all steel and manufactured products used in the project are produced in the United States.
- (b) All steel manufacturing processes must take place in United States, except metallurgical processes involving refine of steel additives.
- (c) The steel requirements apply to all steel items including, but not limited to, structural steel, running rail and contact rail.
- (d) For a manufactured product to be considered produced in the United States:
 - {1} All of the manufacturing processes for the product must take place in the United States; and
 - {2} All items or material used in the product must be of United States origin.

ATTACHMENT D

CERTIFICATE OF LOBBYING ACTIVITIES

CONTRACT NO. _____

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, or officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any federal contract, grant, loan or cooperative agreement.
- (2) If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress in connection with this federal contract, grant, loan or cooperative agreement, the undersigned shall complete and submit Standard Form-L.L.L., "Disclosure Form to Report Lobbying," to the contract administrator.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants and contracts under grants, loans and cooperative agreements) and that all recipients of subcontract awards in excess of \$100,000 shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by § 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

**ATTACHMENT E
DISCLOSURE FORM TO REPORT LOBBYING
DISCLOSURE OF LOBBYING ACTIVITIES**

Complete this form to disclose lobbying activities pursuant to 31 U.S. C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action: <input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance	2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award	3. Report Type: <input type="checkbox"/> a. initial filing <input type="checkbox"/> b. material change For material change only: year _____ quarter _____ Date of last report: _____
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, if known: Congressional District, if known:	5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime: Congressional District, if known:	
6. Federal Department/Agency:	7. Federal Program Name/Description: CFDA Number, if applicable: _____	
8. Federal Action Number, if known:	9. Award Amount, if known: \$ _____	
10. a. Name and Address of Lobbying Entity (If individual, last name, first name, MI):	b. Individuals Performing Services (including address if different from No. 10a) (Last name, First name, MI):	
11. Amount of Payment (check all that apply): 12. Form of Payment (check all that apply): <input type="checkbox"/> a. cash <input type="checkbox"/> b. in kind; specify: nature _____ value _____	13. Type of Payment (check all that apply): <input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferred <input type="checkbox"/> f. other; specify: _____	
14. Brief Description of Services Performed or to be Performed and date(s) of service, including officer(s), employee(s), or member(s) contacted, for payment indicated in Item 11: (Attach Continuation Sheet(s) SF-LLL-A, if necessary)		
15. Continuation Sheet(s) SF-LLL-A attached: <input type="checkbox"/> Yes <input type="checkbox"/> No		
16. Information requested through this form is authorized by title 31 USC § 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 USC § 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No: _____ Date: _____	

ATTACHMENT F

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime federal recipient, at the initiation or receipt of a covered federal action, or a material change to a previous filing to title 31 USC § 1352. The filing of a form is required for each payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of congress, or an employee of a Member of Congress in connection with a covered federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered federal action.
3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered federal action.
4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subaward of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, state and zip code of the prime federal recipient. Include Congressional District, if known.
6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the federal program name or description for the covered federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate federal identifying number available for the federal action identified in item 1 - (e.g., Request for Proposal (RFP) number, Invitation for Bid (IFB) number, grant announcement number, the contract, grant, or loan award number, the application/proposal control number assigned by the federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered federal action where there has been an award or loan commitment by the federal agency, enter the federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10.
 - (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered federal action.
 - (b) Enter the full name, of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the amount of box(es). Check all boxes that apply. If payment is made through in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with federal officials. Identify the federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.
15. Check whether or not an SF-LLL-A Continuation Sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

ATTACHMENT G

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION
AND OTHER RESPONSIBILITY MATTERS -
PRIMARY COVERED TRANSACTIONS**

Federal Transit Administration (FTA)

The prospective Primary Participant (potential contractor for a major third-party contract), _____ certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or agency;
2. Have not within a three (3) year period preceding this Bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (federal, state or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;
3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state or local) with commission of any of the offenses enumerated in Paragraph 2 of this certification; and
4. Have not within a three (3) year period preceding this Bid had one or more public transactions (federal, state or local) terminated for cause or default.

[If the primary participant (applicant for an FTA grant, or cooperative agreement or potential third-party contractor) is unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.]

THE PRIMARY PARTICIPANT (POTENTIAL CONTRACTOR FOR A MAJOR THIRD-PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 USC SECTIONS 3801, *ET SEQ.*, ARE APPLICABLE THERETO.

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

ATTACHMENT H

CONTRACT NO: _____

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION –
LOWER-TIER COVERED TRANSACTIONS**

(This Attachment may be completed and submitted to the Buyer after award of Contract.)

The Lower-Tier Participant (potential sub-grantee or sub-recipient under a Federal Transit Administration (FTA) project, potential third-party contractor, or potential subcontractor under a major third-party contract), _____ certifies, by submission of this Bid, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency.

The Lower-Tier Participant will not knowingly enter into any lower-tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

The prospective Lower-Tier Participant agrees by submitting this proposal that it will include this requirement in all lower-tier covered transactions and in all solicitations for lower-tier covered transactions.

If the Lower-Tier Participant (potential sub-grantee or sub-recipient under an FTA project, potential third-party contractor, or potential subcontractor under a major third party contract) is unable to certify to any of the statements in this certification, such participant shall attach an explanation to this Bid.

THE LOWER-TIER PARTICIPANT (POTENTIAL SUB-GRANTEE OR SUB-AGREEMENT UNDER AN FTA PROJECT, POTENTIAL THIRD-PARTY CONTRACTOR, OR POTENTIAL SUBCONTRACTOR UNDER A MAJOR THIRD-PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTAND THAT THE PROVISIONS OF 31 USC §§ 3801, *ET SEQ.* ARE APPLICABLE THERETO.

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

EXHIBIT P
ASSIGNMENT OF LEASE FOR SECURITY PURPOSES

After Recording Return To:
King County
King County Metro Transit Division
King Street Center, Mail Stop KSG-TR-0435
201 Jackson Street
Seattle, WA 98104
Attn: Manager: Design and Construction

**LEASEHOLD DEED OF TRUST AND
ASSIGNMENT OF LEASE FOR SECURITY PURPOSES**

GRANTOR: KIRKLAND PARK & RIDE, L.L.C., a Washington limited liability
company

GRANTEE: FIRST AMERICAN TITLE INSURANCE COMPANY ("Trustee")

GRANTEE: KING COUNTY, a political subdivision of the State of Washington
("Beneficiary")

Legal Description:
Abbreviated form:
Additional legal on page Exhibit A of document

Assessor's Property Tax Parcel Account Number(s):

Reference number(s) of Related Document(s):

**LEASEHOLD DEED OF TRUST AND ASSIGNMENT
OF LEASE FOR SECURITY PURPOSES**

THIS LEASEHOLD DEED OF TRUST AND ASSIGNMENT OF LEASE FOR SECURITY PURPOSES (the "Deed of Trust" or the "Assignment") is made as of this ____ day of _____, 2012 by Kirkland Park & Ride, L.L.C., a Washington limited liability company, as grantor and debtor ("Grantor") whose address is 11624 SE 5th Street, suite 200, Bellevue WA 98005 to First American Title Insurance Company, as trustee ("Trustee") whose address is 818 Stewart Street, Seattle Washington 98101 for the benefit of King County, a political subdivision of the State of Washington, as beneficiary and secured party ("Beneficiary") whose address is King County Metro Transit Division, King Street Center, Mail Stop KSG-TR-0435, 201 Jackson Street, Seattle, WA 98104, Attn: Manager: Design and Construction.

[NTD: Name of Grantor and members to be revised upon receipt of organizational documents for such entities]

WITNESSETH

A. Grantor and Beneficiary are parties to that certain Garage Ground Lease (the "Garage Ground Lease") and that certain Transit Center Ground Lease (the "Transit Center Ground Lease") each dated as of _____, 2012 by and between Beneficiary as ground lessor and Grantor as ground lessee with respect to certain real property located in the Cities of Kirkland and Bellevue, King County, Washington. The Garage Ground Lease and the Transit Center Ground Lease are hereinafter referred to collectively as the "Ground Leases."

B. Concurrently therewith, the Beneficiary as tenant and Grantor as landlord entered into that certain Lease (with Option to Purchase-Transit Center) (the "Transit Center Project Lease") and that certain Lease (with Option to Purchase-Parking Garage) (the "Garage Project Lease") each dated as of _____, 2012. The Transit Center Project Lease and the Garage Project Lease are hereinafter referred to collectively as the "Project Leases." Pursuant to the terms of the Project Leases, Grantor agreed, among other things, to design, develop, finance, lease, construct and complete the Transit Center and the Garage on the Transit Center Land and the Garage Land, each as defined in the applicable Project Lease, and Grantor agreed to lease the Transit Center and the Garage upon Final Completion thereof to Beneficiary for a term, rent and other terms and conditions set forth in the applicable Project Lease.

C. As part of its obligations under the Project Leases, Grantor has entered into that certain lease dated _____, 2012 (the "Park and Ride Lease") with _____ ("Landlord"), which provides replacement parking for the minimum number of vehicles required under the Phasing Plan which cannot be accommodated on the Land under the Phasing Plan, which parking is suitable for use as a park and ride lot by transit commuters utilizing Beneficiary's transit center in South Kirkland, during the construction of the Transit Center and the Garage on the Transit Center Land and the Garage Land.

D. Grantor has agreed to assign Beneficiary all of its right, title and interest under the Park and Ride Lease as further security for the performance of its obligations under Section 16 of the Project Leases.

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration in hand paid, GRANTOR HEREBY IRREVOCABLY GRANTS, BARGAINS, SELLS, CONVEYS, TRANSFERS AND ASSIGNS to Trustee, in trust, with power of sale and right of entry and possession, all of Grantor's rights in the leasehold estate ("Leasehold Estate") created by and under the Park and Ride Lease between _____ as landlord and Grantor as tenant in certain real property situated in King County, Washington and more particularly described in Exhibit A attached hereto and by this reference incorporated herein, including all of the improvements and fixtures now or hereafter erected thereon, together with all of Grantor's right, title or interest in or to the fee title to said real property or any part thereof at any time acquired by Grantor in the event that the fee title to the real property and the Leasehold Estate are not kept separate and apart, but are merged by operation of law, or otherwise and all privileges and other benefits of any kind or nature created by or available to Grantor under the Park and Ride Lease including but not limited, to all right, title and interest of Grantor now or hereafter existing, in and to all modifications and amendments to the Park and Ride Lease; all rights of Grantor to renew or extend the term of the Leasehold Estate, whether such rights be contractual, statutory or otherwise, all rights of Grantor to cancel surrender or terminate the Park and Ride Lease or the Leasehold Estate, and (iv) all proceeds and claims arising on account of any damage to or taking of such real property or the Leasehold Estate or any part thereof, together with all of the tenements, hereditaments and appurtenances now or hereafter thereunto belonging or in any wise appertaining and the rents, issues and profits thereof. All of the property conveyed or intended to be conveyed to Trustee is hereafter referred to as the "Property".

FOR THE PURPOSE OF SECURING the payment and performance of Grantor's obligations under Section 16 of the Project Leases, including, but not limited to, Grantor's obligations to lease replacement parking for the minimum number of vehicles required under the Phasing Plan which cannot be accommodated on the Land under the Phasing Plan and which otherwise meets the requirements of Section 16 of the Project Leases, for use by transit commuters utilizing Beneficiary's transit center in South Kirkland and Grantor's obligation to pay all rent and other charges and perform all of its obligation under the Park and Ride Lease from and after the Effective Date of the Project Leases and until a date which is the later of three (3) years or 180 days following the later of Final Completion of the Transit Center and/or each the Garage, as defined in the Project Leases, and to pay Beneficiary certain amounts in connection with Beneficiary's providing increased transit service and notifying transit users regarding changes in transit services and transit commuter parking as provided under Section 16.2 of the Project Leases.

To protect the security of this Deed of Trust, Grantor covenants and agrees as follows:

1. Each of the recitals set forth above is incorporated into this Deed of Trust as though fully set forth herein. All capitalized terms not otherwise defined herein shall have the same definitions as set forth in the Transit Center Project Lease or, if not defined therein, as defined in the Transit Center Ground Lease.

2. The lien of this Deed of Trust is a lien solely on the leasehold estate of Grantor under the Park and Ride Lease and the interest of Grantor in the Property. Grantor represents, warrants, covenants and agrees with Beneficiary that the Park and Ride Lease is in full force and effect, Grantor has performed all of its obligations under the Park and Ride Lease and there is no event that with the giving of notice, the passage of time or both, would constitute an event of default by either Landlord or Grantor under the Park and Ride Lease. Grantor shall at all times pay

all rent and other charges and perform all obligations of the tenant under the Park and Ride Lease and exercise all of its rights and options (including options to extend the term) under the Park and Ride Lease. Grantor will promptly notify Beneficiary of any default by Landlord under the Park and Ride Lease and will promptly deliver to Beneficiary a true copy of any notice of default served by Landlord or others on Grantor relating to the Park and Ride Lease.

3. Grantor agrees that it shall not, without the prior written consent of the Beneficiary:

(a) modify, amend, cancel, terminate or consent to the termination of the Park and Ride Lease;

(b) assign or sublease all or any portion of its rights under the Park and Ride Lease; or

(c) pledge, transfer, mortgage, grant a security interest in, or otherwise encumber its rights under the Park and Ride Lease, nor permit any lien, charge or encumbrance upon its interest under the Park and Ride Lease (except in favor of Beneficiary).

4. Grantor agrees to pay before delinquency all lawful taxes and assessments upon the Property and to keep the Property free and clear of all other charges liens, or encumbrances impairing the security of this Deed of Trust. Grantor agrees to defend any action or proceeding purporting to affect the security hereof or the rights or powers of Beneficiary or Trustee and to pay all costs and expenses, including costs of title search and attorney's fees in a reasonable amount, in any such action or proceeding and in any suit brought by Beneficiary to foreclose this Deed of Trust. Grantor agrees to pay all costs, fees and expenses in connection with this Deed of Trust including the expenses of the Trustee incurred in enforcing the obligations secured hereby and Trustee's and Beneficiary's attorney's fees actually incurred as provided by statute.

5. Grantor acknowledges and agrees that neither the foregoing grant of a deed of trust and assignment of the Park and Ride Lease to Beneficiary for security purposes, nor the exercise by Beneficiary of any of its rights or remedies under this Deed of Trust, including, but not limited to the appointment of a receiver for the Property by any court at the request of Beneficiary or by agreement with Grantor, shall be deemed to make Beneficiary a "mortgagee-in-possession" or otherwise responsible or liable in any manner with respect to the Property or the use, occupancy, enjoyment or operation of all or any portion thereof, unless and until Beneficiary, in person or by agents, assumes actual possession thereof and expressly assumes in writing all of the right, title and interest of Grantor under the Park and Ride Lease by written notice to Landlord. Beneficiary shall have the right to offset all amounts paid by Beneficiary under the Park and Ride Lease against the Monthly Rent payable under the Project Leases. Nothing contained in this Deed of Trust obligates Beneficiary to perform any obligation under the Park and Ride Lease, or to take any action thereunder or to pay any rent or expend any money or incur any expense or discharge any obligation, duty or liability of the Grantor as tenant under the Park and Ride Lease.

6. All notices or requests required or permitted under this Deed of Trust shall be in writing, shall be personally delivered or sent by certified mail, return receipt requested, postage prepaid, by nationally recognized, overnight courier or by facsimile transmission and shall be deemed given when so delivered, received or faxed (provided the fax machine has issued a printed

confirmation of receipt). All notices or requests to any party shall be sent to the other party as follows:

If to Grantor: Kirkland Park & Ride, L.L.C.
11624 SE 5th Street, Suite 200
Bellevue, WA 98005 Attention: Gary Young
Facsimile: (425) 586-7700

If to Beneficiary: King County Property Services Division
500 King County Administration Building
500 Fourth Avenue
Seattle, WA 98104
Facsimile: (206) 205-5070

And: Manager, Design and Construction
King County Metro Transit Division
King Street Center, Mail Stop KSC-TR-0435
201 Jackson Street
Seattle, WA 98104
Facsimile: (206) 684-1803

Such addresses may be amended by notice to the other parties given as provided above, except that notice of any such change in address shall be effective only upon receipt.

7. The Trustee shall reconvey all or any part of the property covered by this Deed of Trust to the person entitled thereto on written request of the Grantor and the Beneficiary, or upon satisfaction of the obligation secured and written request for reconveyance made by the Beneficiary or the person entitled thereto.

8. Upon default by Grantor in the performance of any agreement contained herein or in the Park and Ride Lease, all sums secured hereby shall immediately become due and payable at the option of the Beneficiary. In such event and upon written request of Beneficiary, Trustee shall sell the trust property, in accordance with the Deed of Trust Act of the State of Washington, at public auction to the highest bidder. Any person except Trustee may bid at Trustee's sale. Trustee shall apply the proceeds of the sale as follows: to the expense of the sale, including a reasonable Trustee's fee and attorney's fee; to the obligation secured by this Deed of Trust; the surplus, if any, shall be distributed to the persons entitled thereto.

9. Trustee shall deliver to the purchaser at the sale its deed, without warranty, which shall convey to the purchaser the interest in the Property which Grantor had or had the power to convey at the time of Grantor's execution of this Deed of Trust, and such as Grantor may have acquired thereafter, Trustee's deed shall recite the facts showing that the sale was conducted in compliance with all the requirements of law and of this Deed of Trust, which recital shall be prima facie evidence of such compliance and conclusive evidence thereof in favor of bona fide purchaser and encumbrances for value.

10. The power of sale conferred by this Deed of Trust and by the Deed of Trust Act of the State of Washington is not an exclusive remedy and Beneficiary may cause this Deed of Trust to be foreclosed as a mortgage, and may seek appointment of a receiver for the Property.

11. In the event of the death, incapacity, disability or resignation of Trustee, Beneficiary may appoint in writing a successor trustee, and upon the recording of such appointment in the mortgage records of the county in which this Deed of Trust is recorded, the successor trustee shall be vested with all powers of the original trustee. The Trustee is not obligated to notify any party hereto of pending sale under any other Deed of Trust or of any action or proceeding in which Grantor, Trustee or Beneficiary shall be a party unless such action or proceeding is brought by the Trustee.

12. Grantor further agrees as follows:

(a) This Deed of Trust may be amended only by a written instrument signed by Grantor and Beneficiary and shall be governed by and construed and enforced in accordance with the laws of the State of Washington.

(b) This Deed of Trust shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto

(c) The obligations evidenced by the Ground Leases, the Project Leases and the Park and Ride Lease were incurred primarily for commercial, investment or business purposes and not for personal family or household purposes within the meaning of RCW 19.52.080.

(d) The Property is not used primarily for agricultural or farming purposes.

(e) Washington State Notice. ORAL AGREEMENTS OR ORAL COMMITMENTS TO LOAN MONEY, EXTEND CREDIT OR TO FORBEAR FROM ENFORCING REPAYMENT OF A DEBT ARE NOT ENFORCEABLE UNDER WASHINGTON LAW.

IN WITNESS WHEREOF, Grantor has executed this Leasehold Deed of Trust and Assignment of Lease for Security Purposes as of the day and year first above written.

KIRKLAND PARK & RIDE, L.L.C., a
Washington limited liability company

By: KTOD DEVELOPER, , L.L.C., a
Washington limited liability company, Its
Manager

By: _____
Name: _____
Its: _____

State of WASHINGTON)
) ss.
County of KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me and said person acknowledged that s/he signed this instrument, on oath stated that s/he was authorized to execute the instrument and acknowledged it as the _____ of KTOD DEVELOPER L.L.C., a Washington limited liability company, Manager of KIRKLAND PARK & RIDE L.L.C., a Washington limited liability company to be the free and voluntary act and deed of such party for the uses and purposes mentioned in the instrument,

GIVEN UNDER MY HAND AND OFFICIAL SEAL this ___ day of _____, 2012.

Notary Public
Print Name: _____
My Commission expires: _____

Exhibit A

Legal Description of Land Leased Under Park & Ride Lease

Certain real property situated in the City of _____, King County, Washington and more particularly described as follows:

