

PROJECT MANUAL

FOR

**PENINSULA HOUSING AUTHORITY
EKLUND HEIGHTS PHASE 4**

**Design Development
Outline Specifications**
August 22, 2025



Prepared for:

Peninsula Housing Authority

2603 S Francis Street
Port Angeles, WA 8362

Prepared By:

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275 5th Street, Ste. 100
Bremerton, WA 98337



SECTION 000103
PROJECT DIRECTORY

PART 1 GENERAL

1.01 OWNER

- A. PENINSULA HOUSING AUTHORITY, 2603 S FRANCIS ST, PORT ANGELES, WA 98362
 - 1. CONTACT: SARAH MARTINEZ, 360.452.7631 EXT 101, smartinez@peninsulapha.org

1.02 ARCHITECT

- A. RICE FERGUS MILLER, 275 5TH ST, SUITE 100, BREMERTON, WA 98337
 - 1. ARCHITECT OF RECORD: DEAN KELLY, 512.632.0185, DKelly@rfmarch.com
 - 2. PROJECT MANAGER: LORIE LIMSON COOK, 253.988.3702, LlimsonCook@rfmarch.com

1.03 CIVIL ENGINEER

- A. COUGHLIN PORTER LUNDEEN, 801 SECOND AVE, STE 900, SEATTLE, WA 98104
 - 1. BART BALKO, 206.399.6857, BartB@cplinc.com

1.04 LANDSCAPE ARCHITECT

- A. LYON LANDSCAPE ARCHITECTS, 2111 S C ST, TACOMA, WA 98402
 - 1. MOGHAN LYON, 253.209.4053, moghan@lyonla.com

1.05 STRUCTURAL ENGINEER

- A. ATLAS DESIGN GROUP, 35314 SE CENTER ST, SNOQUALMIE, WA 98065
 - 1. CHRIS PADIN, 425.400.9239, CHRIS.PADIN@ADG-INC.COM

1.06 MECHANICAL, PLUMBING, AND ELECTRICAL ENGINEER

- A. IMEG, 1725 WESTLAKE AVE N, STE 300, SEATTLE, WA 98109
 - 1. PROJECT MANAGER: STEVEN HUFF, 206.788-4579. Steven.D.Huff@imegcorp.com

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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- D. **012300 - Alternates**
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ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

- A. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts plus delivery to site
- B. Costs not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation, finishing, and overhead and profit.
- C. Contractor Responsibilities:
 - 1. Assist Architect or Owner in selection of products, suppliers, and installers.
 - 2. Obtain proposals from suppliers and installers and offer recommendations.
 - 3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
 - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- D. Differences in costs will be adjusted by Change Order.

1.04 ALLOWANCES SCHEDULE

- A. Section 265100 Interior Lighting: Include the stipulated sum of \$ TBD for purchase and delivery of interior light fixtures and lighting controls.
- B. Section 265600 Exterior Lighting: Include the stipulated sum of \$ TBD for purchase and delivery of exterior light fixtures and lighting controls.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 012300
ALTERNATES**

PART 1 GENERAL

1.01 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.02 SCHEDULE OF ALTERNATES

- A. Alternate No. A - 1:
 - 1. Base Bid Item: Section 323119 Decorative Metal Fences and Gates and as indicated on Drawings
 - 2. Alternate Item: Deduct for 323111 Chain Link Fences and Gates at all locations Decorative Metal Fences and Gates are indicated.
- B. Alternate No. A - 2:
 - 1. Base Bid Item: Section 092116 Gypsum Board Assemblies - Provide resilient channel at all residential units:
 - a. Both sides of residential unit demising walls.
 - b. Residential unit side of hallway walls.
 - c. Ceiling of first floor units.
 - 2. Alternate Item: Deduct for no resilient channels.
- C. Alternate No. A - 3:
 - 1. Base Bid Item: Section 074646 Fiber Cement Siding as indicated on drawings.
 - 2. Alternate Item: Other siding system(s) TBD at select locations TBD
- D. Mechanical and Electrical Alternates
 - 1. See Mechanical and Electrical Narratives for additional proposed Alternates.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 013329.01
SUSTAINABLE DESIGN REPORTING - ESDS V4.1

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General requirements for sustainable design reporting.
 - 1. This project intends to be constructed using procedures and documentation complying with the Washington State Evergreen Sustainable Development Standard (ESDS) v4.1 and other requirements identified in this specification.
 - 2. Attachment A: The ESDS v4.1 Checklist for this project is attached to this Section identifying the sustainable Design Elements required for this project.
 - 3. Attachment B: ESDS Narrative for this project is attached to this Section identifying the sustainable design compliance path.

1.02 REPORTING REQUIREMENTS

- A. Free-standing furniture and furnishings are not included in the Contract.
- B. Contractor must familiarize himself with the relevant reporting requirements and provide the necessary information and instruction to all subcontractors and installers.

1.03 PRODUCT REPORTING SCOPE

- A. General: Product reporting scope for the purpose of achieving the selected sustainability certification level is limited to those items directly affecting ability to achieve targeted credits.

1.04 SUBMITTALS

- A. Sustainable Design Documentation: The scope of required documentation is specified in ESDS v4 and is incorporated by Reference into this work.
- B. Contractor is required to provide the Documentation applicable to each Design Element Identified on the Checklist applicable to construction activities, materials, and system.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROCEDURES

- A. Submit sustainable design documentation required of Contractor, using procedures defined under Submittals for Information in Section 013000.

- B. Where an item of sustainable design documentation is specified, fill out and submit electronically the appropriate forms, using appropriate software.
 - 1. Fill out one line for each different brand name product and each different manufacturer of a lot of commodity products.
 - 2. Where required attachments are specified, attach the documentation.
 - 3. Mark each blank with the appropriate information; use "ATT" for items attached; if any item is not relevant use the code "NR"; if any item is not available use the code "NA".
- C. Each form must be signed by the entity capable of certifying the information.
 - 1. Certification signatures must be made by an officer of the company.
 - 2. For products, certification must be made by the manufacturer not the supplier.
 - 3. For custom fabricated products, certification by the fabricator is acceptable.
- D. Submit the completed forms in accordance with the requirements of Section 013000, as information submittals.
 - 1. Give each form a unique submittal number.
 - 2. Do not combine sustainable design documentation with product data or shop drawing submittals.
- E. Specific General Trades, Owner/Architect Requirements in addition to requirements in technical sections:
 - 1. Physical barriers to pest control: Provide rodent and corrosion-resistant screens on all openings greater than 1/4 inch.
 - 2. Architect will provide periodic visual observation of exterior envelope of materials, installation methods, and potential water and moisture infiltration.
 - 3. O&M Instructions/Manuals: At completion of the work, Owner to provide permanently on site and digitally available online.
 - 4. One-year Post-Occupancy Evaluation: As part of one -year Warranty Walk-Through, Owner and Architect to review durability, original intent vs actual functionality, and lessons learned.

END OF SECTION

- B. Where an item of sustainable design documentation is specified, fill out and submit electronically the appropriate forms, using appropriate software.
 - 1. Fill out one line for each different brand name product and each different manufacturer of a lot of commodity products.
 - 2. Where required attachments are specified, attach the documentation.
 - 3. Mark each blank with the appropriate information; use "ATT" for items attached; if any item is not relevant use the code "NR"; if any item is not available use the code "NA".
- C. Each form must be signed by the entity capable of certifying the information.
 - 1. Certification signatures must be made by an officer of the company.
 - 2. For products, certification must be made by the manufacturer not the supplier.
 - 3. For custom fabricated products, certification by the fabricator is acceptable.
- D. Submit the completed forms in accordance with the requirements of Section 013000, as information submittals.
 - 1. Give each form a unique submittal number.
 - 2. Do not combine sustainable design documentation with product data or shop drawing submittals.
- E. Specific General Trades, Owner/Architect Requirements in addition to requirements in technical sections:
 - 1. Physical barriers to pest control: Provide rodent and corrosion-resistant screens on all openings greater than 1/4 inch.
 - 2. Architect will provide periodic visual observation of exterior envelope of materials, installation methods, and potential water and moisture infiltration.
 - 3. O&M Instructions/Manuals: At completion of the work, Owner to provide permanently on site and digitally available online.
 - 4. One-year Post-Occupancy Evaluation: As part of one -year Warranty Walk-Through, Owner and Architect to review durability, original intent vs actual functionality, and lessons learned.

END OF SECTION

Evergreen Standard v4.1 Checklist

INSTRUCTIONS: **Do not leave any cells blank.**

For Mandatory Criteria:

- Indicate with a capital "X" all criteria that apply to your project in the Points column.
- Select "N/A" if the criterion does not apply to your project.

For Optional Criteria:

- New Construction projects must achieve 50 points; Rehab projects must achieve 40.
- Enter the appropriate number of optional points you are claiming in the Points column, or 0 if no points are selected.

Evergreen Sustainable Development Standard v4.1 Checklist

Project Name: Eklund Heights Phase 4

Site Name: Eklund Heights

Site Region: Rural

Site Activity: New Construction

Project Type: Rental

Design Element: Integrative Process

#	Title	Requirement Type/Optional Points	Points
1.01 a	Integrative Process Planning	Mandatory	X
b	Integrative Design: Documentation	Mandatory	X
c	Integrative Design: Construction Management	Mandatory	X
d	Integrative Design: Post Occupancy Evaluation	Optional 6 Points	6
1.02	Advanced Tools	Optional up to 13 Points	0
1.03	Beyond ADA: Universal Design	Optional 8 Points	8
1.04	Healing-Centered Design	Optional 8 Points	0
1.05	Active Design: Promoting Physical Activity	Optional 8 Points	0
Section 1 SUBTOTAL			14

Design Element: Location & Neighborhood Fabric

#	Criterion Title	Requirement Type/Optional Points	Points
2.01	Appropriate Project Siting	Mandatory	X
2.02 a	Connections to Existing Development & Infrastructure		
b	Connections to Existing Development & Infrastructure	Optional 2 Points for Rural/Tribal New Construction	2
2.03 a	Compact Development	Mandatory for New Construction	X
b	Compact Development: Higher Density	Optional 5 Points for New Construction	5
2.04 a	Access to Services	Mandatory for New Construction	X
b	Enhanced Access to Services	Optional 5 Points	5
2.05 a	Access to Transit	Mandatory for New Construction	X
b	Enhanced Access to Transit	Optional 2, 6, or 8 Points	8
2.06 a	Preservation of and Access to Open Space	Mandatory for Rural/Tribal New Construction	X
b	Preservation of and Access to Urban Open Space		
2.07	Walkable Neighborhoods - Sidewalks & Pathways	Mandatory Except for Tribal	X
2.08	Reducing Private Automobile Use	Optional Up to 5 Points	0
2.09	Greyfield, Brownfield, or Adaptive Reuse Site	Optional 5 or 7 Points	0
2.10	Access to Fresh, Local Foods	Optional 3 Points	0
2.11	Locating in Certified Communities	Optional 8 Points	0
2.12 a	Access to Broadband: Broadband Ready	Mandatory	X
b	Access to Broadband: Connectivity	Optional 6 Points	0
Section 2 SUBTOTAL			20

Design Element: Site Improvements

#	Criterion Title	Requirement Type/Optional Points	Points
3.01	Environmental Remediation	Mandatory	X
3.02 a	Landscaping	Mandatory	X
b	Advanced Landscaping	Optional 5 Points	5
c	Landscaping- Significant Trees	Optional up to 5 Points	0
3.03	Efficient Irrigation	Mandatory	X
3.04	Storm Drain Labels	Mandatory	X
Section 3 SUBTOTAL			5

Design Element: Water Conservation

#	Criterion Title	Requirement Type/Optional Points	Points
4.01 a	Water-Conserving Fixtures	Mandatory	X
b	Advanced Water-Conserving Fixtures	Optional up to 6 Points	0
4.02 a	Leak Detection		
b	Leak Detection Pre-Acquisition		
4.03 a	Lead Service Lines in Existing Buildings		
b	Lead Service Lines in New Buildings	Optional 3 Points for New Construction with Demolition	0
4.04 a	Water Metering – New Construction	Optional 2 Points for New Construction	0
b	Water Metering - Rehab		
4.05	Water Reuse	Optional up to 12 Points	0
4.06	Efficient Plumbing Layout & Design	Optional 4 Points	0
4.07	Access to Potable Water During Emergencies	Optional 8 Points	0
Section 4 SUBTOTAL			0

Design Element: Energy Efficiency

#	Criterion Title	Requirement Type/Optional Points	Points
5.01 a	Building Performance – Commissioning	Mandatory for New Construction	X
b	Building Performance – Weatherization		
5.02 a	Additional Efficiency	Optional 3-25 Points for New Construction	0
b	Additional Efficiency - Window Replacement		
5.03	ENERGY STAR Appliances	Mandatory	X
5.04	Central Laundry	Optional 3 Points	3
5.05	Electricity Metering		
5.06	Renewable Energy		
5.07 a	Photovoltaic Ready	Mandatory for New Construction	X
b	Photovoltaic Ready - Upgrades		
5.08 a	Domestic Water Heating	Mandatory for New Construction	X
b	Domestic Water Heating – Higher Efficiency		
5.09	Space Heating & Cooling Equipment Replacement		
Section 5 SUBTOTAL			3

Design Element: Materials

#	Criterion Title	Requirement Type/Optional Points	Points
6.01 a	Healthier Material Selection	Mandatory	X
b	Healthier Material Selection - Advanced	Optional up to 15 Points	0
c	Healthier Material Selection - Toxin-Free Recycled Content	Optional up to 3 Points	0
6.02 a	Embodied Carbon Reduction - Materials	Optional up to 11 Points	2
b	Embodied Carbon Reduction - Regional Sourcing	Optional up to 4 Points	0
6.03	Construction Waste Management	Optional Up to 5 Points	2
6.04 a	Reduced Heat Island Effect: Roofing	Optional 2 Points	0
b	Reduced Heat-Island Effect: Paving	Optional 2 Points	0
6.05	Socially Sustainable Products	Optional up to 3 Points	0
Section 6 SUBTOTAL			4

Design Element: Healthy Living Environment

#	Criterion Title	Requirement Type/Optional Points	Points
7.01	Combustion Equipment	Mandatory	X
7.02	Garage Isolation	Mandatory	n/a
7.03	Integrated Pest Management	Mandatory	X
7.04	Lead-Safe Work Practices	Mandatory for Rehab & New Construction with Demolition	n/a
7.05 a	Smoke-Free Units and Common Areas	Mandatory	X
b	Smoke-Free Property	Optional 7 Points	7
7.06	Exhaust Fans – Bathroom Upgrade		
7.07 a	Exhaust Fans – Kitchen	Mandatory for New Construction	X
b	Exhaust Fans – Kitchen Upgrade		
7.08 a	Ventilation	Mandatory for New Construction (single family & ≤3 Stories)	X
b	Ventilation Upgrades		
c	Ventilation - Outside Air Filtration	Optional 8 Points	0
7.09	Clothes Dryer Exhaust	Mandatory	X
7.10	Mold Prevention: Surfaces	Mandatory	X
7.11	Mold Prevention: Tub & Shower Enclosures	Mandatory	X
7.12	Vapor Barrier Protection Strategies	Mandatory for Projects with Foundation Work	n/a
7.13	Enhanced Building Envelope Design	Optional up to 8 Points	0
Section 7 SUBTOTAL			7

Design Element: Operations, Maintenance & Resident Management

#	Criterion Title	Requirement Type/Optional Points	Points
8.01 a	Building Maintenance Manual – Sustainability Supplement	Mandatory	X
b	O&M Instructions for Maintenance Staff	Optional 7 Points	7
8.02	Resident/Owners’ Manual	Mandatory	X
8.03	Walk-Throughs and Orientations to Property Operation	Mandatory	X
8.04	Project Data Collection	Optional 5 Points	0
8.05	Educational Signage	Optional 1 Point	0
8.06	ESDS Certification Plaque	Optional 2 Points	0
Section 8 SUBTOTAL			7

Thresholds

In order to ensure that your project will pass the threshold for the Evergreen Sustainable Development Standard, we advise building in a "cushion" of 5-10 points above what is required.

New Construction projects must achieve 50 points
Rehab projects must achieve 40 points, unless otherwise approved

Section 1	14
Section 2	20
Section 3	5
Section 4	0
Section 5	3
Section 6	4
Section 7	7
Section 8	7
Overall Checklist Total	60

DIVISION 01 33 29.01

EVERGREEN SUSTAINABLE DEVELOPMENT STANDARD V4.1 NARRATIVE

PART 1 GENERAL

1.01 INTRODUCTION

- A. This section outlines the requirements and responsibilities for achieving compliance with the Evergreen Sustainable Development Standard (ESDS) Version 4.1 for Eklund Heights.
- B. ESDS v4.1 is a performance-based green building standard required for affordable housing projects funded through the Housing Trust Fund and other public agencies.
- C. The project shall comply with all applicable mandatory criteria and achieve the required number of optional points as outlined in the Evergreen Project Plan (EPP).
- D. All contractors and consultants shall support the Owner's compliance with ESDS requirements as described in this Section and other related sections of the specifications.

1.02 SECTION INCLUDES

- A. Section Includes:
 - 1. General requirements and procedures for the pursuit of Evergreen Sustainable Development Standard (ESDS) New Construction Certification using the Housing Trust Fund Evergreen Sustainable Development Standard v4.1.
 - a. ESDS v4.1 Certification requires 50 points, currently at 60 points. The Work shall incorporate the sustainable design measures and procedures required to achieve this level of ESDS certification.
 - b. Contractor shall comply with performance, administrative and documentation requirements for all ESDS mandatory and selected 'optional' criteria for which the Contractor is assigned responsibility. The ESDS Checklist following this section indicates the mandatory and selected 'optional' criteria to be pursued. Reference 1.7 below for specific ESDS documentation required by Contractor.
 - c. Remaining ESDS mandatory and selected 'optional' criteria required to obtain the Owner's targeted level of ESDS certification are dependent on the Architect, Engineers and other team members, and are not part of the Work of the Contractor's responsibility.

2. Coordination of ESDS requirements with other Sections of this Work, as described in Part 3 of this Section.
3. Coordination with other related requirements within Sections listed in "Related Requirements" and "Submittals."

1.03 RELATED REQUIREMENTS

- A. See "General Conditions of the Contract" for Submittal Procedures
- B. Section 01 7419 – Construction Waste Management and Disposal
- C. Section 01 9113 – General Commissioning Requirements
- D. Divisions 2-48 where ESDS Requirements are specific to the work of each of these sections.

1.04 DEFINITIONS

- A. ESDS/Evergreen [Standard] Checklist – This is a form prepared by the Evergreen Coordinator. It is to support ESDS criteria tracking throughout ESDS implementation, documentation, and submission.
- B. ESDS/Evergreen Project Plan (EPP) – This is a form prepared and submitted by the Evergreen Coordinator. It describes what 'optional' criteria were selected for the project and how mandatory and selected 'optional' criteria will be implemented in the project. This form and the attachments required for mandatory and selected 'optional' criteria are to be submitted for review and approval by the reviewing entity.
- C. ESDS/Evergreen Binder – The Evergreen Coordinator must compile and maintain this binder throughout construction. This binder must be kept on a files sharing site online and may also be kept on site as a physical binder. The binder includes the EPP, the Evergreen Binder Matrix, and all documents required to confirm compliance with ESDS. During construction, the Third Party Verifier, on-site project team (General Contractor, Project Engineer, and any relevant designees/subcontractors), reviewing entity, and other appropriate parties must have access to the binder. Near the end of construction, the property management team must be granted access to the binder.
- D. ESDS/Evergreen Binder Matrix – This is a document to support ESDS documentation tracking and completion of ESDS work. It shall be filled out and included in the ESDS Binder.
- E. Project Sponsor – The project owner/client organization.

- F. Evergreen Advocate (EA) – The Project Sponsor’s representative regarding ESDS implementation. This person must be an employee of the sponsor organization, and their primary responsibility is to conduct the Project Priorities Survey (PPS) and to ensure the findings of the PPS are applied as the project is developed.
- G. Evergreen Coordinator (EC) – The Project Sponsor’s agent regarding ESDS implementation. This person does not need to be an employee of the sponsor organization. This role may be filled by the same person designated to be the EA. The EC completes and maintains the EPP, ESDS Binder, coordinates site visits, ensures that ESDS features are implemented and correctly installed, and troubleshoots any ESDS problems with appropriate project team members.
- H. Third Party Verifier (3PV) – The 3PV’s verifies the correct implementation of ESDS criteria without delaying construction. They conduct ESDS on-site inspections in a consistent, fair, and transparent manner, scheduled to coincide with draw inspections.
- I. Project Priorities Survey (PPS) – This is a survey that must be completed for ESDS Integrative Process Planning (IP) mandatory criteria. It must be completed before ESDS application and submitted in the full application. It will serve as a simple guide to understand the context, population, and environmental considerations that a project must address in order to facilitate a well-informed integrative design process.
- J. Bio-based Materials – Organic material or product containing in whole or part biogenic (biological sources) carbon. Organic materials contain carbon-based compounds in which the carbon is attached to other carbon atoms, hydrogen, oxygen, or other elements in a chain, ring, or three-dimensional structures.
- K. EPA WaterSense – A third party certification program indicating the certified plumbing fixture has been tested for good performance and water savings. Products and services that have earned the WaterSense label have been certified to be at least 20 percent more efficient without sacrificing performance.
- L. Cradle to Cradle Certification – A protocol developed by McDonough Braungart Design Chemistry that establishes guidelines for the manufacture of products in ways that harmonize with natural systems. These guidelines require, for example, that products be recyclable indefinitely, contain no hazardous ingredients, and be manufactured using renewable energy.
- M. Forest Stewardship Council (FSC) – Independent, third-party verification that forest products are produced and sold based on a set of criteria for forest management and chain-of-custody controls developed by the Forest Stewardship Council (FSC), an

international nonprofit organization. FSC criteria for certifying forests around the world address forest management, legal issues, indigenous rights, labor rights, multiple benefits, and environmental impacts.

- N. FloorScore – A third party entity which tests and certifies hard surface flooring and flooring adhesive products, ensuring they meet stringent indoor air quality emissions requirements. FloorScore certification is applicable to any hard surface flooring and flooring adhesives.
- O. Green Label Plus – A voluntary, industry testing program for carpet, adhesive and cushion products which establishes the highest standard for indoor air quality (IAQ) ever set by the carpet industry. The Carpet and Rug Institute (CRI) created Green Label Plus to identify carpets, adhesives and cushions that are tested by an independent, certified laboratory and meet stringent criteria for low chemical emissions.
- P. GreenGuard Select – A chemical exposure minimization standard combining indoor air quality product emissions criteria with other product specific chemical requirements. Criteria includes volatile organic compound (VOC) content limits, lower formaldehyde emission requirements, lead and phthalate content requirements, and commercial furniture testing protocols.
- Q. SCS Indoor Advantage Gold – A certification program, developed by SCS Global Services, certifies compliance with rigorous indoor air quality emission requirements. The program is designed for interior building materials, furnishings and finish systems. This standard aligns with both ANSI/BIFMA M7.1 and X7.1, and CA 01350.
- R. CARB Phase II ULEF – California’s Air Resources Board Phase II is the stringent emission standards for formaldehyde emissions from composite wood products, include hardwood plywood, particleboard, and MDF.
- S. Solar Reflectance – The fraction of solar energy that is reflected by a surface. The standard technique for its determination uses spectrophotometric measurements, with an integrating sphere to determine the reflectance at each wavelength. The average reflectance is then determined by an averaging process, using a standard solar spectrum, as documented by ASTM Standards E903 and E892.

1.05 REFERENCE STANDARDS

- A. Evergreen Sustainable Development Standard Version 4.1 – A guide of all the mandatory and ‘optional’ criteria, which can be viewed or downloaded for free from [Evergreen Sustainable Development - Washington State Department of Commerce](#).

- B. California Department of Public Health (CDPH) Standard Method v1.1 – 2010, CA Section 01350 – A method for emission testing and requirements for all products and materials except furniture. This method, widely recognized as a leadership standard for its stringent scientific criteria and detailed specificity, was developed through an open, consensus process. It uses the chronic reference exposure levels established by the California Office of Environmental Health Hazard Assessment, which include some of the most stringent criteria in use. It also adopted an incorporated the first edition of the ANSI/BIFMA M7.1 standard test method for furniture.

1.06 ORDER OF PRECEDENCE PROVISIONS

- A. In the case of inconsistency or ambiguities in design documents (all specifications and drawings), compliance with the strictest design requirement among conflicting criteria is required.
- B. If provided, alternate pricing for compliance with less strict criteria will be evaluated in addition to the mandatory baseline strictest criteria.
- C. Provide notice upon discovering potential design conflicts prior to bid where possible.

1.07 GENERAL ESDS REQUIREMENTS

- A. Designate a Evergreen Coordinator, responsible for the following ESDS-related tasks and coordination:
 - 1. Scheduling and conducting ESDS meetings, quarterly, throughout construction. Combine with regular project meetings, when possible.
 - 2. Documentation, and associated procedures, as required in all Contractor-assigned ESDS mandatory and selected 'optional' criteria.
 - 3. Monitor all on-site ESDS-related Work while in progress.
- B. Coordinate and schedule site visits with Evergreen Coordinator and Third Party Verifier to allow viewing of all ESDS criteria pursued.
- C. Coordinate and schedule with Evergreen Coordinator visits to allow viewing of related ESDS credits pursued.
- D. Integrate commissioning activities within construction schedule and work with commissioning authority (CxA) to ensure they are able to lead, review and oversee the completion of the commissioning process activities for any central commercial heating,

cooling, water heating and ventilation system. See Section 01 9100 – General Commissioning.

- E. Download the Evergreen Sustainable Development Standard Version 4.1 (see 1.4 A) and keep this guide at the site construction office throughout the duration of construction.
- F. Submit all final ESDS documentation to Evergreen Coordinator.

1.08 SUBMITTALS

- A. All ESDS-related submittals are in addition to typical submittals. In cases where ESDS-submittal requests result in duplication of documentation, these documents must still be submitted to verify compliance of ESDS certification as well as for typical submittal procedures. ESDS-submittals shall have all pertinent ESDS product data highlighted or flagged prior to submission to the Evergreen Coordinator.
- B. ESDS-Procedural Plans: Within 30 days of Notice to Proceed, prior to the start of any demolition, construction or removal of waste from the site, submit the following plans for review and approval:
 - 1. Construction Waste Management Plan – See Section 01 7419.
- C. Preliminary Submittals:
 - 1. Attend ESDS kick-off meeting when concrete foundation is at grade.
- D. Progress Submittals:
 - 1. Report ongoing compliance with Contractor-responsible ESDS credits at all ESDS progress meetings.
- E. Final Submittals: Submit final ESDS related documents to the Evergreen Coordinator, within 30 days of completion of construction.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 ESDS CERTIFICATION

- A. All mandatory and selected 'optional' criteria marked as "Yes" in the final ESDS Checklist must be met in order to achieve ESDS v4.1 New Construction certification with 50 points, currently at 60 points.

- B. Prior to construction, confirm that site does not present any obstacles to achievement of the ESDS mandatory and selected 'optional' criteria for which the Contractor is responsible.

END OF SECTION

SECTION 014216
DEFINITIONS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Provide: To furnish and install.
- E. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 014533
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Code or Building Code: ICC (IBC), International Building Code, most recent edition adopted by authority having jurisdiction, including all applicable amendments and supplements without limitation, and specifically Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspections and Tests: Inspections and testing of materials, installation, fabrication, erection, or placement of components and connections mandated by Building Code to safeguard public welfare.
 - 1. Special inspections and tests are separate from and independent of tests and inspections conducted by Owner or Contractor for purposes of quality assurance and contract administration.

1.02 SUBMITTALS

- A. Special Inspection Agency Qualifications: Prior to start of work, Special Inspection Agency is required to:
 - 1. Submit agency name, address, and telephone number, names of full time specialist and responsible officer.
 - 2. Submit certification that Special Inspection Agency is acceptable to AHJ.
- B. Testing Agency Qualifications: Prior to start of work, Testing Agency is required to:
 - 1. Submit agency name, address, and telephone number, and names of full time specialist and responsible officer.
 - 2. Submit certification that Testing Agency is acceptable to AHJ.
- C. Test Reports: After each test or inspection, Testing Agency is required to submit report to Architect, Owner, and to AHJ.
- D. Certificates: When required by AHJ, Special Inspector will submit certification by manufacturer, fabricator, and installation subcontractor to Architect, Owner, and AHJ.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- E. Fabricator's Inspection Reports: When required by AHJ, submit reports to Architect, Owner and AHJ.

1.03 SPECIAL INSPECTION AND TESTING AGENCY

- A. Owner to employ services of Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by building code.
- B. Special Inspection Agency may delegate to independent testing agency to perform testing and sampling associated with special inspections and required by building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of contract documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SPECIAL INSPECTIONS AND TESTING

- A. The Code requires special inspections and testing of certain materials, components, assemblies, and connections used in constructing the project. Special inspections and testing will be performed in accordance with the Code and as required on the Structural Drawings.
- B. Special inspections and testing will be performed in accordance with the Code for the following materials and project components:
 - 1. Concrete.
 - 2. Wood.
 - 3. Soils.
 - 4. Fire-resistant penetrations and joints.

3.02 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified reference standards.
 - 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 - 4. Promptly notify Architect, Owner, and Contractor of observed irregularities or non-compliance of work or products.
 - 5. Perform additional tests and inspections required by Architect, Owner, or AHJ.

6. Submit reports of all tests or inspections specified.
7. At completion of the work, provide Certification to the Architect, Owner, and AHJ that all required Special Inspections and Tests have been completed and all discrepancies resolved.

END OF SECTION

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SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 QUALIFICATIONS

1.02 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.03 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.04 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

3.05 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.06 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.07 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- D. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- E. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

1.02 SUBMITTALS

- A. Sustainable Design Submittals: Submit Waste Management Plan and Waste Disposal Reports in accordance with procedures specified in Section 01329.01 Sustainable Design Reporting - ESDS v4.1.
- B. At completion of project, prior to Certificate of Occupancy, submit Waste Diversion Report to the Authority Having Jurisdiction in accordance with 2021 IBC WA State Amendments Appendix P Construction and demolition Material Management.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
- D. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- E. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
 - 1. Recycle Materials: Divert minimum of 50 percent of construction waste from landfill.
- F. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- G. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

**SECTION 017800
CLOSEOUT SUBMITTALS**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Project Record Documents: Submit documents to Owner for initial review prior to Substantial Completion.
- B. Operation and Maintenance Data:
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.

PART 3 EXECUTION

2.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.

2.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

2.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.

2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
1. Cleaning and maintenance produces and procedures shall be in compliance with requirements of Section 013329.01 Sustainable Design Reporting - ESDA v4.1.
 2. Include sign-in sheets of all Owner Instruction and training sessions with name and contract information of Instructor and all Attendees.

2.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

2.05 ELECTRONIC FILES

- A. Provide PDF files of all documents, Record Documents, Operation and Maintenance Data, and Operation and Maintenance Data for Materials and Finishes, with Chapters or Sections electronically bookmarked.

2.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

END OF SECTION

SECTION 018000.01
ENERGY PERFORMANCE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General energy performance requirements:
1. This project intends to be designed and constructed using procedures and documentation complying with the Washington State Energy Code – Commercial, 2021 Edition, current editions.
 2. Attachment A: The Energy Compliance Requirements Narrative is attached to this Section identifying the project requirements and compliance path required for this project.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SEE ATTACHED NARRATIVE

END OF SECTION

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ENERGY COMPLIANCE REQUIREMENTS NARRATIVE

PART 1 GENERAL

1.01 INTRODUCTION

- A. Due to the complexity and inter-discipline coordination required to fully comply with the 2021 Washington State Energy Code (WSEC) this stand-alone narrative has been provided for all trades to reference rather than duplicating energy code notes within multiple narratives.
- B. While this narrative identifies key energy code compliance items, the specific design elements are still included within the respective trade narratives. For example, if an onsite photovoltaic system is required as part of the energy code compliance package, that requirement will be indicated in this narrative, but the system capacity, components, and design elements will be described in detail in the Division 26 Electrical Systems Narrative.

1.02 GENERAL PROJECT ENERGY CODE COMPLIANCE PATH

- A. Because the dwelling units are accessed from an interior corridor, under the 2021 WSEC this project is defined as a "Commercial Building" and must follow the Commercial provisions of the energy code.
- B. This project is utilizing the Prescriptive Path, as described in 2021 WSEC C401.2, Option 1. All the provisions of sections C402, C403, C404, C405, C406, C408, C409, C410, C411, and C412 must be met.

1.03 SPECIFIC ENERGY CODE COMPLIANCE NOTES

- A. This narrative does not list every required item in the energy code, but instead provides details on sections of the energy code that may require significant explanation or coordination. The design specifics for complying with these items are included in the respective Architecture, HVAC, Plumbing, and Electrical drawings and narratives.

1.04 WSEC C402.1.5 ENVELOPE COMPONENT PERFORMANCE CALCULATION

- A. Because this project is utilizing the prescriptive energy code compliance path, it must demonstrate that the proposed whole-project heat loss from the WSEC C402.1.5 Component Performance calculation (aka UA calculation) does not exceed that of a prescriptive code building.

1. Thermal envelope, moisture barrier, and air barrier design are by architect and/or building envelope and air barrier consultant.
2. IMEG will maintain the Component Performance calculation and coordinate thermal envelope assembly performance requirements with design team.
3. IMEG has provided an annotated set outlining envelope thermal performance/ insulation requirements for the DD package. See: "PHA Eklund Heights - Energy Annotated Envelope Set - DD.pdf".

1.05 WSEC SECTIONS C403-C405

- A. The Mechanical/Plumbing/Electrical/Lighting Contractor(s) shall be responsible for general compliance with the requirements of Sections C403 – C405.

1.06 WSEC C406.2 ADDITIONAL ENERGY EFFICIENCY + C406.3 LOAD MANAGEMENT REQUIREMENTS

- A. Under the 2021 WSEC, Section C406 has undergone significant revisions compared to the 2018 code cycle. The code section now includes requirements to incorporate measures that reduce annual energy consumption (C406.2 Additional Energy Efficiency Measures) as well as to manage peak-load intensity (C406.3 Load Management Measures). Like the 2018 code cycle, the project must achieve an area-weighted target for C406.2 (and now C406.3), and each measure in the list is still worth a number of credits for a given occupancy type. However, the amount of credits required is now based on the occupancy type(s) present in the project, and the number of credits achieved for each measure has been updated.
- B. Projects may apply different C406.2 Additional Energy Efficiency Measures and C406.3 Load Management Measures to different areas of the building, as long as the area-weighted credits achieved is greater than the minimum number of area-weighted points credits.
- C. For conditioned spaces, the number of C406.2 and C406.3 credits required is dependent on the occupancy type of the space. For unconditioned spaces and open and/or enclosed parking garages, the number of C406.2 credits required is reduced to 50% of the requirement for conditioned spaces, and these spaces are fully exempt from C406.3 (i.e. the number of C406.3 credits required for these spaces is zero).
- D. This project must achieve 41 area-weighted points across the design to satisfy the requirements C406.2 15 area-weighted points across the design to satisfy the

requirements of C406.3

Occupancy Type	Project Square Footage	% Of Floor Area	C406.2 Energy Point Target	C406.3 Load Point Target
Group R-2 Multi-Family Residential	~15,000	100%	41	15

- E. In this narrative, IMEG identifies the package of C406.2 and C406.3 measures incorporated into the design for energy code compliance. See Part 2 of this narrative for details on specific C406.2 and C406.3 options packages.
- F. See Division 22, 23, and 26 for detailed requirements of each C406.2 and C406.3 measure that are applicable to the systems designed by that discipline.

1.07 WSEC SECTION C408 SYSTEM COMMISSIONING REQUIREMENTS

- A. Under the 2021 WSEC, Section C408 requires that a building commissioning process led by a certified commissioning professional and fundamental testing be conducted for systems listed in the following code sections:
 - 1. Section C403 (mechanical systems)
 - 2. Section C404 (service water heating systems)
 - 3. Section C405 (receptacle and lighting control systems)
 - 4. Section C406 or C407 (equipment and systems installed to meet with energy efficiency requirements)
 - 5. Section C409 (energy metering systems)
 - 6. Section C410 (refrigeration systems)
- B. See Division 01 for Commissioning Specifications and Division 22, 23, and 26 for details of requirements for each C408 subsection.

1.08 WSEC SECTION C409 ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

- A. As this new construction project has a gross conditioned floor area of less than 25,000 ft², this project is not required to meet the C409 metering requirements.

1.09 WSEC SECTION C411.1 ON-SITE RENEWABLE ENERGY

- A. New buildings and additions larger than 10,000 ft² of gross conditioned floor area shall include a renewable energy generation system consisting of not less than 0.5 watts rated peak PV energy production per square foot of conditioned space.
 - 1. PHA requested energy production estimates for the energy-code required on-site renewable energy system.
 - 2. Based on a 7.5 kW rated capacity rooftop PV system, IMEG estimates the system will produce:
 - a. ~7,900 kWh of renewable energy annual
 - b. This is worth ~\$700 in offset electricity costs (based on an estimated rate of \$0.09/kWh)
 - c. This will offset ~5-10% of total building energy use based on energy consumption estimates.
- B. See Division 26 for full details of requirements for Section C411.1
- C. To meet the requirements of Section C411.1, Section C411.2 contains options to allow for an off-site PV system (with larger capacity requirements) that can be discussed if it is desired to eliminate on-site renewable energy from this project. This would have to be discussed with the authority having jurisdiction prior to permit submittal to work out the details.

1.10 WSEC SECTION C411.3 SOLAR READINESS

- A. A solar zone shall be located on the roof of the building or on another structure elsewhere on the site and comply with the requirements of Section C411.3. Any current PV installation (such as that required by C411.1) may be located in the C411.3 solar zone.
- B. The minimum area of the solar zone for this building shall be determined by one of the following methods:
 - 1. 40% of roof area per Section C411.3.1, Option 1.

- 2. 20% of electrical service size per Section C411.3.1, Option 2.
- C. See Division 26 for details of requirements for each C411.3 subsection.

1.11 SUSTAINABILITY PROTOCOLS

- A. Evergreen Sustainable Development Standard (ESDS)
 - 1. The project will achieve ESDS 4.1 New Construction certification. MEP Contractors will be involved in coordination efforts required to achieve mandatory and optional pursued criteria credits.
- B. The project is not pursuing any other green rating system at this time.

PART 2 EFFICIENCY PACKAGES

2.01 WSEC C406.2 ADDITIONAL ENERGY EFFICIENCY COMPLIANCE PACKAGE

- A. C406.2 Compliance Package Introduction
 - 1. The package presented in the subsections below represents a selection of C406.2 measures for the Group R-2 occupancy type in the building that brings the entire project into compliance.
- B. C406.2 Compliance Package Description
 - 1. The basis of design to achieve C406.2 Additional Energy Efficiency Compliance is to implement the requirements of C406.2.8- Service Hot Water Distribution Right Sizing, which earns 42 credits, meeting the required 41 credits.
 - a. If desired, alternative C406 compliance packages can be considered.

Total C406 Energy Efficiency Measure Credits achieved BEYOND what is necessary to meet code	ESDS Points
30	5
60	10
90	15
120	20

150	25
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2. In addition to the energy code requirement for C406 credits, points in the ESDS sustainability protocol can be earned by achieving MORE C406 credits than is required for basic energy code compliance:
 - a. The DD Basis of Design achieves approximately 80 more C406 credits than what is necessary to meet code, which puts the project on track to achieve 10 ESDS points
 - 1) The domestic hot water (DHW) Air-to-Water-Heat-Pump plant will achieve C406.2.6.3 for Heat Pump Water Heating, worth 54 C406 credits.
 - (a) PHA requested that IMEG estimate the difference in energy cost between utilizing traditional electric resistance tanks and the specified heat pump water heaters.
 - (b) Based on an assumed occupancy of 30 residents consuming 18 gallons of DHW per day and electricity at \$0.09/kWh, the following table estimates daily, monthly, and annual DHW generation costs for the project:

Energy Cost for DHW	Electric Resistance	DHW HP
Daily	\$11	\$4
Monthly	\$320	\$119
Annually	\$3,899	\$1,444
 - 2) The dwelling unit ventilation systems will achieve C406.2.2.6 for High performance DOAS (though the corridors will not achieve this credit). This results in approximately 25 area-weighted credits, when accounting for only the dwelling unit achievement.
 - b. Project team could discuss if there are additional “easy to achieve” C406 credits that would allow the project to be awarded 15 ESDS points in this category.

C. See Division 22 and 23 narratives for full details.

2.02 C406.3 LOAD MANAGEMENT CREDIT COMPLIANCE PACKAGE

- A. This project will comply with C406.3 Load Management by pursuing C406.3.6 Service Hot Water Energy Storage. This achieves 248 area-weighted C406.3 credits, meeting the minimum required 15 credits.
- B. See Division 22 narrative for full details.

PART 3 VALUE ENGINEERING AND EQUIPMENT SUBSTITUTIONS

3.01 ENERGY IMPACT REVIEW

- A. All VE efforts and Equipment Substitutions must be communicated to the design team to ensure that energy code compliance impacts are recognized and incorporated into the energy code compliance and documentation.

END OF SECTION

SECTION 019113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
 - 1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
 - 2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
 - 3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
 - 4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
- B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.
- C. The Commissioning Authority is employed by Owner.

1.02 SCOPE OF COMMISSIONING

- A. Building systems are to be tested and commissioned to meet WSEC minimum requirements using WSEC Commissioning Compliance Checklist C408.1.4.1 and ESDS Standard Checklist credits established for this project per Section 013329.01 Sustainable Design Reporting.
- B. Refer to technical sections in Divisions 22, 23, and 26 for detailed testing and commissioning requirements.
- C. The following are to be commissioned:
 - 1. Plumbing Systems:
 - a. Water heaters; service water heating systems.
 - 2. HVAC System, including:
 - a. Major and minor equipment items.

- b. Refrigeration Systems.
 - c. Equipment and systems installed to meet energy efficiency requirements.
 - d. Control system.
3. Electrical Systems:
- a. Receptacles and lighting control systems.
 - b. Energy metering systems.
- D. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

1.03 SUBMITTALS

- A. Product Data: If submittals to Architect do not include the following, submit copies as soon as possible:
- B. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- C. Startup Plans and Reports.
- D. Completed Prefunctional Checklists.
- E. At project completion, contractor's Commissioning Agent to provide Owner with completed WSEC Commissioning Compliance Checklist C408.1.4.1 certified by the Commissioning Agent, ready for Owner's signature.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.
- C. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
 - 1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.01 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.
- C. Submit directly to the Commissioning Authority.

3.02 FUNCTIONAL TESTS

- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
- B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.
- C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
- D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
- E. Functional Test Procedures:
 - 1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.03 SENSOR AND ACTUATOR CALIBRATION

- A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

3.04 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- D. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.
- E. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- F. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
- G. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
- H. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
 - 1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority's request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
 - 2. Other points will be monitored by the Commissioning Authority using dataloggers.
 - 3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.
 - 4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. Add design intent documentation furnished by Owner to manuals prior to submission to Owner.

- B. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

END OF SECTION

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**SECTION 033000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- B. Test Reports: Submit report for each test or series of tests specified.

1.02 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Provide admixtures as indicated on structural drawings.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder:
 - 1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.

2.06 CURING MATERIALS

- A. Curing and Sealing Compound, Moisture Emission-Reducing, Penetrating: Clear, water-based, non-film-forming curing agent; capable of providing adequate bond for flooring adhesives, initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission, moisture vapor emission, and alkalinity.
- B. Provide at all locations with floor finishes.
- C. Curing Compound, Non-Dissipating: Liquid, membrane-forming, clear, nonyellowing acrylic; complying with ASTM C309.
 - 1. Vehicle: Water-based.
 - 2. Gloss: Low.
 - 3. Solids by Mass: 15 percent, minimum.
 - 4. Provide all locations with no floor finish.

2.07 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.
- B. Refer to Structural drawings for additional requirements.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
- D. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.

PART 3 EXECUTION

3.01 PREPARATION

- A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.

3.02 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI PRC-304.
- B. Place concrete for floor slabs in accordance with ACI PRC-302.1.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.04 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Concrete Floors: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Re-measure corrected areas by the same process.

3.05 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
 - 1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI PRC-302.1; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.

3.06 CURING AND PROTECTION

- A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

END OF SECTION

SECTION 035413
GYPSUM CEMENT UNDERLAYMENT

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations.
- B. Test Reports: Indicate moisture content of existing concrete substrates.
- C. Applicator's qualification statement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Cement Underlayment:
 - 1. Maxxon Corporation; Gyp-Crete 2000 Multifamily: www.maxxon.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
 - 3. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

2.02 MATERIALS

- A. Gypsum Cement Underlayment: Self-leveling gypsum-based mix producing the following properties when mixed with water in accordance with manufacturer's directions:
 - 1. Compressive Strength: Minimum 2,500 psi in accordance with ASTM C472.
 - 2. Density: Maximum 115 pcf.
 - 3. Thickness: 1-1/2 inch
 - 4. Surface Burning Characteristics: Flame spread/smoke developed index of 0/0 in accordance with ASTM E84.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
 - 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.

- D. Accessories: Perimeter isolation strips and tape as recommended by underlayment manufacturer.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- F. Primer: Manufacturer's recommended type for substrates specified for project.
- G. Joint and Crack Filler: As recommended by manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mix materials in accordance with manufacturer's instructions.
- B. Install in accordance with manufacturer's written instructions.
- C. Add aggregate for areas where thickness exceeds 1/2 inch. Mix underlayment and water for minimum two minutes before adding aggregate, and ensure aggregate is coated by continuously mixing.
- D. Install reinforcement as recommended by manufacturer.
- E. Place to indicated thickness, with top surface level to 1/8 inch in 10 feet.
- F. Apply before partition installation.

END OF SECTION

SECTION 044313
STONE MASONRY VENEER

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on stone units, mortar, and reinforcement.

1.02 QUALITY ASSURANCE

- A. Stone Fabricator Qualifications: Company specializing in fabricating cut stone with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type required by this section, with minimum 5 years of documented experience.

PART 2 PRODUCTS

2.01 STONE

- A. Stone, General: See recommendations in ASTM C1528/C1528M.
- B. Type: adhered, natural thin veneer stone for exterior application.
- C. Basis of Design: Ledge stone by Old World Stone Veneer.

2.02 MORTAR APPLICATIONS

- A. Use only factory premixed packaged dry materials for mortar, with addition of water only at project site.

2.03 MORTAR MIXES

- A. Provide one of the following in accordance with stone veneer manufacturer's directions.
 - 1. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
 - 2. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Mixing: Use mechanical batch mixer and comply with referenced standards.

2.04 ACCESSORIES - ADHERED VENEER

- A. Lath: ASTM C 847, 2.5 lb galvanized expanded metal lath or ASTM C 847, 3.4 lb galvanized 3/8" rib lath as recommended by stone veneer manufacturer.
- B. Rainscreen Drainage Material:

1. Drainage Mat: Ribbed, dimpled, or channeled polyester or extruded polyester sheets with polypropylene fabric mortar screen on one face.
 - a. Thickness: 1/8 inch.
 - b. Seam Tape and Bug Screen: As recommended by rainscreen manufacturer.

2.05 STONE FABRICATION - ADHERED VENEER

- A. Comply with ASTM C1242 requirements for adhered stone system without mechanical anchors for maximum stone weight and maximum individual stone panel size.
- B. Style, color, shape and pattern: TBD from manufacturer's standard .
- C. Slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.

PART 3 EXECUTION

3.01 INSTALLATION - RAINSCREEN DRAINAGE MATERIAL

- A. Install rainscreen drainage material and metal lath with accessories over sheathing material and water-resistant barrier with fastening system in accordance with ASTM C1063 into wood or metal studs. Install drainage material with filter fabric mortar screen to exterior.

3.02 INSTALLATION - ADHERED VENEER

- A. Install thin stone veneer with a cementitious mortar setting bed to a scratch coat backing surface, in accordance with stone fabricator's instructions and applicable sections of the ICC (IBC), TMS 402/602 and ASTM C1242 that apply to adhered masonry veneer.
- B. Mortar Joints: Concave.
 1. Style: Tight fit joints.

3.03 INSTALLATION - MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. Extend metal flashings through exterior face of stone and terminate in an angled drip with hemmed edge.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.04 CLEANING

- A. Remove excess mortar as work progresses, and upon completion of work.

END OF SECTION

SECTION 055000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Stainless Steel, General: ASTM A666, Type 304.
- F. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- G. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.03 FABRICATED ITEMS

- A. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.
- B. Miscellaneous steel fabricated items as indicated on drawings.

2.04 FINISHES - STEEL

A. Prime paint steel items.

1. Exceptions: Galvanize items to be embedded in concrete, items specified for galvanized finish, and exterior items..

PART 3 EXECUTION

3.01 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

END OF SECTION

SECTION 055213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- B. Calculations: Structural calculations of railing and guardrails showing design and fasteners meet loading requirements of IBC for handrails and guardrails, stamped and signed by structural engineer.

1.02 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Performance Criteria for handrails and guardrails:
 - 1. Rails: Resist a linear load of 50 pounds per linear foot in accordance with Section 4.5.1.1 of ASCE 7.
 - 2. Rails: Resist a concentrated load of 200 pounds in accordance with Section 4.5.1 of ASCE 7.
 - 3. Guard Infill Components, including all rails except the handrail and top rail shall resist a concentrated load of 50 pounds in accordance with Section 4.5.1.2 of ASCE 7.
 - 4. Guard Infill Components shall not have openings that allow passage of a sphere 4-3/8 inches in diameter. The triangular openings at the open sides of a stair, formed by the riser, tread, and bottom rail shall not allow passage of a sphere 6 inches in diameter.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Allow for expansion and contraction of members and building movement without damage to connections or members.
- C. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

- D. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING AND GUARDRAIL SYSTEM

- A. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, prime painted for field painting.
- B. Steel Bars and plates for guardrail infill: ASTM A53/A53M Grade B Schedule 80, prime painted for field painting
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Straight Splice Connectors: Steel concealed spigots.

2.03 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Grind all welds smooth before applying factory primer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

END OF SECTION

**SECTION 061000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species and Grade: As indicated on structural drawings.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Western Wood Products Association; WWPA G-5.
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6):
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 STRUCTURAL COMPOSITE LUMBER

- A. Structural Composite Lumber Materials: Factory-fabricated engineered wood products consisting of wood veneers, strands, or flakes pressed with moisture-resistant adhesive into blocks of material, evaluated in accordance with ASTM D5456.
 - 1. Laminated Veneer Lumber (LVL): Engineered wood products consisting of thin wood veneer bonded together with adhesive with grain of veneers running parallel to long dimension.
 - 2. Laminated Strand Lumber (LSL): Engineered wood products consisting of flaked wood strands bonded together with adhesive.
 - a. Strand Length-to-Thickness Ratio: Approximately 150.

B. Structural Composite Lumber Assemblies:

1. Wood I-Joists: Factory-prefabricated engineered wood structural members consisting of structural composite flanges and oriented strand board webs, bonded together with adhesive, evaluated in accordance with ASTM D5055.

2.04 CONSTRUCTION PANELS

A. Subflooring: PS 2 type, rated Sheathing.

1. Bond Classification: Exterior.
2. Span Rating: As indicated on structural drawings..
3. Performance Category: 3/4 PERF CAT.

B. Roof Sheathing: PS 2 type, rated Structural I Sheathing.

1. Bond Classification: Exterior.
2. Span Rating: As indicated on structural drawings..
3. Tongue and groove edges or square edges with panel clips.

C. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.

1. Span Rating: As indicated on structural drawings.

2.05 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

C. Water-Resistive Barrier: See Section 072500.

2.06 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

PART 3 EXECUTION

3.01 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Install structural members full length without splices unless otherwise specifically detailed.
- C. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.

3.02 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring: Screw and glue to framing; staples are not permitted.
- B. Roof Sheathing: Screw fasten panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
- C. Wall Sheathing: Screw fasten with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails or screws.

3.03 BLOCKING

- A. Provide 2x blocking in partitions for all wall mounted and recessed items, including but not limited to handrail bracket, FE's, FE cabinets, Kox box, casework, countertops, shelving, wall stops, whiteboards, tackboards, display cases, mirrors, toilet accessories, grab bars, future grab bar locations, coathooks, owner installed wall mounted equipment (OFOI), contractor installed wall mounted equipment (CFI) and the like. Hollow wall anchors and toggle bolts are not acceptable.

END OF SECTION

SECTION 061753
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.
- B. Structural calculations showing performance with design criteria, signed and stamped by Professional Structural Engineer.

1.02 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design by or under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 TRUSSES

- A. Wood Trusses: Design and fabricate trusses in accordance with ANSI/TPI 1 and to achieve specified design requirements indicated.
 - 1. Design and fabricate temporary bracing in accordance with TPI DSB-89.
 - 2. Species and Grade: As indicated on structural drawings.,
 - 3. Connectors: Steel plate.
 - 4. Design Floor Live and Dead Load: As indicated on structural drawings..
 - 5. Roof Deflection: 1/240, maximum.

2.02 MATERIALS

- A. Lumber:
 - 1. Moisture Content: Between 7 and 9 percent.
- B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.

2.03 ACCESSORIES

- A. Wood Blocking, Bridging, Plates, and Miscellaneous Framing: Softwood lumber, any species, construction grade, 19 percent maximum and 7 percent minimum moisture content.
- B. Fasteners: Electrogalvanized steel, type to suit application.

PART 3 EXECUTION

3.01 ERECTION

- A. Install trusses in accordance with manufacturer's instructions, SBCA (BCSI); maintain a copy of applicable documents on site until installation is complete.
- B. Set members level and plumb, in correct position.

END OF SECTION

**SECTION 062000
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood Stairs
- C. Wood casings, base, and moldings.
- D. Exterior Wood Trim and Battens.
- E. Exterior Wood Furring.
- F. Exterior Exposed Wood Decking for stained finish.

1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Wood Base: Size and profile as indicated on drawings.
- C. Wood Battens: Cedar, rough-sawn. Size and profile as indicated on the drawings.
- D. Exterior Wood Trim: Doug-Fir, Appearance Grade D & Better, S4S, 1x as indicated on drawings.
- E. Exterior Wood Furring: Doug-Fir, 1x4.
- F. Exterior Exposed Wood Decking: Doug-Fir, Appearance Grade D & Better, S4S, Tongue and Groove 1x6.

2.02 LUMBER MATERIALS

- A. Softwood Lumber: TBD species, TBD sawn, maximum moisture content of 6 percent; with vertical grain, SFS, Grade A Select, finger jointed..
- B. Hardwood Lumber: TBD species, TBD sawn, maximum moisture content of 6 percent ; with vertical grain SFS, Grade A Select, finger jointed. where scheduled for transparent finish and paint grade where scheduled for painted finish.

2.03 HARDWARE AND FASTENERS

- A. Exterior Trim and Batton Fasteners: Corrosive resistant coated, star drive, trim head screw fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
 - 1. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 2. Secure with countersunk, concealed fasteners and blind nailing.
 - 3. Use fine finishing nails for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 - 4. For shop-finished items, use filler matching finish of items being installed.
- D. Standing and Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces from maximum length of lumber available, to greatest extent possible.
 - 2. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.
 - 3. Scarf running joints and stagger in adjacent and related members.
 - 4. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- E. Stairs: Securely anchor carriages to supporting substrates.

1. Install stairs with treads and risers no more than 1/8 inch from indicated position.
 2. Secure with countersunk, concealed fasteners and blind nailing.
 3. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.
- F. Wood Battens: Screw fasten over siding system. with finishing screws.
- G. Corner Boards and Trim: Screw fasten prior to siding installation with finishing screws.
- H. Furring: Screw fasten through continuous insulation into framing.
- I. Exterior Exposed Wood Decking: Screw fasten to roof sheathing with finishing screws, appearance side down.

END OF SECTION

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**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- B. Insulation Over Wood Stud Framed Walls, Continuous: Extruded polystyrene (XPS) board.
- C. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
- D. Insulation in Wood Framed Ceiling Structure: Batt insulation with separate vapor retarder.
- E. Insulation over Roof Deck: Polyisocyanurate board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
 - 4. Design Development Phase Basis of Design: R or U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.
 - 5. Board Edges: Square.
 - 6. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
- B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
 - 1. Classifications:
 - a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
 - 1) Class 1 - Faced with glass fiber reinforced cellulosic facers on both major surfaces of core foam.

- 2) Compressive Strength: Classes 1-2-3, Grade 2 - 20 psi (138 kPa), minimum.
 - 3) Thermal Resistance, R-value: At 1-1/2 inch thick; Class 1, Grades 1-2-3 - 8.4 (1.48), minimum, at 75 degrees F.
 - 4) Design Development Phase Basis of Design: R or U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.
- b. Type V: Faced with oriented strand board (OSB) or plywood on one major surface of the core foam and faced on the other major surface with any facer described in this specification.
- 1) Compressive Strength: 16 psi, minimum.
 - 2) Thermal Resistance, R-value: At 1-1/2 inch thick; 6.2, minimum, at 75 degrees F.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 4. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
 5. Board Size: 48 inch by 96 inch.
 6. Board Thickness: Provide multiple layers to meet R-Values indicated on drawings.
 7. Board Edges: Square.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 2. Thermal Resistance: R-value of as indicated on drawings.
 3. Design Development Phase Basis of Design: R or U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.

2.04 ACCESSORIES

- A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
1. Application: Sealing of interior circular penetrations, such as pipes or cables.
- B. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

- C. Support for Cladding and Continuous Insulation: Continuous thermal Z-girts.
 - 1. Fiberglass reinforced plastic (FRP) girts that provide cladding attachment support for exterior wall cladding.
 - 2. Fasteners: As recommended by clip manufacturer.
- D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- E. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- F. Adhesive: Type recommended by insulation manufacturer for application.
- G. Baffles: Polystyrene, 46 or 48 inches long. Basis of Design: Durovent by A.D.O. Products

PART 3 EXECUTION

3.01 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Adhesive apply board insulation to perimeter foundation walls where indicated on drawings. Cut, scribe, and fit joints tightly with no gaps.

3.02 BOARD INSTALLATION USING CLADDING AND CONTINUOUS INSULATION SUPPORTS

- A. Install supports in accordance with manufacturer's installation instructions.
- B. Install supports in compliance with system orientation, sizes, and locations as indicated on drawings and in accordance with approved shop drawings.
- C. Install supports to fill in exterior wall spaces without gaps or voids in insulation.

3.03 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
 - 1. See applicable roofing specification section for specific board installation requirements.
 - 2. Ensure vapor retarder is clean and dry, continuous, and ready for application of roofing system.
 - 3. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
 - 4. Do not apply more insulation than can be covered with roofing on the same day.
 - 5. Stagger joints in multiple layer applications.

3.04 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

- C. Install insulation baffles at eaves and all locations where needed to maintain clear air vent pathways. Trim, fit, and staple in place per manufacturers installation instructions.
- D. Support insulation on wire mesh where indicated to maintain clearances. Staple mesh to wood framing.

END OF SECTION

**SECTION 072500
WEATHER BARRIERS**

PART 1 GENERAL

1.01 SUBMITTALS

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIERS

- A. Description: Materials installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly. Primary materials include mechanically applied sheets; accessory materials include flashings and seam tapes.
- B. Water-Resistive and Air Barrier, Multilayers: Outer layers of nonwoven, spunbonded polypropylene with vapor permeable, watertight polymeric middle layer.
 - 1. Air Permeance: 0.0011 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 28 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
 - 3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 3 months of weather exposure.
 - 4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
 - 5. Seam and Perimeter Tape: As recommended by sheet manufacturer.

2.02 ACCESSORIES

- A. Seal and Perimeter Tapes: As recommended by water-resistive barrier manufacturer.
- B. Building Insulation: See Section 072100.
- C. Metal Flashings: See Section 076200.
- D. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and weather barrier materials.
 - 1. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch nominal thickness.
- E. Primer: Liquid applied polymer.
- F. Flexible Flashing: Self-adhering sheet flashing complying with ASTM D1970/D1970M; waive slip resistance requirement if not installed on roof.
 - 1. Width: 3 inches.

- G. Threshold Flashing: Closed-cell foam tape with rubberized adhesive membrane; seals subfloor under threshold.
 - 1. Width: Match threshold width.
- H. Flashing Tape: Special reinforced film with high-performance adhesive.
 - 1. Application: Window and door opening flashing tape.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Install continuous water-resistive barriers where indicated on drawings, with sheets lapped to shed water.
- C. Mechanically Fastened Sheets:
 - 1. Install sheets in shingle fashion to shed water; align horizontally.
- D. Openings and Penetrations in Exterior Water-Resistive Barriers:
 - 1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches onto water-resistive barrier and at least 6 inches up jambs; mechanically fasten stretched edges.

END OF SECTION

**SECTION 072600
VAPOR RETARDERS**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on material characteristics, performance criteria, and limitations.

PART 2 PRODUCTS

2.01 VAPOR RETARDERS

- A. Vapor Retarder Sheet: Polyethylene sheeting complying with ASTM D4397, clear colored.
 - 1. Thickness: 10 mil, 0.010 inch, nominal.
 - 2. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide; compatible with sheet material.

2.02 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Vapor Retarder and Adjacent Substrates: As indicated, complying with vapor retarder manufacturer's installation instructions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Vapor Retarders: Install continuous airtight barrier over surfaces indicated, with sealed seams and sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

END OF SECTION

SECTION 074113
METAL ROOF PANELS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
- B. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

1.02 WARRANTY

- A. Finish Warranty: Provide 40 year manufacturer standard warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.
- B. Weathertightness Warranty: Provide 20 year manufacturer standard warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: AEP Span-Lok HP.

2.02 PERFORMANCE REQUIREMENTS

- A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
 - 1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed $L/180$ of span length(L) when tested in accordance with ASTM E1592.
 - a. Dead Loads: Weight of roofing system.
 - b. Live Loads: As required by ASCE 7.
 - 2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
 - 3. Wind Uplift: Class 90 wind uplift resistance of UL 580.

4. Air Infiltration: Maximum 0.06 cfm/sq ft at air pressure differential of 6.24 lbf/sq ft, when tested according to ASTM E1680.
5. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
6. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 120 degrees F.
7. Solar Reflective Index: Provide panels with SRI minimum of 64 to meet ESDS compliance path.

2.03 STRUCTURAL METAL ROOF PANELS

- A. General: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Structural Metal Panels: Factory-formed panels with factory-applied finish.
 1. Steel Panels:
 - a. Aluminum-zinc alloy-coated SS (structural steel) sheet complying with ASTM A792/A792M; minimum AZ50 coating.
 - b. Steel Thickness: Minimum 24 gauge, 0.024 inch.
 2. Profile: Standing seam, with 2-inch seam height; concealed fastener system for field seaming with special tool.
 3. Width and Profile: Maximum panel coverage of 16 inches with two pencil ribs.

2.04 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard galvanized concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FINISHES

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer's standard line.

2.06 ACCESSORIES

- A. Underlayment: Self-adhering polymer modified asphalt sheet complying with ASTM D1970/D1970M, with strippable release film and top surface of woven polypropylene sheet.

- B. Factory finished trims and flashings to match roof panels: Rake, eave, vented ridge cap, head wall flashings, and counterflashings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
- B. Provide UL listed clip designed to allow panels to thermally expand and contract and provide ± 1 inch of thermal movement. Clip shall incorporate a self-centering feature to allow 1" of movement in both directions along panel length.
- C. Mechanically field crimp and interlock entire length of seams.
- D. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

END OF SECTION

SECTION 074246
CEMENTITIOUS WALL PANELS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide manufacturer's data sheets for each product, including preparation instructions, storage and handling requirements, and installation instructions.
- B. Shop Drawings: Indicate layout, panel locations, and configuration.
- C. Samples: Submit two samples of each color of panel, 6 by 6 inches, showing finish and texture.

1.02 WARRANTY

- A. Manufacturer Warranty: Provide 20-year manufacturer warranty for panels and 10-year finish warranty. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 CEMENTITIOUS WALL PANELS

- A. Basis of Design Manufacturer: Equitone [inspires], Etex USA.
- B. Description: Factory-fabricated, drained and back-ventilated (D/BV) rainscreen panel system, site assembled; comply with AAMA 509.
- C. Performance Requirements:
 - 1. Design and size components to support assembly dead loads and withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - 2. Fire Performance: Comply with NFPA 285.
 - 3. Panel Surface Burning Characteristics: Maximum flame spread index of 0 and maximum smoke developed index of 5 when tested in accordance with ASTM E84.
 - 4. Movement:
 - a. Accommodate movement within system without damage to components or seal deterioration.
 - b. Accommodate movement between system and perimeter components when subject to seasonal temperature cycling, dynamic loading, load release, and support framing deflection.
 - 5. Drainage: Provide positive drainage to exterior for moisture entering system and condensation occurring within system.

- D. Cementitious Wall Panels: Fiber-cement sheets complying with ASTM C1186, Type A, Grade IV; with manufacturer's standard factory-trimmed edges.
 - 1. Size: 1,250 mm x 2,500 mm (nominal 4 feet x 8 feet).
 - 2. Thickness: 8 mm (nominal 5/16 inch).
 - 3. Panel Orientation: As indicated on drawings.
 - 4. Surface Texture: Smooth.
 - 5. Color: Matt, wood look FCW 121 American Walnut.
 - 6. Coating: Manufacturer's standard scratch-resistant and soil-resistant coating.
- E. Soffit Panels: Same material and finish as wall panels.

2.02 SUPPORT FOR CLADDING AND CONTINUOUS INSULATION

- A. Continuous Thermal Z-Girts:
 - 1. Material: Fiberglass-reinforced plastic.
 - 2. Depth: As required for insulation thickness.
 - 3. Length: 6 inches for clips, 96 inches for girts.⁰⁷
 - 4. Spacing: 16 inches on center vertically.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Ensure supports for cladding and continuous insulation are plumb and plane.
- B. Control and Expansion Joints: Install as recommended by wall panel manufacturer.
- C. Exposed Fasteners: Install with manufacturer's pre-finished, color matched metal screws, space equally.

END OF SECTION

SECTION 074623
WOOD SIDING

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide manufacturer's data on materials, component profiles, fastening methods, sizes, surface texture, finishes, and accessories; showing compliance with requirements.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with local wind load resistance requirements of ASCE 7.

2.02 WOOD SIDING MATERIALS

- A. Panel Siding: APA 303 rated siding 303-6-W, exterior exposure class, panel style.
 - 1. Panel Size: 48 inch by 96 inch size sheet, 19/32 inch thick. Tongue and groove on long edges.
 - 2. Span Rating: 16 inches on center.
 - 3. Texture/Pattern: T1-11 with channel grooves 8 inches on center.
 - 4. Finish: Rough-sawn.

2.03 ACCESSORIES

- A. Nails: Corrosion resistant type; nonstaining, of size and strength to securely and rigidly retain the work.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panels, batten strips, and trim in accordance with manufacturer's instructions.
- B. Fasten siding securely in place, level and plumb, over wood 1x furring strips.
- C. Seal exposed wood substrates exposed to weather to prevent water accumulation and moisture intrusion.
- D. Install metal flashings at internal and external corners, sills, heads of wall openings, and horizontal joints of sheet materials.

END OF SECTION

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SECTION 074646
FIBER-CEMENT SIDING

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Installation methods, including nail patterns.

1.02 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer warranty for years as indicated under Fiber-Cement Siding article sub-headings for "Warranty". Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN MANUFACTURER

- A. James Hardi Building Products Inc., HZ-10 Product Zone.

2.02 FIBER-CEMENT SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
 - 1. Style: Standard lap style.
 - 2. Texture: Smooth.
 - 3. Length: 12 feet, nominal.
 - 4. Width (Height): 9-1/4 inches for 8 inch exposure.
 - 5. Thickness: 5/16 inch, nominal.
 - 6. Finish: Factory applied primer.
 - 7. Warranty: 50 year limited; transferable.
- B. Panel Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
 - 1. Texture: Smooth.

2. Length (Height): 96 inches, nominal.
 3. Width: 48 inches.
 4. Thickness: 5/16 inch, nominal.
 5. Finish: Factory applied primer.
 6. Warranty: 50 year limited; transferable.
- C. Soffit Panels: Panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
1. Texture: Smooth.
 2. Length: 96 inches, nominal.
 3. Width: 48 inches.
 4. Thickness: 5/16 inch, nominal.
 5. Finish: Factory applied primer.
- D. Accessories
1. Fasteners: Galvanized or corrosion resistant; length as required to penetrate CI and sheathing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install siding in accordance with manufacturer's instructions and recommendations.
1. Read warranty and comply with terms necessary to maintain warranty coverage.
 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 3. Install lap siding with 1-1/4 inch lap.
- B. Over foam sheathing and wood furring: Read and comply with sheathing manufacturer's recommendations.
- C. Install minimum 6 inch wide flashing at field butt joints that overlaps the course below by 1 inch.
- D. Do not install siding less than 6 inches from ground surface, or closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- E. Exterior Soffits: Install exterior soffit panels perpendicular to framing, with staggered end joints over framing members or other solid backing.

END OF SECTION

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SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- B. Submit color chart of manufacturer's full range of standard colors for initial selection. Up to three colors may be selected for Different applications.
- C. Samples: Submit two samples of each color selected, 2 by 2 inches in size, illustrating metal finish color.

1.02 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

2.02 PREPAINTED, METALLIC-COATED STEEL SHEETS

- A. Description: Factory-applied coatings applied to metallic-coated steel sheet substrates prior to fabrication by coil coating; topcoat systems consist of primers and organic topcoats on exposed, top side of sheet; washcoats on bottom, unexposed sheet side.
- B. Comply with ASTM A755/A755M.
- C. Metallic-Coated Steel Sheet Substrates:
 - 1. Aluminum-Zinc-Alloy-Coated Steel Sheets: Commercial steel sheets, alloy-coated by hot-dip process; comply with ASTM A792/A792M; coating designation AZ50.
- D. Substrate Preparation for Prefinishing: Clean and prepare substrate surfaces in accordance with coating manufacturer's recommendations for substrate type and application.
- E. Washcoats or Backercoats: Provide washcoats or backercoats in accordance with organic coating manufacturer's recommendations.
- F. Primer Coats: Provide basecoat primers in accordance with coating manufacturer's recommendations for substrate type, topcoat, and application.
- G. High-Performance Organic Coating System: Provide thermally cured, 50-percent PVDF or silicone-modified polyester systems in accordance with AAMA 2604; tested for weathering for 5 years with 5 delta units maximum of color change.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- D. Fabricate as indicated on drawings and per SMACMA Architectural Sheet Metal Manual.

2.04 GUTTERS AND DOWNSPOUTS

- A. See Section 077123 for manufactured gutters and downspouts.

2.05 FLASHING

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as indicated on drawings and per SMACMA Architectural Sheet Metal Manual.
- B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- C. Seal metal joints watertight.

END OF SECTION

SECTION 077123
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity of 5-minute duration for a 100 year storm.

1.02 SUBMITTALS

- A. Product Data: Provide data on prefabricated components.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pre-Finished Galvanized Steel Sheet: Comply with Section 076200.

2.02 COMPONENTS

- A. Gutters: Profile as indicated.
- B. Downspouts: Profile as indicated on drawings.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.

2.03 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate as indicated on drawings and per SMACMA Architectural Sheet Metal Manual.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Fabricate gutter and downspout accessories; seal watertight.

2.04 FINISHES

- A. Comply with finish requirements of Section 076200.

2.05 ACCESSORIES

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots.

1. Configuration: Angular.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as indicated on drawings and per SMACMA Architectural Sheet Metal Manual.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

END OF SECTION

**SECTION 077200
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used.

PART 2 PRODUCTS

2.01 ROOF HATCHES AND VENTS

- A. Eave Vents: Factory fabricated, formed panels with integral attachment flanges and snap-on cover.
 - 1. Vent Material: 0.040-inch thick aluminum.
 - 2. Perforated Screen: 24-gauge, 0.0239-inch galvanized steel; with 54 percent open area perforation.
 - 3. Finish: Manufacturer's standard polyvinylidene fluoride (PVDF) coating.
 - 4. Finish Color: To be selected by Architect from manufacturer's standard range. Up to three colors may be selected to match soffit colors/stain.
- B. Flat Roof Access Hatches with Ladder: Factory-assembled roof hatch with PVC frame and flat cover and folding metal access ladder, complete with operating and release hardware.
 - 1. Mounting: Provide frames and insulated curbs suitable for mounting conditions as indicated on drawings.
 - 2. Thermally Broken Hatches: Provide insulation within hatch frame and cover.
 - 3.
 - 4. Folding Ladder Access: Triple section ladder, upper roof hatch door with PVC frame and lower insulated door with wood box to enclose and support ladder; 23-1/2 by 47 inches rough opening.
 - a. Ladder Room Height Range: 91-3/4 to 110-1/4 inches, nominal.

2.02 ROOFTOP SUPPORTS/ASSEMBLIES

- A. Rooftop Support/Assemblies: Manufacturer-engineered and factory-fabricated assemblies.
 - 1. Design Loadings and Configurations: As required by applicable codes.
- B. Fall Prevention Anchors
 - 1. Provide components and system in compliance with:

- a. ANSI/ASSE Z359.18 Safety Requirements for Anchorage Connectors for Active Fall Protection Systems.
 - b. ANSI/ASSP A10.32 Personal Fall Protection Systems Used in Construction and Demolition Operations.
 - c. OSHA 1926.502(d) Personal Fall Arrest Systems.
 - d. OSHA 1910.140 Personal fall protection systems.
2. Factory welded A36 steel, galvanized, minimum 5/8 inch fixed U anchor on top of nominal 2-1/2 inch steel pipe 12 inches high, welded to minimum 3/8 inch thick 16 inch x 16 inch steel plate base. With fasteners for attachment to wood structure.
 3. 310 pound working load, 5,000 pound ultimate load.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.
- B. Fall protection anchors: Install with manufacturer's fasteners at fastener spacing per manufacturer to meet loading requirements.

END OF SECTION

**SECTION 078400
FIRESTOPPING**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

PART 2 PRODUCTS

2.01 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

END OF SECTION

**SECTION 079200
JOINT SEALANTS**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Backing material recommended by sealant manufacturer.
 - 4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 5. Substrates the product should not be used on.
 - 6. Substrates for which use of primer is required.
- B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.02 PERFORMANCE REQUIREMENTS

- A. All adhesives and sealants must have VOC content less than or equal to the thresholds provided by the SCAQMD Rule 1168 dated 10/6/2017.

1.03 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints:
 - a. Seal open joints except open joints indicated on drawings as not sealed.
 - b. Seal the following joints:

- 1) Joints between doors, windows, and other frames or adjacent construction.
- 2) Joints between dissimilar materials.
2. Interior Joints:
 - a. Seal open joints except specific open joints indicated on drawings as not sealed.
 - b. Seal the following joints:
 - 1) Joints between door frames and window frames and adjacent construction.
 - 2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.
 - 3) Joints between dissimilar materials.
- B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.
 2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane traffic-grade sealant.
- C. Interior Joints: Use nonsag silicone sealant, unless otherwise indicated.
 1. Wall and Ceiling Joints in Nonwet Areas: Acrylic emulsion latex sealant.
 2. Wall and Ceiling Joints in Wet Areas: Nonsag mildew-resistant silicone. sealant for continuous liquid immersion.
 3. Floor Joints in Wet Areas: mildew-resistant silicone. sealant suitable for continuous liquid immersion.
 4. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- D. Interior Wet Areas Mildew-Resistant Silicone.: Bathrooms, restrooms, kitchens, and laundry rooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.02 JOINT SEALANTS - GENERAL

2.03 NONSAG JOINT SEALANTS

- A. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 1. Color: Clear or white depending on adjacent materials.

- B. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
- D. Acrylic Latex Sealant: ASTM C834; for use as acoustical sealant.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
- E. Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.

2.04 SELF-LEVELING JOINT SEALANTS

- A. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Color: Gray.

2.05 ACCESSORIES

- A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

- E. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- C. Schedule: Provide integrated door, frame, and hardware schedule using door numbers indicated on drawings.

1.02 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Manufacturer's standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
 - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.02 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 - a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
 3. Door Thermal Resistance: As indicated on drawings.
 4. Design Development Phase Basis of Design: R or U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.
 5. Door Thickness: 1-3/4 inches, nominal.
- C. Interior Doors, Non-Fire-Rated:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 3. Door Thickness: 1-3/4 inches, nominal.
- D. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 4. Door Thickness: 1-3/4 inches, nominal.

2.03 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A40/ZF120 coating.

2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 3. Weatherstripping: Separate, see Section 087100.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
1. Fire Rating: Same as door, labeled.
- F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.04 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.05 ACCESSORIES

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
1. Size: As indicated on drawings.
 2. Glazing: As scheduled on drawings.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.

END OF SECTION

SECTION 081420
PRE HUNG WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hollow core pre-finished wood doors with frames and hinges for residential units.
- B. Hollow core pre-finished wood doors without frames for bi-pass closet doors for residential units.

1.02 SUBMITTALS

- A. Product Data: Indicate door and frame materials and construction; type and characteristics.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- C. Schedule: Provide integrated door, frame, and hardware schedule using door numbers indicated on drawings.

1.03 QUALITY ASSURANCE

1.04 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's standard one-year warranty on interior doors.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Pre-hung side-hung and sliding interior hollow core molded wood doors:
 - a. Factory primed for field applied opaque finish. Prime faces, stiles, and rails.
 - b. Faces: MDF
 - c. Stiles and Rails: MDF or wood. Vertical edges beveled.
 - d. Core: Corrugated Cell.
 - e. Construction: Molded wood fiber facings, three ply core, edge-bonded, 1 3/8-inch total thickness.
 - f. Door Frame: Manufacturer's standard solid wood flat jambs with integral door stop.

- g. Opaque Finish: Field-applied per Section 099000 Painting
- h. Door Hinges: Three per side-hung door, manufacturer's standard 3-1/2 inch, full mortise, 5-knuckle, plain bearing hinges, brushed chrome/nickel finish.
- i. Other door hardware specified in Section 087100 – Door Hardware. Provide solid blocking for surface mounted hardware.
- j. Basis of Design: "Molded Panel Series" by Masonite Corporation.

2.02 DOOR FABRICATION

- A. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- B. Factory fit doors in frame opening dimensions identified on shop drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Coordinate installation of doors with installation of hardware.
- C. Install doors and wood frames as scheduled on the drawings.
- D. Install bi-pass closet doors with hardware specified in Section 087100 and adjust for smooth operation. Ensure door bumpers are in place and aligned to avoid damage to doors/wall finishes.

END OF SECTION

SECTION 081613
FIBERGLASS DOORS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
- B. Shop Drawings: Indicate layout and profiles; include assembly methods.
- C. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
- D. Schedule: Provide integrated door, frame, and hardware schedule using door numbers indicated on drawings.

1.02 WARRANTY

- A. Manufacturer Warranty: Provide 5-year manufacturer warranty covering materials and workmanship, including degradation or failure due to chemical contact. Complete forms in Owner's name and register with manufacturer.
- B. Manufacturer Warranty: Provide 20-year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same. Include coverage for degradation of vinyl color finish. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 DOOR AND FRAME ASSEMBLIES

- A. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.
 - 1. Operation: Manual.
 - 2. Operation: Power operator per Section 087113 where scheduled.
 - 3. Screw-Holding Capacity: Tested to 890 pounds, minimum.
 - 4. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
 - 5. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
- B. Fire-Rated Doors and Frames: Comply with fire-ratings as indicated on drawings.
 - 1. Tested in accordance with ICC (IBC) for positive pressure or UL 10C.
 - 2. UL (DIR) listed and labeled.

3. Provide mineral fiber or intumescent core as required for fire-rating as indicated.

2.02 COMPONENTS

- A. Doors: Fiberglass construction with reinforced core.
 1. Type: As indicated on drawings, including swinging doors.
 2. Thickness: 1-3/4 inch, nominal.
 3. Core Material: Manufacturer's standard core material for application indicated.
 4. Construction:
 - a. Molded in one piece including through color gel coating on each side; manufacturer's standard subframe, core and faces fused during curing; hardware reinforcements.
 5. Face Sheet Texture: Smooth.
 6. Door Panel Configuration: As indicated on drawings.
 7. Subframe and Reinforcements: Manufacturer's standard materials.
 8. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
 9. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.
- B. Door Frames: Provide type in compliance with performance requirements specified for doors.
 1. Type: Factory assembled with chemically welded joints.
 2. Profiles: As indicated on drawings.
 3. Door Stop: 5/8 inch wide, by 1-7/8 inches deep.
 4. Non-Fire-Rated:
 - a. Fiberglass reinforced plastic (FRP) with gel-coating matching doors.
 5. Fire-Rated: Provide frames bearing labels to match doors.
 - a. Fiberglass reinforced plastic (FRP) with gel-coating matching doors.
 6. Frame Anchors: Stainless steel, Type 304; provide three anchors in each jamb for heights up to 84 inches with one additional anchor for each additional 24 inches in height.

2.03 PERFORMANCE REQUIREMENTS

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.
- B. Fiberglass Doors: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific door type:
 - 1. Performance Class (PC): LC.
- C. Forced Entry Resistance: Pass in accordance with AAMA 1304 test method.
- D. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf.
- E. Air Leakage: Maximum 0.1 cfm/sf, when tested in accordance with ASTM E283/E283M at differential pressure of 6.24 psf across assembly.
- F. Thermal Transmittance, Exterior Doors: AAMA 1503, Overall U-value Including Glazing: Design Development Phase Basis of Design: U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.
- G. Acoustical Performance: Sound Transmission Class (STC) of 25, Outdoor/Indoor Transmission Class (OITC) rating of 25, minimum, when tested in accordance with ASTM E90.

2.04 FINISHES

- A. Gel Coating: Ultraviolet (UV) stabilized polyester finish.
 - 1. Thickness: Minimum 15 mils, 0.015 inch wet thickness, plus/minus 3 mils, 0.003 inch.

2.05 HARDWARE

- A. Door Hardware: See Section 087100.

2.06 ACCESSORIES

- A. Stops for Glazing and Louver: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.
- B. Glazing: See Section 088000.
- C. Door Vision Lite Frames: Frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.
 - 2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
 - 3. Metal Finish: Color to match door gel coat, polyester powder coating.

- D. Louvers for Non-Fire-Rated Doors: Same materials, construction, finish, and color as door; fixed vanes, 45 degree sloped vanes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.
- B. Install fire-rated assemblies in accordance with NFPA 80.
- C. Install exterior doors in accordance with ASTM E2112.
- D. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.

END OF SECTION

SECTION 083100
ACCESS DOORS AND PANELS

PART 2 PRODUCTS

1.01 ACCESS DOORS AND PANELS ASSEMBLIES

1.02 WALL- AND CEILING-MOUNTED ACCESS UNITS

- A. Wall- and Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
1. Material: Steel.
 2. Door Style: Single thickness with rolled or turned in edges.
 3. Frames: 16-gauge, 0.0598-inch minimum thickness.
 4. Single Steel Sheet Door Panels: 16-gauge, 0.0625-inch minimum thickness.
 5. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
 - a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for purpose indicated.
 6. Steel Finish: Primed.
 7. Hardware:
 - a. Hardware for Fire-Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Continuous piano hinge.
 - c. Latch/Lock: Screw driver slot for quarter turn cam latch.

PART 3 EXECUTION

2.01 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.

END OF SECTION

SECTION 084313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- C. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- D. Schedule: Provide integrated door, frame, and hardware schedule using door numbers indicated on drawings.

1.02 WARRANTY

- A. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- B. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Centered (front to back).
 - 2. Finish: Class I color anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 3. Finish Color: As selected by Architect from manufacturer's standard line.
 - 4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.

6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Performance Requirements

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
3. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
4. Overall U-value Including Glazing: Design Development Phase Basis of Design: U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.

2.02 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
 2. Glazing Stops: Flush.
- B. Swing Doors: Glazed aluminum.
1. Thickness: 1-3/4 inches.
 2. Top Rail: As indicated on drawings.
 3. Vertical Stiles: As indicated on drawings.
 4. Bottom Rail: As indicated on drawings.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).

- B. Fasteners: Stainless steel.

2.04 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

2.05 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: See Section 087100 and Section 087113.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- E. Threshold: Extruded aluminum, ADA compliant, one piece per door opening, ribbed surface; provide on all exterior doors.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

END OF SECTION

SECTION 085313
VINYL WINDOWS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements, and recommended head, sill, and jamb details.
- B. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance.
- C. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.

1.02 QUALITY ASSURANCE

- A. Field Testing and Inspection:
 - 1. Owner will engage independent testing and inspection for water and air infiltration of select windows. If select windows fail, contractor to pay for testing of all windows.
 - 2. Architect will periodically review window installation as part of exterior envelope water and moisture inspection plan.

1.03 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's standard Commercial Warranty for Multi-Family buildings. Complete form in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: VPI, Spokane, Washington

2.02 DESCRIPTION

- A. Vinyl Windows: Factory-fabricated frame and sash members of extruded, hollow, ultraviolet-resistant, glass-fiber reinforced polyvinyl chloride (PVC) with integral color; with factory-installed glazing, hardware, related flashings, anchorage and attachment devices.
1. Configuration: As indicated on drawings.
 - a. Product Type: FW - Fixed window and HS - Horizontal sliding window in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 2. Interior Color: As selected by Architect from manufacturer's full line of colors.
 3. Exterior Color: As selected by Architect from manufacturer's full line of colors.
 4. Operable Units: Double weatherstripped.
 5. Framing Members: Fusion welded corners and joints, with internal reinforcement where required for structural rigidity; concealed fasteners.
 6. System Internal Drainage: Drain to exterior side by means of weep drainage network any water entering joints, condensation within glazing channel, or other migrating moisture within system.
 7. Glazing Stops, Trim, Flashings, and Accessory Pieces: Formed of rigid PVC, fitting tightly into frame assembly.
 8. Mounting Flange: Integral to frame assembly, providing weather stop at entire perimeter of frame.
 9. Insect Screens: Tight fitting for operating sash location.

2.03 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
1. Performance Class (PC): R.
- B. Design Pressure: In accordance with applicable codes.
- C. Condensation Resistance Factor: CRF of 60, minimum, the lower value of the glass and frame window components and determined in accordance with AAMA 1503.
- D. Overall Thermal Transmittance (U-value): As indicated on drawings, including glazing, measured on window sizes required for this project. Design Development Phase Basis of Design: R or U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.
- E. Center of Glass Solar Heat Gain Coefficient (SHGC): As indicated on drawings.

- F. Acoustic Performance: Minimum outdoor-indoor transmission class (OITC) rating of 25, when tested in accordance with ASTM E90 and ASTM E1332.

2.04 COMPONENTS

- A. Glazing: Insulated double pane, annealed and tempered glass as scheduled , clear, low-E coated, krypton filled, bird-friendly, with thermoplastic warm-edge spacer, with glass thicknesses as recommended by manufacturer for specified wind conditions and acoustic rating indicated.
- B. Frame Depth: As indicated on drawings.
 - 1. Type: Nailing flange.
 - 2. Frame Corners: Block-reinforced butt-joint corner inserts.
- C. Insect Screens: Aluminum, extruded or roll-formed frame with mitered and reinforced corners; apply screen mesh taut to frame; secure to window with hardware to allow easy removal.
 - 1. Hardware: Manufacturer's standard; quantity as required per screen.
 - 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's 18 x 16 mesh.
 - 3. Frame Finish: Manufacturer's standard, color to match window frame and sash color.
- D. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to maintain weather seal in accordance with AAMA 701/702.

2.05 HARDWARE

- A. Horizontal Sliding Sash: Rigid PVC interfacing tracks with dual brass wheel and stainless steel axle assembly housing, provide two sets for each operating sash and opening stops in head and sill track as required.
- B. Window Opening Control Devices (WOCD): Provide operable window sash hardware that limits openings to only allow passage of 4-inch diameter rigid sphere or less, and is easily releasable to fully open without use of keys, tools, or special knowledge. Comply with ASTM F2090.
- C. Finish of Exposed Hardware: Baked enamel, match interior sash and frame color.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install window unit assemblies in accordance with manufacturer's instructions and applicable building codes.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities as necessary.

- C. Align window plumb and level, free of warp or twist, and maintain dimensional tolerances and alignment with adjacent work.

3.02 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

END OF SECTION

SECTION 087100 DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames"
 - 2. Division 08 "Pre-Hung Wood Doors".
 - 3. Division 08 Section "Fiberglass Doors".
 - 4. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
 - 5. Division 8 "Power Door Operators".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. UL 305 - Panic Hardware.
4. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware 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.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.

2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in

Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Manufacturers:
 - a. McKinney (MK) - TA/T4A Series, 5-knuckle.
 - b. Or Equal

2.3 SLIDING AND FOLDING HARDWARE

- A. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should conform with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
2. Manufacturers:
 - a. Pemko (PE).

2.4 DOOR OPERATING TRIM

- A. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Manufacturer's Standard.
- C. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

D. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

E. Construction Keying: Provide construction master keyed cylinders.

F. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Commercial Duty): ANSI/BHMA A156.2, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

- a. Schlage (SC)

B. Cylindrical Locksets, Grade 2 (Standard Duty): ANSI/BHMA A156.2, Grade 2 Certified Products Directory (CPD) listed. Locks are to be non-handed and fully field reversible.

1. Provide locksets with functions and features as follows:

- a. Meets ANSI/BHMA A156.41 for single motion egress.
- b. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
- c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
- d. Meets Florida Building Code FL2998 and UL Certification Directory ZHEM.R21744 for latching hardware for hurricane requirements.
- e. Five-year limited warranty for mechanical functions.

2. Manufacturers:

- a. Schlage (SC)

C. Residential Tubular Locking Devices: Standard ANSI A156.2, Grade 2.

1. Tubular locksets, deadbolts, and handle sets designed to fit ANSI standard door preps.
2. Locks are to be non-handed and have adjustable backset.
3. Provide levers of like design and style as specified for commercial openings.
4. Manufacturers:
 - a. Schlage (SC)

2.7 AUXILIARY LOCKS

- A. Cylindrical Deadlocks: ANSI/BHMA A156.36 Grade 2 Certified Products Directory (CPD) deadbolts to fit standard ANSI 161 preparation in functions and with visual status indicators as specified in the hardware sets.
 1. Manufacturers:
 - a. Schlage (SC)

2.8 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
 1. Strikes for Bored Locks and Latches: BHMA A156.2.
 2. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 3. Dustproof Strikes: BHMA A156.16.

2.9 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 1. Exit devices shall have a five-year warranty.
 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Commercial Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Fabricate latchbolts from cast stainless steel, Pullman type, incorporating a deadlocking feature.
1. Manufacturers:
 - a. Von Duprin (VD)

2.10 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Standard Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
- C. Door Closers, Surface Mounted (Light Commercial): ANSI/BHMA 156.4, minimum Grade 3 Certified Products Directory (CPD) listed surface mounted, light commercial grade door closers. Non-handed, minimum sizes 2 to 4 Provide closer standard packed for regular, top-jamb, and parallel arm type mounting applications.

2.11 ARCHITECTURAL TRIM

- A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
 4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

2.12 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

2.13 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

2.14 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.

- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

- 1. Quantities listed are for each pair of doors, or for each single door.
- 2. The supplier is responsible for handing and sizing all products.
- 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
- 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

- B. Manufacturer's Abbreviations:

- 1. MK - McKinney
- 2. PE - Pemko
- 3. RO - Rockwood
- 4. YA - Arrow, formerly known as Yale
- 5. SC - Schlage
- 6. VD - Von Duprin

Hardware Sets

Set: 1.0

Doors: D1

Entry

1 Hinge, Full Mortise	TA2714	US26D	MK
2 Spring Hinges		US26D	MK
1 Deadbolt		626	SC
1 Passage Latch		626	SC
1 Kick Plate	K1050_X1.5LDW CSK BEV	US32D	RO
1 Door Stop	525/526 as required	NP	RO
1 Gasketing	S44GR		PE

1 Door Bottom	2113AVUN		PE
1 Threshold	_____ FHSL14SS as detailed		PE
1 Viewer	626	DCRM	RO

Set: 2.0

Doors: E1, E2
 Bath & Bedroom

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Privacy Set		26D	SC
1 Door Stop	525/526 as required	NP	RO
1 Balance of Hardware	by door mfg.		

Set: 3.0

Doors: E3
 Closet

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Passage Set		26D	SC
1 Door Stop	525/526 as required	NP	RO
1 Balance of Hardware	by door mfg.		

Set: 4.0

Doors: F1, F2
 Sliding By Pass

1 Sliding Door Hdwe			PE
2 Flush Pull	860	US32D	RO

Set: 5.0

Doors: 102A
 Main Entry

6 Hinge (heavy weight)	T4A3386 x NRP	US32D	MK
2 Electric Power Transfer			VD
2 Concealed Vert Rod Exit, Electrified		630	VD
2 Overhead Low energy operators section 087113		630	
1 Power Supply			
1 Card Reader Pin Pad	By Division 28		
2 Door Pull	TBF158	US32D	RO
2 Door Stop	463-RKW	US32D	RO
1 Rain Guard	346C		PE
1 Gasketing	by door mfg.		
2 Sweep	315CN		PE
1 Threshold	_____ FHSL14SS as detailed		PE

Set: 6.0

Doors: 102B

Main Entry

6 Hinge (heavy weight)	T4A3786 x NRP	US26D	MK
2 Electric Power Transfer		630	VD
2 Overhead Low energy operators section	087113	630	
2 Sets Push Pulls		US32D	RO
2 Door Stops		US26D	RO

Set: 7.0

Doors: 101A, 109A, 120A
 Stairwell, Side Entrance, West Stair

3 Hinge (heavy weight)	T4A3386 x NRP	US32D	MK
1 Rim Exit Device, Nightlatch		630	VD
1 Door Pull	TBF158	US32D	RO
1 Electric Strike		630	
1 Power Supply			
1 Card Reader Pin Pad	By Division 28		
1 Surface Closer	5801	689	YA
1 Door Stop	463-RKW	US32D	RO
1 Rain Guard	346C		PE
1 Gasketing	by door mfg.		
1 Sweep	315CN		PE
1 Threshold	_____ FHSL14SS as detailed		PE

Set: 8.0

Doors: 104A
 Electrical

3 Hinge (heavy weight)	T4A3386 x NRP	US32D	MK
1 Rim Exit Device, Nightlatch		630	VD
1 Door Pull		US32D	RO
1 Surface Closer	2701	689	YA
1 Door Stop	463-RKW	US32D	RO
1 Rain Guard	346C		PE
1 Gasketing	by door mfg.		
1 Sweep	315CN		PE
1 Threshold	_____ FHSL14SS as detailed		PE

Set: 9.0

Doors: 104B
 Electrical

3 Hinge (heavy weight)	T4A3386 x NRP	US32D	MK
1 Rim Exit Device, Nightlatch		630	VD
1 Door Pull		US32D	RO
1 Surface Closer with Stop	2701	689	YA
1 Gasketing	by door mfg.		

1 Sweep 315CN PE

Set: 10.0

Doors: 103A
 Plumbing

3 Hinge (heavy weight)	T4A3386 x NRP	US32D	MK
1 Rim Exit Device, Nightlatch		630	VD
1 Door Pull		US32D	RO
1 Surface Closer with Stop	2701	689	YA
1 Rain Guard	346C		PE
1 Gasketing	by door mfg.		
1 Sweep	315CN		PE
1 Threshold	_____ FHSL14SS as detailed		PE

Set: 11.0

Doors: 103B
 Plumbing

3 Hinge (heavy weight)	T4A3386 x NRP	US32D	MK
1 Rim Exit Device, Nightlatch		630	VD
1 Door Pull		US32D	RO
1 Surface Closer with Stop	2701	689	YA
1 Gasketing	by door mfg.		
1 Sweep	315CN		PE

Set: 12.0

Doors: 105A, 202A
 Laundry

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Passage Latch		626	SC
1 Surface Closer	2701	689	YA
1 Kick Plate	K1050__X1.5LDW CSK BEV	US32D	RO
1 Door Stop	441CU/409 as required	US26D	RO
1 Gasketing	S44GR		PE

Set: 13.0

Doors: 101B, 109B, 217A, 206A
 North Stair, West Stair

3 Hinge (heavy weight)	T4A3786	US26D	MK
1 Fire Rated Rim Exit, Passage		630	VD
1 Surface Closer	2701	689	YA
1 Kick Plate	K1050__X1.5LDW CSK BEV	US32D	RO
1 Door Stop	441CU/409 as required	US26D	RO
1 Gasketing	S44GR		PE

Set: 14.0

Doors: 110A, 201A, 105A, 213A
Janitor, Mechanical, Storage

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Storeroom Lock		626	SC
1 Surface Closer	2701	689	YA
1 Kick Plate	K1050__X1.5LDW CSK BEV	US32D	RO
1 Door Stop	441CU/409 as required	US26D	RO
1 Gasketing	S44GR		PE

Set: 15.0

Doors: Pedestrian Gates

1 Hinge, Full Mortise	Rim panic device w/weepers, Function ANSI 03 OUT-98-697NL-RV-WP-630-CYL.	630	VD
1 Electric Strike		630	VD
1 Power Supply			
1 Card Reader Pin Pad	By Division 28		

Note: Balance of hardware by gate manufacturer. Div 32 fence sections have mounting hardware for panic and strike on gates - Keedex gate boxes.

Set: 16.0

Knox Box Co.

(1) Knox box for building, Model 3270, recessed.

Knox key switch Model 3502, single lock on plate for fire only, SPDT. One for each pedestrian gate and each vehicle gate.

END OF SECTION

SECTION 087113
POWER DOOR OPERATORS

PART 1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

1.02 SUBMITTALS

- A. Shop Drawings.
- B. Product Data: Provide data on system components, sizes, features, and finishes.

PART 2 PRODUCTS

2.01 POWER DOOR OPERATORS - GENERAL

- A. Electrically Operated or Controlled Hardware: Provide necessary power supplies, relays, and interfaces as required for proper operation; provide wiring between control components and to building power connection in compliance with NFPA 70.
- B. Comply with ADA Standards for egress requirements.
- C. Comply with NFPA 101 and requirements of authorities having jurisdiction; provide units selected for actual door weight and for light pedestrian traffic unless otherwise indicated.
- D. Exterior and Vestibule Doors: Provide equipment suitable for ambient operating temperature range of minus 20 to plus 140 degrees F.
- E. Exterior Doors: Provide units capable of operating, closing, and holding doors closed under positive and negative differential pressure; if necessary, provide power closing.
- F. System Integration: Integrate operator functionality with access control systems as required for a complete working installation.

2.02 OPERATORS FOR SWINGING DOORS

- A. Door Operator: Hydraulic.
 - 1. Applications: Include operators for single and double doors.
 - 2. Speed Control: Variable, field-adjustable opening and closing cycles.
 - 3. Functionality: Power-assist open, spring close operation.
 - a. Power-Assist Operators: Comply with BHMA A156.19; operator activated by pushing or pulling the door, not by separate actuator or sensor; safeties not required.
 - 1) Signage: Provide signage in accordance with BHMA A156.19.

4. Power Supply Units: Self-contained, electrically operated, and independent of door operator.

2.03 CONTROLLERS, ACTUATORS, AND SAFETY DEVICES

- A. Safety Devices: Manufacturer's standard units recommended for project applications and conditions.

2.04 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- B. Disconnect Switch: Factory mount disconnect switch in control panel.

2.05 FINISHES

- A. Aluminum Finishes: Manufacturer's standard.
 1. Class I Natural Anodized Finish: Clear anodic coating; AAMA 611 AA-M12C22A41, minimum dry film thickness (DFT) of 0.7 mil, 0.0007 inch.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.

3.02 MAINTENANCE

- A. Provide service and maintenance of operating equipment for one year from Date of Substantial Completion, at no extra charge to Owner.

END OF SECTION

**SECTION 088000
GLAZING**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

1.02 QUALITY ASSURANCE

- A. Perform work in accordance with GANA (GM), GANA (SM), IGMA TM-3000, and NGA (LGRM) for glazing installation methods.

1.03 WARRANTY

- A. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
 - 1. In conjunction with weather barrier related materials described in other sections, as follows:
 - a. Water-Resistive Barriers: See Section 072500.
 - b. Vapor Retarders: See Section 072600.

- c. Air Barriers: See Section 072700.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 - 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

2.04 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Spacer Color: Black.
 - 4. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - b. Color: Black.
 - 5. Purge interpane space with dry air, hermetically sealed.
 - 6. Pre-Equalized Insulated Glazing Units: Provide glazing units sealed at manufacturing plant with internal pressure matching pressure of the installation location.
- B. Insulating Glass Units: Vision glass, double glazed.

1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with argon.
3. Outboard Lite: Annealed or Tempered as scheduled, 1/8 inch thick, minimum.
 - a. Tint: Clear.
4. Inboard Lite: Annealed or Tempered as scheduled float glass, 1/8 inch thick, minimum.
 - a. Tint: Clear.
5. Thermal Transmittance (U-Value), Summer - Center of Glass: As indicated on drawings. Design Development Phase Basis of Design: R or U Value as indicated on IMEG Energy Annotated Envelope drawings, Section 2, Envelope Assembly Options, Option Selected.
6. Shading Coefficient: As indicated on drawings.
7. Solar Heat Gain Coefficient (SHGC): As indicated on drawings.
8. Glazing Method: Dry glazing method, gasket glazing.

2.05 GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.

2.06 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.01 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

END OF SECTION

SECTION 092116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data:
 - 1. Provide data on gypsum board, accessories, and joint finishing system.

1.02 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. Drywall Finishing Council: Recommended Specification For Preparation of Gypsum Board Surfaces Prior to Texture.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. Fire-Resistance-Rated Partitions: UL or GA Assembly number and rating as indicated on drawings.
 - 2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces, unless otherwise indicated.
 - 2. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
- B. Backing Board For Wet Areas:

1. Application: Surfaces behind tile in wet areas, including tub and shower surrounds, shower ceilings, and kitchens.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.

2.03 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness 2 inches.
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 2. Joint Compound: Drying type, vinyl-based, ready-mixed.
 3. Joint Compound: Setting type, field-mixed.
- D. Resilient Channel - Double leg.
1. Steel, 33 ksi min, 25 gauge.
 2. Size: 2-1/2 inch overall width x 1/2 inch deep, with 1-1/4 inch face.
 3. Finish: G40EQ
- E. Screws for Fastening of Gypsum Panel Products to Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

PART 3 EXECUTION

3.01 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Resilient Channel: Screw fasten to studs and floor framing 16 inches on center maximum or as indicated on drawings.

3.02 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

3.03 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 3: Walls to receive textured wall finish.
 - 3. Level 2: In mechanical/electrical rooms, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

3.04 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.
- B. Texture: Light orange peel where scheduled.
- C. Prior to texture application, treat entire board surface to minimize absorption differential by one of the following methods:

1. Apply a thin skim coat of gypsum board joint compound to the entire surface as defined by GA-214 Recommended Levels of Finish for Gypsum Board, Glass Mat and Fiber-Reinforced Gypsum Panels.
2. Apply a product recommended by the texture or paint manufacturer for this purpose. Allow

END OF SECTION

SECTION 096433
LAMINATED WOOD FLOORING

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, wood species and colors available; and installation instructions.
- B. Shop Drawings: Indicate floor joint pattern and termination details.
- C. Samples: Submit two samples 3 by 8 inch in size illustrating floor finish, color, and sheen.
- D. Up to three colors/finishes may be selected. At a minimum, hallways and residential units will be different color/finish.
- E. Installer's Qualification Statement.

1.02 PERFORMANCE REQUIREMENTS

- A. All flooring shall be compliant with the California Department of Public Health Standard (CDPH) Method V1.1 (2010), using CA Section 01350, for school or residential exposure scenarios or v1.2 (2017).

1.03 FIELD CONDITIONS

- A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40 percent.
- B. Maintain minimum room temperature of 65 degrees F and relative humidity in accordance with adhesive manufacturer's instructions for a minimum period of 48 hours prior to delivery of materials to installation space, during installation, and after installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Laminated Wood Flooring:
 - 1. Basis of Design: Evoke LVP
 - 2. Construction: Tongue and groove, self-locking, 5-ply laminated wood planks.
 - 3. Installation Method: Glued down.
 - 4. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 5. Surface Burning Characteristics: Flame Spread Index of 200, maximum; Smoke Developed Index of 450, maximum; when tested in accordance with ASTM E84.

6. Static Load Resistance: 250 psi minimum, when tested in accordance with ASTM F970.
7. Species: species appearance TBD.
8. Color: As selected from manufacturer's full range for species specified above.
9. Thickness: 3/8 inch.
10. Face Width: 3 inch.
11. Edge Profile: Beveled.
12. Length: Random, minimum of 9 inches.
13. Treatment: Acrylic impregnated.
14. Finish: Smooth, factory applied, UV cured urethane.

2.02 ACCESSORIES

- A. Adhesives: Water-resistant; types recommended by flooring manufacturer for project substrates.
- B. Transition Strip: Same species and finish as flooring material; profiles indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wood Flooring:
 1. Install flooring in accordance with manufacturer's and NWFA installation instructions.

END OF SECTION

**SECTION 096500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Shop Drawings: Indicate seaming plans.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Installer's Qualification Statement.

1.02 PERFORMANCE REQUIREMENTS

- A. All flooring shall be compliant with the California Department of Public Health Standard (CDPH) Method V1.1 (2010), using CA Section 01350, for school or residential exposure scenarios or v1.2 (2017).

1.03 QUALITY ASSURANCE

- A. Installer Certification: Installer shall be certified by flooring manufacturer to field form and install heat welded seams and cove base.

PART 2 PRODUCTS

2.01 SHEET FLOORING

- A. Vinyl Sheet Flooring: Homogeneous without backing, with color and pattern throughout full thickness.
 - 1. Minimum Requirements: Comply with ASTM F1913.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 3. Thickness: 0.080 inch nominal.
 - 4. Sheet Width: 72 inch minimum.
 - 5. Static Load Resistance: 250 psi minimum, when tested as specified in ASTM F970.
 - 6. Integral coved base with cap strip.
 - 7. Pattern: TBD.
 - 8. Color: TBD.

9. Finish: Smooth.
10. Basis of Design Manufacturer: Tarkett.

2.02 STAIR COVERING

- A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness.
 1. Minimum Requirements: Comply with ASTM F2169, Type TP, rubber, thermoset.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 3. Nominal Thickness: 0.1875 inch.
 4. Nosing: Round.
 5. Striping: 2 inch wide contrasting color abrasive strips.
 6. Texture: Smooth.
 7. Color: To be selected by Architect from manufacturer's full range.
- B. Stair Risers: Full height and width of tread in one piece, matching treads in material and color.
 1. Thickness: 0.080 inch.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: PVC.
 1. Transition Strips: Basis of design Johnsonite CTA-XX-Z 3/8 inch to 0.080 inch rolling traffic transition, or as needed to match flooring thicknesses. Color to match sheet flooring.
 2. Cove Base Cap: Basis of design Johnsonite SCC-XX-D for 0.080 material, or as needed to match flooring thickness. Color to match sheet flooring.
- D. Filler for Coved Base: Plastic.
- E. Sealer and Wax: Types recommended by flooring manufacturer.
- F. Cove Strip: 1-inch radius provided or approved by resilient sheet manufacturer.
- G. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams. Color to match flooring.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

3.02 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Cove Base: Install where indicated on drawings, using cove base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, with cove base cap.
- C. Transition Strips: Provide where sheet flooring transitions to other flooring materials.

3.03 INSTALLATION - STAIR COVERINGS

- A. Adhere over entire surface. Fit accurately and securely.

END OF SECTION

**SECTION 099113
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- B. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Non-metallic roofing and flashing.
 - 6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
 - 7. Glass.
 - 8. Concealed pipes, ducts, and conduits.

1.02 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- B. Samples: Submit two paper chip samples, 4x4 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

B. Colors: As indicated in Color Schedule.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including fiber cement siding, primed wood, and primed metal.
1. Two top coats and one coat primer.
 2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
 3. Top Coat Sheen:
 - a. Velvet: MPI gloss level 2; use this sheen at all locations.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
1. Alkali-Resistant Water-Based Primer; MPI #3.
 2. Water Based Primer for Galvanized Metal; MPI #134.
 3. Stain Blocking Primer; MPI #136.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Fiber Cement Siding: 12 percent.
2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

END OF SECTION

SECTION 099123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
- B. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
 - 6. Floors, unless specifically indicated.
 - 7. Glass.
 - 8. Concealed pipes, ducts, and conduits.

1.02 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. MPI product number (e.g., MPI #47).

3. Cross-reference to specified paint system products to be used in project; include description of each system.
- B. Samples: Submit two paper chip samples, 4x4 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.
- C. Performance Requirements: Coatings shall comply with one of the following.
 1. All products must have been tested and found compliant with the California Department of Public Health Standard (CDPH) Method V1.1 (2010), using CA Section 01350, for school or residential exposure scenarios. Compliance with v1.2 (2017) also acceptable.
 2. Certification by UL GreenGuard Gold, or SCS Indoor Advantage Gold are evidence of compliance; credible laboratory test.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Basis of Design: Glidden.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Colors: As indicated on drawings.
 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.03 PAINT SYSTEMS - INTERIOR

- A. P-1 Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board and wood.

1. Two top coats and one coat primer.
 2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
 3. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
- B. P-2 Medium Duty Door/Frames/Trim: For surfaces subject to frequent contact by occupants, including metals:
1. Two top coats and one coat primer.
 2. Top Coat(s): Interior Alkyd, Water Based; MPI #157, 167, 168, or 169.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
1. Alkali Resistant Water Based Primer; MPI #3.
 2. Interior Institutional Low Odor/VOC Primer Sealer; MPI #149.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
1. Gypsum Wallboard: 12 percent.
 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

END OF SECTION

SECTION 099300
STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and catalog number, and general product category.
 - 2. Manufacturer's installation instructions.
- B. Samples: Two samples on actual wood substrate to be finished, 4 by 8 inch in size, indicating selected colors and sheens for each system, with specified coats cascaded.

PART 2 PRODUCTS

2.01 STAINS AND TRANSPARENT FINISHES - GENERAL

- A. Finishes:
 - 1. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. Supply each finish material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.02 EXTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

- A. Basis of Design Manufacturer/System: Sikkens Exterior Coatings by AkzoNobel.
- B. Finish on Wood:
 - 1. 1-coat sanding sealer/primer.
 - 2. 1-coat stain.
 - 3. 1-mid-coat
 - 4. 2-coat sealer.
 - 5. Stain: Exterior semi-transparent stain for wood, water based.

6. Mid-coat and Sealer: Exterior water based, clear.
7. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Apply sanding sealer/primer and apply stain within the time period recommended by sealer/primer manufacturer.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Sand wood surfaces lightly between coats to achieve required finish.

END OF SECTION

**SECTION 101200
DISPLAY CASES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Submit complete printed data and installation details indicating products to be provided as specified.
- B. Provide chart of manufactures standard tackboard fabrics.

PART 2 PRODUCTS

2.01 DISPLAY CASES

- A. Surface-Mounted Display Case: Factory-fabricated aluminum-framed display case with adjustable glass shelves, finished interior.
 - 1. Width: 4 feet.
 - 2. Height: 24 inches.
 - 3. Depth: 4 inches.
 - 4. Components:
 - a. Glazed Doors: Sliding,
 - 1) Number of Doors: One pair.
 - b. Back Panel: Tackable.

2.02 COMPONENTS

- A. Wood Case Construction: 3/4 inch factory finished plywood or MDF.
- B. Glazed Sliding Doors:
 - 1. 3/16 inch clear tempered glass with plastic finger pulls.
 - 2. Door track: Extruded aluminum glass shoe with bottom rollers and top plastic guide.
 - 3. Lock: Glass door cylinder lock.
- C. Tackable Back Panel: Fine-grained, homogeneous natural cork on hardboard.
 - 1. Cork Thickness: 1/8 inch.
 - 2. Fabric: Vinyl fabric; minimum fabric weight: 13 oz/sq yd.

3. Color, Texture, Weave, and Pattern: As selected from manufacturer's full range.
4. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02 DISPLAY CASE SCHEDULE

- A. Quantity: One, first floor near main entry, where indicated on drawings.

END OF SECTION

SECTION 101419
DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's product literature for each type of dimensional letter sign, indicating style, font, colors, locations, and overall dimensions of each sign.
- B. Selection Samples: Where materials, colors, and finishes are not specified, submit two sets of selection charts or chips.

PART 2 PRODUCTS

2.01 DIMENSIONAL LETTERS

- A. Applications: Building Address numbers on building and Monument Sign with logos, names, PHA phone number.
 - 1. Use individual plastic letters and numbers, and custom logo.
 - 2. Mounting Location: Exterior on building and monument sign as indicated on drawings.
- B. Plastic Letters and num:
 - 1. Material: Injection molded plastic.
 - 2. Thickness: Manufacturer's standard for letter size.
 - 3. Letter Height: As indicated on drawings.
 - 4. Text and Typeface:
 - a. Character Font: Helvetica, Arial, or other sans serif font.
 - 5. Finish: Semi-gloss.
 - 6. Color: As selected.
 - 7. Mounting: Concealed screws or studs.
- C. Logo: Custom panel with color logo. Electronic file for logo provided by owner.

2.02 ACCESSORIES

- A. Concealed Screws: Noncorroding metal; stainless steel, galvanized steel, chrome plated, other, or studs..

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.

END OF SECTION

SECTION 101423
PANEL SIGNAGE

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.
- B. Shop Drawings:
 - 1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
- C. Selection Samples: Where colors, materials, and finishes are not specified, submit two sets of color selection charts or chips.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.02 PANEL SIGNAGE

- A. Panel Signage:
 - 1. Application: Room and door signs.
 - 2. Description: Flat signs with applied character panel media, tactile characters and braille.
 - 3. Sign Size: As required by text
 - 4. Total Thickness: 1/8 inch.
 - 5. Sign Edges: Squared.
 - 6. Color and Font, unless otherwise indicated:
 - a. Character Font: Helvetica, Arial, or other sans serif font.
 - b. Character Case: Upper and lower case (title case).
 - c. Background Color: As selected.
 - d. Character Color: Contrasting color.
 - 7. Material: Acrylic plastic base with applied plastic letters and braille.

8. Tactile Letters: Raised 1/32 inch minimum.

2.03 SIGNAGE APPLICATIONS

A. Room and Door Signs:

1. Residential Units: Three digit room letters/numbers to be determined later, not the numbers indicated on drawings.
2. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings: Laundry, Janitorial, Mechanical, Electrical, Stairs, and Storage. Mechanical and Electrical room signs to include "Staff Only."
3. Tactile Exit signs reading "Exit" in raised letters and braille at all doors leading to stairwells and all doors opening to the exterior.
4. Fire Alarm: Provide sign on all doors of room with main FACP reading "FIRE ALARM PANEL" in 1-1/2 inch high red UV resistant letters; no braille.

2.04 ACCESSORIES

- #### **A. Tape Adhesive: Double-sided tape, permanent adhesive.**

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions, ICC A117.1, and IBC Chapter 11 with Washington State Amendments..
- B. Install with horizontal edges level.

END OF SECTION

SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products of each category type by single manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Zinc Alloy: Die cast, ASTM B86.
- E. Acrylic Plastic Sheet: ASTM D4802.
- F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, brushed finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Grab Bars: Stainless steel, smooth surface.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.

- b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
- c. Finish: Satin.
- d. Length and Configuration: As indicated on drawings.

2.05 RESIDENTIAL TOILET, SHOWER, AND BATH ACCESSORIES

- A. Medicine Cabinet: Metal cabinet, shelves, and door; surface mounted.
 - 1. Overall Size: As indicated on drawings.
 - 2. Cabinet Construction: Heavy-gauge steel, factory-applied, gloss white, baked-enamel finish. Form body in one piece, without seams, and with rounded inside corners.
 - 3. Shelves: Adjustable, white baked-enamel steel; provide not less than three shelves.
 - 4. Door Type: Mirror with satin finish stainless steel frame.
 - 5. Single Door: Fitted with continuous piano-type hinge, shock-absorbing spring-and-rod door stop, magnetized catch, right-hand swing, reversible type.
- B. Towel Bar: Round tubular bar; round mounting posts, concealed attachment.
 - 1. Mounting Post Material: Stainless steel; satin finish.
 - 2. Bar Material: Stainless steel; satin finish.
 - 3. Length: 24 inches.
- C. Shower Curtain Rod: Straight tube, 1 inch diameter, with mounting flanges for concealed attachment.
 - 1. Material: Stainless steel; satin finish.
 - 2. Length: 72 inches.
- D. Shower Curtain: Mildew resistant fabric with corrosion resistant metal grommets.
 - 1. Material: Cotton, machine washable.
 - 2. Color: White.
 - 3. Shower Curtain Hooks: Chrome-plated spring wire.
- E. Soap Dish:
 - 1. Type: Surface mounted with drain holes.
 - 2. Material: Stainless steel; satin finish.

F. Robe Hook: Single-prong, concealed attachment.

1. Material: Stainless steel; satin finish.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Specified in 224000 - Plumbing Fixtures.

2.07 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.

1. Drying rod: Stainless steel, 1/4 inch diameter.

2. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.

3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.

4. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

END OF SECTION

SECTION 104400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide extinguisher operational features.

PART 2 PRODUCTS

2.01 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 - 1. Class: A:B:C type.
 - 2. Size: 5 pound: 2A-10B:C.
 - 3. Finish: Baked polyester powder coat, red color.

2.02 FIRE EXTINGUISHER CABINETS

- A. Fire Rated Cabinet Construction: 1/2 hour rated.
 - 1. Steel; outer and inner boxes.
- B. Cabinet Configuration: Semi-recessed type.
 - 1. Trim: Flat square edge.
- C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.
- D. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- F. Finish of Cabinet Exterior Trim and Door: Red enamel.
- G. Finish of Cabinet Interior: White colored enamel.

2.03 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install within ICC A117.1 reach range or height as indicated on drawings..
- C. Place extinguishers in cabinets.
- D. Provide (3) per floor to meet IFC 75 foot travel distance.

END OF SECTION

**SECTION 105500
POSTAL SPECIALTIES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, maintenance information, and current USPS approval documentation.

PART 2 PRODUCTS

2.01 CENTRAL MAIL DELIVERY BOXES

- A. Basis of Design: Vital cluster box units by National Mailboxes, division of NMHP Inc.
- B. Central Mail Delivery Boxes: Provide products approved for United States Postal Service (USPS) delivery cluster box unit "F."
 - 1. Materials: Aluminum with stainless steel hardware.
 - 2. Finish: Powder coat in color selected by Architect from manufacturer's standard colors.
- C. Cluster Box Units (CBU): Pedestal-mounted, mail receptacle with weather-resistant cabinet for outdoor installation; front-loading, double-column design.
 - 1. Unit A: 24 customer compartments (3 inch high), 1 outgoing mail receptacle, and 1 parcel compartment.
 - 2. Accessibility: Provide minimum of two customer compartments and one parcel compartment within ICC ANSI A117.1 accessibility reach ranges.

2.02 COMPONENTS

- A. Locking - Front Loading Master Door: Three-point latching mechanism with USPS master lock furnished and installed by postmaster.
- B. Locking - Customer Compartment Doors: USPS approved cam lock, 3 keys each lock.
- C. Locking - Parcel Compartment Doors: Double-lock arrangement with USPS approved cam lock for customer access, and USPS master lock furnished and installed by postmaster.
- D. Pedestals: Standard aluminum pedestal with rubber mounting pad designed to meet USPS and height requirements of ADA Standards.
- E. Identification - Customer and Parcel Compartments: Sequential numerical or alphabetic characters, top to bottom, left to right; factory-installed.
 - 1. Silver adhesive decals, 3/4 inch high black characters centered on 1-1/2 inch high by 1-3/4 inch long decal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install postal specialties in accordance with approved shop drawings, manufacturer's instructions, and USPS requirements.

END OF SECTION

**SECTION 105723
CLOSET AND UTILITY SHELVING**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, with installation instructions.
- B. Shop Drawings: Provide drawings prepared specifically for this project; show dimensions of shelving or storage system and attachment to substrates.

PART 2 PRODUCTS

2.01 LAMINATED WOOD STORAGE SYSTEMS

- A. Applications:
 - 1. Closet Storage System: Wall-mounted thermally fused laminate clad vertical panels with attached components and accessories, as indicated on drawings.
 - 2. Closet Storage System: Wall bracket-supported thermally fused laminate clad shelving with attached components and accessories, as indicated on drawings.
 - a. Storage System Nominal Dimensions: Unless otherwise indicated, provide shelves and hanging areas of widths and heights indicated on drawings.
 - b. System Depth: 14 inches, unless otherwise indicated.
- B. Laminated Storage Components:
 - 1. Particleboard with thermal-fused melamine surfaces.
 - 2. Edge Finish: Hot-melt PVC edge banding, matching color.
 - 3. Substrate Thickness: 3/4 inch, nominal.
 - 4. Color: White.
- C. Cabinet Hardware: As selected from manufacturer's standard types, styles and finishes.
 - 1. Hanging Rod: Tubular steel, 1 inch diameter, with end caps on open ends. Finish: Chrome. Wall Thickness: 20 gauge, 0.035 inch.
- D. Mounting Hardware for Laminated Wood Storage System: Provide manufacturer's standard mounting rail, mounting fasteners, shelf hardware, hanging rod assembly, and other accessories for a complete installation of the storage system.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install laminated wood storage system in accordance with drawings. Position units level, plumb, and at proper location relative to adjoining units and related work.

END OF SECTION

SECTION 113013
RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.01 SUBMITTALS

1.02 QUALITY ASSURANCE

- A. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

PART 2 PRODUCTS

2.01 KITCHEN APPLIANCES

- A. Provide Equipment Energy Star Rated.
- B. Basis of Design manufacturer for all appliances: GE, white finish.
- C. Models and Features: See equipment schedule on drawings.

2.02 LAUNDRY APPLIANCES

- A. Provide Equipment Energy Star Rated.
- B. Models and Features: See equipment schedule on drawings.

2.03 ACCESSORIES

- A. Dryer Vent Assembly: Comply with ICC (IMC)-2021 and ICC (IRC)-2021.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.

END OF SECTION

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SECTION 122113
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data indicating physical and dimensional characteristics.
- B. Samples: Submit color chart showing manufacturer's full range of standard colors/finishes for initial selection. Submit two samples, 4 inch long of up to three selected colors illustrating selected slat materials and finish. cord

PART 2 PRODUCTS

2.01 BLINDS WITHOUT SIDE GUIDES

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Manual Operation: Control of raising and lowering by cordless push-up/pull down; blade angle adjustable by control wand.
- C. Plastic Slats: PVC, Class A Fire Rated, square slat corners.
 - 1. Width: 2 inch.
 - 2. Color: As selected by Architect.
- D. Slat Support: Woven polypropylene cord, ladder configuration.
- E. Head Rail: Pre-finished, formed plastic box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
- F. Headrail Attachment: Wall brackets.

2.02 FABRICATION

- A. Determine sizes by field measurement.
- B. Fabricate blinds to fit within openings with uniform edge clearance of 1/2 inch.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.

END OF SECTION

SECTION 123200
MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
- B. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, and keying information.
- C. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
 - 1. Wood samples for color and species selection.

PART 2 PRODUCTS

2.01 CASEWORK, GENERAL

- A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Wood Veneer Faced Cabinets: Custom Grade.

2.02 FABRICATION

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
- B. Construction: As required for selected grade.
- C. Seismic Performance: Casework, including attachments to other work, able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Fittings and Fixture Locations: Cut and drill components for fittings and fixtures.
- E. Hardware Application: Factory-machine casework members for hardware that is not surface applied.
- F. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- G. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.
- H. Matching Wood Grain: Comply with requirements of quality standard for specified grade.

2.03 WOOD-VENEER-FACED CASEWORK

- A. Wood-Veneer-Faced Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
1. Style: Reveal overlay. Ease doors and drawer fronts slightly at edges.
 2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
 - a. Base Cabinets: 24 inches.
 - b. Tall Cabinets: 24 inches.
 - c. Wall Cabinets: 13 inches.
 3. Finishes:
 - a. Exposed Exterior Surfaces: HPVA HP-1 Grade A, Ash, plain sliced, random-matched.
 - b. Exposed Interior Surfaces: Thermally fused laminate.
 - 1) Color: White.
 - c. Semi-Exposed Surfaces: HPVA HP-1 Grade B, Ash, plain sliced, random-matched.
 - d. Concealed Surfaces: Manufacturer's option.
 - e. Factory-finish all exposed and semi-exposed surfaces with the same finish.
 - 1) Stain: Single application of clean, manufacturer-recommended stain of selected color; tinted coating not acceptable.
 - 2) Coating: Clear, superior-quality, chemical-resistant acyclic urethane; applied in accordance with manufacturer instructions, force-dried, sanded and wiped clean.
 - 3) Coats: Multiple coats as required to achieve minimum 1.5 mil dry film thickness.
 - 4) Appearance: Clear satin gloss; not cloudy or muddy.

2.04 COUNTERTOPS

- A. Countertops: See Section 123600.

2.05 CABINET HARDWARE

- A. Comply with BHMA A156.9 requirements.
1. Acceptable base materials for plated finishes include brass, bronze, and steel.

2. Satin brushed chrome/nickel plated finish.
- B. Shelves in Cabinets:
1. Shelf Standards and Rests: Two rows of pre-drilled holes each end with adjustable metal shelf brackets, brackets to have holes to accept screws..
- C. Swinging Doors: Hinges, pulls, and catches.
1. Hinges: Semi-concealed, number as required by referenced standards for width, height, and weight of door.
 2. Pulls: Wire pulls, 4 inches wide or as required to meet ADA.
 3. Catches: Magnetic.
- D. Drawers: Pulls to meet ADA.
- E. Drawer Slides: Ball-bearing full extension slides. Drawers up to 4 inches high medium duty, 70-120 lb class. Drawers greater than 4 inches high, heavy duty 125-200 lb class.

2.06 MATERIALS

- A. Wood-Based Materials:
1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
- B. Semi-Exposed Solid Wood: Dry, sound, plain sawn, no appearance defects, any species similar in color and grain to exposed portions.
- C. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.
- D. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.
- E. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed portions of cabinetry.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Verification of Environmental Conditions:
1. Do not deliver casework until the following conditions have been met:
 - a. Building has been enclosed (windows and doors sealed and weather-tight).

- b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
- c. Ceiling, overhead ductwork, piping, and lighting have been installed.
- d. Installation areas do not require further “wet work” construction.

3.02 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
 - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
 - 2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
 - 3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
 - 4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- F. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- G. Install hardware uniformly and precisely.

END OF SECTION

**SECTION 123600
COUNTERTOPS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic laminate faced countertops.
- B. Plastic laminate faced window sills.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- B. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- C. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

PART 2 PRODUCTS

2.01 COUNTERTOPS AND SILLS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Countertops and sills: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. Finish: Matte or suede, gloss rating of 5 to 20.
 - c. Surface Color and Pattern: As indicated on drawings.
 - 2. Countertop Exposed Edge Treatment: Postformed laminate; front edge substrate built up to minimum 1-1/4 inch thick with raised radiused edge, integral coved backsplash with radiused top edge and metal trim.

3. Sill Exposed Edge Treatment: Plastic laminate with square edge.
4. Back and End Splashes: Same material, same construction.
5. Fabricate countertops and sills in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.

2.02 MATERIALS

- A. Plywood for Supporting Substrate of Countertops and Sills: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 ACCESSORIES

- A. Chrome trim for backsplash and endsplash, U shape.

2.04 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
- C. Fabricate individual window sills in one piece.
- D. Wall-Mounted Counters: Provide brackets as indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Seal joint between back/end splashes and vertical surfaces.
- D. Install trim on backsplashes and endsplashes.
- E. Securely attach window sills using concealed fasteners or construction adhesive. Make flat surfaces level; shim where required. Seal joints.

END OF SECTION

DIVISION 21 05 05

FIRE SUPPRESSION SYSTEMS NARRATIVE

PART 1 - GENERAL

1.01 INTRODUCTION

A. Section includes:

1. The purpose of this section is to define the design approach upon which the contractor is to base a budget/estimate for bid purposes and establish the design criteria, and design submittals, which will be required in the preparation and execution of the design.
2. All work under this section shall comply with the requirements of general conditions, supplemental conditions, special conditions, and division 1 – general requirements, and shall include all mechanical sections specified herein.

1.02 APPLICABLE CODES AND STANDARDS:

A. Design shall comply with rules and regulations of the following:

1. NFPA 13R (2019) – Standard for the Installation of Fire Sprinkler Systems
2. 2021 International Fire Code (IFC)
3. 2021 International Building Code (IBC)
4. All other applicable local jurisdiction amendments

1.03 ORDER-OF-PRECEDENCE PROVISIONS

- A. In the case of inconsistency or ambiguities in design documents (all specifications and drawings), compliance with the strictest design requirement among conflicting criteria is required.
- B. If provided, alternate pricing for compliance with less strict criteria will be evaluated in addition to the mandatory baseline strictest criteria.
- C. Provide notice upon discovering potential design conflicts prior to bid where possible.

1.04 PROJECT DELIVERY

- A. This project is to be delivered design build. The design build contractors will be the engineers of record and create and stamp fully coordinated design documents for the project. Project shall be designed and stamped by a NICET certified designer who has attained level III or higher.
- B. The Sprinkler Contractor will provide pricing that covers the complete scope of work required to deliver a fully functional and code compliant project.
- C. Request for proposal (RFP): If there is a conflict between design documents and the RFP, the contractor will identify the discrepancy and request a clarification prior to RFP response.
- D. Bidders are encouraged to provide voluntary alternates beyond the specific scope outlined in this narrative and the accompanying drawings.
- E. Bidders are encouraged to contact the design team (through the channels identified by the issuer of the RFP) with clarification requests during the proposal process.
- F. The architectural floor plans provided are not final. Pricing shall allow for equipment relocations due to minor interior layout modifications.
- G. The bid proposals will identify scope gaps the contractor perceives and provide breakout pricing to cover these gaps.
- H. The sprinkler contractor shall submit final CAD as-built drawings to the General Contractor for submittal to owner within two weeks of project completion or unless alternative timing is agreed to.
- I. Operations and Maintenance manuals: Provide hard copy and electronic copies of O&Ms for ALL systems within TWO weeks of substantial completion.
- J. Sprinkler contractor to provide owner training on all systems within the building.
- K. Definitions:

1. Complete system: the contract documents do not attempt to address all materials, devices, equipment, and work that shall be required for completion of the mechanical systems. All materials, devices, equipment, and work not addressed in the contract.
2. The sprinkler contractor is responsible for providing the finished sprinkler work, tested, and ready for normal operation.
3. Sprinkler contractor shall properly store all materials and equipment in order to protect materials from physical damage or damage due to the elements or corrosion.
4. The sprinkler contractor shall make every effort to provide materials from a single manufacturer for any given material type, unless otherwise noted.
5. Materials shall be provided, installed, and/or used in conformance with the manufacturer's recommendations. If manufacturer's recommendations are not in conformance with the intent of the contract documents, obtain clarification from the architect and engineer prior to proceeding.
6. Coordination: check drawings of other trades to verify spaces in which work shall be installed. Establish exact locations of piping and ducts in such a manner as to conform to structure, avoid obstructions, and keep openings and passageways clear. Lines that must pitch or that must have a constant elevation, shall have the right-of-way over lines not so restricted. Maintain maximum headroom. If space conditions appear inadequate, notify the architect before proceeding with the work. Make reasonable modifications in the work without extra cost as needed to prevent conflict with work of other trades and for proper execution of the work.
7. Drawings and narratives shall be considered as a single entity, identified as the contract documents. Consider work indicated in one as required by both.

L. Codes, Permits, Inspections, and Fees:

1. The sprinkler contractor shall obtain all permits and inspections and pay all fees required by state and local authorities, except as noted.
2. All work and materials shall be in accordance with requirements of all applicable local and state codes, statues, standards and other regulations. Date of regulations shall be as adopted by local authorities at the time of permit intake, unless indicated otherwise.

3. The codes shall be construed as establishing a minimum or base level of requirements.
4. Where the contract documents call for material or construction of a better quality or higher capacity than required by the codes, statues, standards, and other regulations, the provisions of the contract documents shall take precedence over the requirements of the codes and standards.
5. Material and equipment within the scope of the UL testing laboratory service shall be listed by the underwriters laboratories for the purpose for which they are used and shall bear their listing mark. FM shall be allowed if acceptable to the authorities having jurisdiction.
6. Sprinkler contractor shall call for all inspections by the local code authorities when they become due and shall not cover any work until approved by these authorities.

M. Construction Coordination Drawings

1. It shall be the contractor's responsibility to work out and coordinate all conflicts and to provide all transitions and offsets required to facilitate installation of work. Provide construction coordination drawings for congested areas requiring close coordination with other trades and the general construction.
 - a. Grooved joint couplings and fitting shall be referred to on drawings and product submittals, and be identified by the manufacturer's listed model or series designation.
 - b. Sprinklers shall be referred to on drawings and product submittals, and be specifically identified by the manufacturer's listed model or series designation.
2. The construction coordination drawings shall be submitted to the architect/owner/engineer for review prior to commencement of any related work. The construction coordination drawings shall be updated as needed during the execution of the work.
3. The construction coordination drawings shall show all related trades, structure, and ceiling, walls, and partitions. Provide cross sections of all congested areas.
4. The final as-built drawings shall be submitted at the completion of the project for record purposes in hard copy, pdf, as well as electronic files.

N. Design, Submittals, Trade Coordination

1. The contractor shall coordinate their shop drawings with other trades prior to shop drawing approval and construction.
2. No cutting or drilling of joists or beams will occur without structural engineer approval.
3. Architectural drawings shall be checked for ceiling heights, walls, and cabinets that are intended to conceal work of this section. Where conflicts occur, the architect shall be notified prior to rough-in or installation of the work. Location of exposed work such as diffusers, grilles, and piping outlets shall take precedence over concealed work.
4. Complete equipment, and materials submittals shall be provided in electronic format. PDF bookmarks are required. Submittals shall be complete with all components included and customized to this project's requirements. Where cut sheets include more than one model or option, the sheets shall be marked to indicate the specific model/ options proposed for this project. Include warranty provisions for all equipment. All submittals require owner team approval prior to purchase.
5. Working construction shop drawings: complete equipment and materials submittals shall be provided in electronic format submitted per the time schedule issued by the owner/GC. Submittals shall be complete with all components included, installation manuals, and customized to this project's requirements. All submittals require owner and design team approval prior to purchase.
6. Contractor agrees that shop drawings submittals processed by the architect are not change orders, that the purpose of shop drawing submittals by the contractor is to demonstrate to the architect that the contractor understands the design concept and demonstrate its understanding by indicating which equipment and material it intends to furnish and install and by detailing the fabrication and installation methods it intends to use.
7. Contractor further agrees that if deviations, discrepancies, or conflicts between shop drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the architect, the design drawings and specifications shall control and shall be followed.

8. Shop drawings shall be reviewed by the equipment manufacturers before submitting to architect to determine whether the products are being correctly used.
9. Construction administration: the selected contractor will perform construction administration, including RFI responses, attendance at periodic meetings, formal review and approval of shop drawings and submittals, coordination with other trades, preparation of final punchlist.
10. Warranty period to extend for one year from date the project is occupied by the owner, not from the date of completion of the work. Warranty not applicable to defective items due to faulty work of subsequent trades.
11. As-builts: contractor shall maintain up to date as-built drawings showing all construction installation with any/all design changes. Drawings shall be maintained in the project office for inspection by the architect/owner at any time. Provide owner with reproducible and electronic (AutoCAD and pdf files) as-built drawings within 4 weeks of project substantial completion. Drawings shall include final as-installed locations of all piping, valves, and sprinkler heads.
12. All work contracted for must be accepted by all applicable inspectors including site superintendent, GC quality control personnel, AHJ's, owner's representative (IMEG) or their assignees.
13. Provide manufacturers product, installation and warranty information for all products supplied with signed contract documents per an agreed upon schedule at the time of contract award. This is of particular importance for GC to forward appropriate information to subcontractors to facilitate coordinated installation of his products.
14. During the construction phase of the project the contractor shall maintain a master punch list for items showing all problems discovered during field inspection, owner inspections, startup testing, functional testing and balancing. This list shall track each item to completion and require engineer signoff after completion is verified. Owner inspection items must be signed off by the owner's representative after completion is verified.

PART 2 - PRODUCTS

2.01 FIRE SPRINKLER SYSTEMS:

- A. Sprinkler system components shall be UL listed or factory mutual approved for all such components that have a listing in the respective agency.
- B. A new 4" water supply service and meter in vault shall be supplied for the fire sprinkler system.
- C. The sizing of the feed main sprinkler piping inside of the building shall be hydraulically calculated based on the static pressure, residual pressure, and flow available. Anticipated size is 4".
- D. The sprinkler system shall be calculated with a minimum 10% or 10 psi safety factor (whichever is higher) as required by the local Authority Having Jurisdiction.
- E. Provide a double check type backflow preventer approved by the local authority having jurisdiction. Backflow preventer to be located in the water entry room on level 1 (see architectural plans for location).
- F. All sprinkler piping upstream of the backflow preventer assembly shall be potable pipe acceptable to the authority having jurisdiction.
- G. Current water pressure is not available for this site. A hydrant test for a nearby site dated 2013 indicates to expect 60 psi static pressure with 772 gpm at a residual pressure of 20 psi. Bidding contractor shall verify available water pressure available at the project site.
- H. Based on the expected site water pressure, a fire pump is not anticipated for this project.
- I. Provide 2-way fire department connection on exterior of the building with swing check valve and ball drip. Coordinate location of FDC with architect and local authorities having jurisdiction
- J. Provide electric alarm bell on the exterior of the building in a constantly attended location. Coordinate the bell location with the architect and local authorities having jurisdiction. Coordinate power (line voltage or low voltage) with electrical or controls

contractor as necessary. Refer to Division 27/28 narratives for additional Fire Alarm details.

- K. Design a wet-pipe fire sprinkler system for all residential, public spaces, and all other heated areas of the building. Wet pipe fire sprinkler system shall be designed for light hazard occupancy in residential and public areas. System shall be designed for ordinary hazard in mechanical, electrical, and storage rooms in accordance with NFPA 13.
- L. Project is only two stories and does not meet the height limits to require standpipes.
- M. Provide tamper switches at all shut-off valves and coordinate wiring with fire alarm contractor.
- N. Provide a paddle type water flow switch at the sprinkler riser assembly and coordinate wiring with fire alarm contractor. Water flow switch shall be located upstream of the main drain and inspector test valves (or combined test and drain valve) as required by code and manufacturer installation requirements.
- O. Floor controls are not required for wet systems on this project. Provide alternate pricing to include floor controls consisting of shut-off valves with integral tamper switches, paddle-type water flow devices, and test and drain valves served from the main riser assembly on level 1.
- P. All wet system drains shall be routed back to a hub drain in the fire sprinkler riser room or to a safe location outside of the building by the fire sprinkler contractor if allowed by the AHJ. Drain sizing and termination shall meet the requirements of NFPA 13 and the local AHJ. If drains are routed to the exterior of the building, coordinate routing and termination with architect.
 - 1. If additional drain termination points are required outside of the fire pump room, sprinkler contractor shall be responsible for identifying and coordinating locations with plumbing design.
- Q. Pipe routing to be coordinated by fire sprinkler contractor. Provide heat trace and insulation as required for wet sprinkler main running through unheated areas. Coordinate power requirements with electrical contractor.

- R. Provide sprinkler coverage of all elevator shafts, pits, and machine rooms in accordance with NFPA 13 and local AHJ requirements.
- S. Sprinkler body shall be die-cast, with a wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation. Wrenches shall be provided by the sprinkler manufacturer that directly engage the wrench boss.
- T. Sprinkler heads in residential finished ceilings shall be white semi-recessed pendent or sidewall type heads. Provide glass bulb standard temperature quick response heads throughout.
- U. Sprinkler heads in non-residential finished ceilings shall be chrome plated semi-recessed pendent or sidewall type heads. Provide glass bulb standard temperature quick response heads throughout.
- V. Sprinkler heads in occupied spaces without finished ceilings shall be brass upright, pendent, or sidewall type heads as appropriate. Provide head guards where required by code or where there is a risk of mechanical damage to the sprinklers. Provide glass bulb standard temperature quick response heads throughout.
- W. Sprinkler heads in mechanical rooms and other back of house spaces shall be brass upright, pendent, or sidewall type heads as appropriate. Provide head guards where required by code or where there is a risk of mechanical damage to the sprinklers. Provide glass bulb standard temperature quick response heads throughout.
- X. Provide a durable metallic box in the riser room with an acceptable stock of spare sprinkler heads and installation wrenches as required by code. The box shall contain at least one (1) of each type of sprinkler installed within the building.
- Y. All exterior overhangs deeper than 4'-0" shall be sprinkled per NFPA 13. Provide dry-barrel type freezeless sprinklers or separate dry system to protect these areas as necessary.
- Z. Exposed piping 2 1/2" and larger shall be schedule 10 or schedule 40 black steel, joints shall be welded or roll-grooved. NFPA 13 compliant thin wall pipe (Allied brand Dyna-Flow or approved equal) is an acceptable alternate.

1. Mechanical Grooved Couplings shall be cast iron and comply with ASTM F1476 – Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications. Gaskets shall be pressure-responsive synthetic rubber with grade to suit the intended service.
- AA. Exposed piping 2” and smaller shall be schedule 40 black steel. Joints shall be threaded or roll grooved. NFPA 13 compliant light weight threadable pipe (Allied brand Dyna-Thread or approved equal) is an acceptable alternate.
- BB. UL listed CPVC piping may be utilized on residential floors where it is concealed and installed in accordance with applicable code and manufacturer listings.
- CC. Mechanical branch tees are not appropriate for new construction and are not allowed on this project. Contractor shall use groove-o-let and thread-o-let welded outlets or standard reducing tees.
- DD. Provide all hangers/ supports and seismic restraints in accordance with NFPA 13R and all local AHJ requirements. Contractor is responsible for providing seismic restraint calculations as required per code to the AHJ as part of their submittal package.
- EE. Piping shall be run concealed in all areas with finished ceilings and locations must be coordinated with architect and interiors drawings.
- FF. Design build sprinkler contractor to coordinate pipe routing and head locations with the architect, interiors architect, design team, and construction team with special attention to interior reflected ceiling and acoustical plans. Shop drawings shall be submitted with the above information for review and coordination prior to construction.
- GG. In areas open to structure, sprinkler piping shall be routed tight to structure. Piping shall not be run in front of windows or beneath skylights where applicable. Contractor to pay special attention to routing in lobby areas.
- HH. Provide pipe escutcheons at all public areas where sprinkler pipe penetrates walls.
 1. Escutcheons and guards shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.

- II. The fire sprinkler contractor shall fire stop all locations where the sprinkler piping penetrates a fire rated wall. Fill all voids with mineral wool and caulk with Intumescent fire caulking.
- JJ. Provide heat trace and insulation of wet sprinkler main running through unheated areas of the building at minimum 5 watts/ foot. Heat trace is to be listed for use with fire protection equipment. Coordinate with electrical contractor for wiring of heat trace.

PART 3 - EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. Install all materials in accordance with code and manufacturer requirements and best industry practices.
- B. Receive and store all materials on site in such a way as to protect uninstalled items from damage. Additional care shall be taken to ensure that CPVC pipe and fittings are protected from exposure to direct sunlight.
- C. Contractor shall have an ongoing employee training and quality control program that includes periodic documented training updates from manufacturer's representatives for all aspects of installation for contractor's field personnel. This shall be paired with a field QC program including periodic inspection of work installed in the field
- D. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks. Gaskets shall be molded and produced by the coupling manufacturer and shall be verified as suitable for the intended service.
- E. A factory-trained field representative (direct employee) of the CPVC manufacturer shall provide on-site training (either on the job site or contractor's office) for contractor's field personnel in the proper handling and installation of CPVC piping products. The factory-trained representative shall periodically review the product installation and ensure best practices are being followed. Contractor shall remove and replace and improperly installed products. A distributor's representative is not considered qualified to conduct the training.

- F. Do not install any sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install any sprinkler with a cracked bulb.

3.02 TEST AND INSPECTION

- A. System shall be tested and inspected. Sprinkler contractor is responsible for all required startup and testing. Coordinate with local authority having jurisdiction and all other authorities having jurisdiction for inspection and acceptance.
- B. Provide copies of all sprinkler system test certificates, including all signatures, to owner for building records.

END OF SECTION

DIVISION 22 05 05

PLUMBING SYSTEMS NARRATIVE

PART 1 - GENERAL

1.01 INTRODUCTION

- A. The purpose of this section is to define the design approach upon which the contractor is to base a budget/estimate for bid purposes and establish the design criteria, and design submittals, which will be required in the preparation and execution of the design.
- B. All work under this section shall comply with the requirements of general conditions, supplemental conditions, special conditions, and division 1 – general requirements, and shall include all plumbing sections specified herein.
- C. This section includes a general narrative description of Division 22 systems with specific equipment and component criteria that are to be included in the project. Reference all other specification sections, floor plans, drawing notes, drawing equipment schedules, and drawing matrices for additional equipment and project criteria.
- D. Specific conflicts between drawings, this specification section, and other specification sections, will not be used to define exclusions. Exclusions based on document conflicts will be accepted or rejected in the engineer of record's formal response to bid clarification requests or Request For Information (RFI's).

1.02 APPLICABLE CODES & STANDARD

- A. Wherever an International, National, or Uniform Code is referenced in this Narrative, it means the 2021 Washington State with Port Angeles Amendments version of that code, including any local amendments, is the design standard for this Project. For example, where the UPC is referenced, the 2021 Washington State with Port Angeles Amendments will be used.
- B. Design and installation shall comply with rules and regulations of the following:

APPLICABLE WASHINGTON STATE BUILDING CODES			
ENERGY CODE	2021 WASHINGTON STATE ENERGY CODE (SEC) FOR COMMERCIAL BUILDINGS	WAC 51-11C	EFFECTIVE MARCH 15, 2021
BUILDING CODE	2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-50	EFFECTIVE MARCH 15, 2021
ACCESSIBILITY CODE	2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON STATE AMENDMENTS CHAPTER 11 AND ICC A117.1-2009	WAC 51-50	EFFECTIVE MARCH 15, 2021
SEISMIC CODE	ASCE 7-2016 AS REFERENCED BY 2018 INTERNATIONAL BUILDING CODE	WAC 51-50	EFFECTIVE MARCH 15, 2021
FIRE CODE	2021 INTERNATIONAL FIRE CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-54A	EFFECTIVE MARCH 15, 2021
MECHANICAL CODE	2021 INTERNATIONAL MECHANICAL CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-52	EFFECTIVE MARCH 15, 2021
PLUMBING CODE	2021 UNIFORM PLUMBING CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-56	EFFECTIVE MARCH 15, 2021
BOILER CODE	WASHINGTON STATE BOILER CODE	WAC 296-104	
ELECTRICAL CODE	2020 NATIONAL ELECTRICAL CODE WITH 2020 WASHINGTON AMENDMENTS (NFPA 70)	WAC 296-46B	EFFECTIVE NOVEMBER 1, 2020
ELECTRICAL	ELECTRICIANS AND ELECTRICAL INSTALLATIONS	RCW CHAPTER 19.28	
NFPA STANDARDS	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS AS REFERENCED BY THE CODES ABOVE OR AS SPECIFICALLY LISTED BELOW		

1.03 ORDER-OF-PRECEDENCE PROVISIONS

- A. In the case of inconsistency or ambiguities in design documents (all specifications and drawings), compliance with the strictest design requirement among conflicting criteria is required.
- B. If provided, alternate pricing for compliance with less strict criteria will be evaluated in addition to the mandatory baseline strictest criteria.
- C. Provide notice upon discovering potential design conflicts prior to bid where possible.

1.04 PROJECT DELIVERY

- A. This project is to be delivered design build. The design build contractor responsible for all Plumbing systems (referred to herein as the plumbing contractor or PC) will be the engineer of record and create and stamp fully coordinated design documents for the project.
- B. Pricing Set Bid Notes
 - 1. The intent is to procure MEP pricing packages that cover the full project though the drawings are not at 100% CD level.
 - 2. Reference current MEP narratives as well as architectural and structural drawings.
 - 3. The architectural floor plans provided are not final. Pricing shall allow for equipment relocations due to minor interior layout modifications.
 - 4. The architectural floor plans provided are not final. Pricing shall allow for equipment relocations due to minor interior layout modifications.

5. Pricing is to include all MEP provisions as needed to completely buildout the project as defined in all referenced documents.
 6. During the bid process, provide specific scope clarification requests through the owner's bid clarification request process.
 7. Bids will include a detailed list of scope exclusions.
 8. Provide breakout additive pricing for specific scope as required to address perceived scope gaps in the project documents. Electrical and Plumbing subcontractors are to include all permit fees. Mechanical permit fees are included in owner's building permit fees.
 9. IMEG will participate in the subcontractor selection process by reviewing proposals, interviewing, and strategizing with the team. Primary goals are to thoroughly identify potential gaps and contingency requirements and to build a strong partnership with the subcontractors and GC.
- C. IMEG scope includes delivery of DD drawings and this Division 22 - Plumbing Systems Narrative. Design efforts beyond this milestone are by Plumbing Contractor (PC).
- D. The Design Build Engineer of Record will create Construction Document drawings starting at the end of Design Development phase using Revit and Level 100 per AIA Level of Development (LOD) Document 2014 at a minimum beginning with the design development phase effort. Level 200 and 300 LOD are to be provided where needed for detailed coordination during the CD phase (mechanical rooms, typical constricted ceiling spaces, other space constrained areas). Shared model coordination with architectural, structural, and all trades is required.
1. Utilize the BIM model to print 2D Design development and CD phase drawings
 2. Use the 3D BIM model throughout the design by the entire project team to facilitate collaboration and coordination. The information contained in the model will be used to create Construction Documents.
 3. Give the 3D BIM design model to the Owner as a record model of the original design at the end of the project. Any modifications to the model to accommodate facilities management or other purposes are at the discretion of the Owner and outside the scope of this contract.
- E. Detailing coordination: The MC will produce a 3D model of all systems. The Contractors will coordinate their shop drawings with other trades. The MC will be lead in this effort and will get signed agreements on shop drawings from MEP and other Subcontractors

prior to starting work. The MC is responsible for all trade coordination effort as required for shop drawing completion.

- F. Detailing coordination: There will be no change orders for field interference coordination modifications.
- G. The PC is encouraged to provide voluntary alternates beyond the specific scope outlined in this narrative and the accompanying drawings.
- H. The PC will provide bid response that covers the complete scope of work required to deliver a fully functional and code compliant project.
- I. Contractor shall attend design coordination meetings as needed.
- J. The design build bid package will be utilized as a basis of design through the completion of design and construction. As the design proceeds deviations from this package are to be clearly noted for the architect, owner, and peer review team for acceptance prior to design completion.
- K. The PC will provide budget/estimate response that covers the complete scope of work required to deliver a fully functional and code compliant project. Request for proposal (RFP). If there is a conflict between design documents and the RFP, the contractor will identify the discrepancy and request a clarification prior to RFP response.
- L. Design drawings, submittals, and shop drawings will be reviewed for conformance with the bid package as well as conformance with codes and accepted practice. Discrepancies will be noted for team review prior to acceptance.
- M. Complete equipment, and materials submittals shall be provided in electronic format. PDF bookmarks are required. Submittals shall be complete with all components included and customized to this project's requirements. Include warranty provisions for all equipment. All submittals require owner team approval prior to purchase.
- N. Construction Administration: The selected Contractor will perform construction administration, including RFI responses, attendance at periodic meetings, formal review and approval of shop drawings and submittals, coordination with other trades, preparation of final punchlist.

- O. All work contracted for must be accepted by all applicable inspectors including Site Superintendent, GC Quality Control Personnel, AHJ's, Owner's Representative or their assignees.
- P. Warranty period to extend for one year from date the project is occupied by the Owner, not from the date of completion of the work. Warranty not applicable to defective items due to faulty work of subsequent trades.
- Q. The PC shall submit final CAD as-built drawings to the General Contractor for submittal to Owner within two weeks of project completion or unless alternative timing is agreed to. Drawings shall be submitted in PDF and original AutoCAD formats.
- R. O&Ms: Provide hard copy and electronic copies (PDF) of O&Ms for ALL systems within TWO weeks of substantial completion or as noted in contract.
- S. Codes, Permits, Inspections, and Fees:
 - 1. The PC shall obtain all permits and inspections and pay all fees required by State and Local authorities, except as noted.
 - 2. All work and materials shall be in accordance with requirements of all applicable local and state codes, statues, standards, and other regulations. Date of regulations shall be as adopted by local authorities at the time of permit intake, unless indicated otherwise.
 - 3. The codes shall be construed as establishing a minimum or base level of requirements. Contract Documents shall not be construed to permit or direct work not in conformance with codes, statues, standards, and other regulations. Where provisions of the various regulations conflict with each other, or with the Contract Documents, the more stringent provisions shall be included in contract pricing. Conflict shall be resolved with the Architect and Authorities Having Jurisdiction (AHJ) prior to completing the design.
 - 4. Where the Contract Documents call for material or construction of a better quality or higher capacity than required by the codes, statues, standards, and other regulations, the provisions of the Contract Documents shall take precedence over the requirements of the codes and standards.
 - 5. Material and equipment within the scope of the UL Testing Laboratory Service shall be listed by the Underwriters Laboratories for the purpose for which they are used

and shall bear their listing mark. ETL or CSA shall be allowed if acceptable to the Authorities Having Jurisdiction (AHJs).

6. PC shall call for all inspections by the local code authorities when they become due and shall not cover any work until approved by these authorities.

1.05 MISCELLANEOUS SCOPE ITEMS:

- A. The PC is to review the Energy, Div 21, 23, 26, 27, and 28 narratives for scope impacts .
 1. Div 23 fan coils for split systems and VRF systems require condensate piping by PC routed to indirect drain connections.
- B. Property line and interior acoustical calculations will be by the architectural design team's Acoustical Consultant prior to permit submittal. Acoustical Consultant to provide the requisite analysis to assure the team of acceptable acoustical performance of each system.
- C. The structural engineer is responsible for all structural calculations required for the supporting structure for permit intake.
- D. PC shall include structural tie-down calculations for all equipment as required by the 2021 IBC and ASCE 7. This will be a deferred permit submittal.
- E. PC is to provide and install fire stopping of all through and membrane penetrations as required by the IBC and other applicable codes. Floor penetrations to include fire rated sleeves with either a 2" stand off water dam (Holdrite Pro Series Water Dam, Hilti-CFS-CID MD or approved equal), or a sleeving system with a built-in mid body waterproofing seal with a factory-provided W rating (Hilti CFS-680 or approved equal).
- F. All ductwork, piping, plumbing, and equipment are to be seismically restrained as required by the 2021 IBC.
- G. All code required access panels in walls and/or ceilings are provided and installed by the plumbing contractor. PC to coordinate required locations and sizes with the architect and GC.
- H. The contractors will provide and install phenolic tags identifying each specific piece of equipment.

- I. All exposed piping in mechanical rooms will be labeled in compliance with accepted industry standards and building standards.

1.06 COORDINATION

- A. All pipe routing and equipment locations shall be coordinated with full design team including but not limited to architect, interior designer, and acoustical engineer.
- B. No cutting or drilling of joists or beams will occur without Structural Engineer approval.
- C. PC shall coordinate with the architect a minimum 36" clearance or more in front of equipment access panels for servicing as required by applicable code, NEC, and the AHJ.
- D. Cutting, framing, patching, and painting of wall, ceiling and floor openings shall be by others.
- E. Electrical contractor shall furnish and install magnetic motor starters for all equipment $\frac{3}{4}$ hp and greater unless a VFD is provided. Provide service and disconnect per code, and do all power wiring, including connecting to equipment. Holding coil circuit shall be powered by electrical contractor (120/1 unless indicated otherwise). All starters shall be provided with H-O-A switch.
- F. VFD's (where required) are provided by the PC and are installed (mounted) and wired by the electrical contractor. Disconnects will be provided integral with the VFD's. VFD's will not be provided with manual or automatic bypass.

1.07 ENERGY CODE COMPLIANCE PATH

- A. The project is pursuing Energy C406 Prescriptive Compliance Path. See the Energy Compliance Requirements Narrative for further details.
- B. The following C406 credits are being pursued related to plumbing:
 1. C406.2.8 – Service Hot Water Distribution Right Sizing. The building shall utilize the Appendix M sizing method from the 2021 Uniform Plumbing Code for sizing of all domestic water piping within the building.
 2. C406.3.6 – Service Hot Water Energy Storage. The project shall include additional DHW storage beyond required capacity and include system controls to allow for operation in alignment with the credit requirements.

1.08 2021 WSEC C404.9 DOMESTIC HOT WATER METER CRITERIA

- A. WSEC C404.9 Domestic hot water meter criteria: Each individual dwelling unit in a Group R-2 multi-family residential occupancy with central service shall be provided with a domestic hot water meter to allow for domestic hot water billing based on actual domestic hot water usage. EC to provide power and data as required for repeaters for water meter data acquisition. PC to provide meters and bases.

1.09 SUSTAINABILITY PROTOCOLS

- A. Evergreen Sustainable Development Standard (ESDS) v4.1
 - 1. The project will achieve ESDS v4.1 New Construction certification. MC/PC/EC shall be involved in coordination efforts required to achieve mandatory and pursued optional criteria points.
- B. The project is not pursuing any other green rating system.

PART 2 - PRODUCTS

2.01 PLUMBING SYSTEMS GENERAL

- A. All plumbing products in contact with potable water shall be certified Lead Free and NSF 61/ NSF 372 compliant.
- B. All plumbing in areas that contain plenums are to be plenum compatible. No plastic material will be utilized unless noted otherwise.
- C. Plumbing materials are per the Plumbing Materials Specification Matrix on the plumbing plans.
- D. The PC shall make every reasonable effort to provide materials from a single manufacturer for any given material type unless otherwise noted.
- E. All pressurized piping shall have a maximum rated working pressure to accommodate the maximum pressure anticipated for the pipe.
- F. Where PVC materials are provided, PC shall provide solid wall piping. Cellular (foam) core piping is not allowed unless noted otherwise in the materials matrix.

- G. All plastic piping installed underground shall be installed in accordance with ASTM D 2321 and ASTM F 1668 as well as all manufacturer guidelines.
- H. PVC & CPVC piping is not allowed in plenum spaces unless it is specifically listed for such use. Plastic piping is not acceptable where water discharge temperatures exceed 140°F.
- I. Provide cleanouts on sanitary sewer system as required by code.
- J. Plumbing is to be insulated per 2021 WSEC requirements.
- K. Pipe hanger rod sizes shall not be smaller than those shown in the 2021 UPC, Table 313.6. Suspended piping shall be supported at intervals not to exceed those show in 2021 UPC Table 313.3.
- L. Trap primers shall be installed to serve all floor and hub drains other than those connected to the garage drainage system.
 - 1. All trap primer lines should be uniformly sloped from the trap primer toward the fixture being primed. Provide PPP Precision Priming Adapter as required to ensure positive slope toward the primed fixture.
 - 2. Flow activated trap primers (PPP Prime Pro) shall be utilized throughout; except as noted below.
 - 3. Electronic (PPP "Mini-Prime") shall be used where fixture flow is not available for trap primer activation of a flow-activated primer. PC shall coordinate power requirement for all electronic trap primers with the electrical contractor.
 - 4. Tailpiece trap primers may be used from other than coffee kitchen sinks.
 - 5. Pressure drop trap primers (PPP Prime-Rite PR-500) shall be used only on water lines serving flush valve fixtures. These shall not be used in other locations due to a lack of reliability based on inadequate pressure fluctuations within the domestic water distribution piping.
- M. All plumbing is to be pressure tested in accordance with code and accepted standards.
- N. All isolation valves are to be installed in accessible locations. Plumbing contractor is to provide access panels and coordinate installation by others as required for access to valves.

- O. All fixtures shall be provided and installed to comply with Washington state accessibility codes or per other architectural directions.
- P. All fixtures to be provided and installed to comply at a minimum with Washington state water conservation performance standards and UPC maximum flow rate standards.
- Q. The PC shall route plumbing vents to maintain minimum 20 feet of clearance from outside air intakes.
- R. All water supply and waste and vent piping shall be secured in place with 3/16" neoprene strips wrapped around the pipe at stud penetrations or point of support to prevent direct contact with framing and resultant rattling and vibration.
- S. Piping and fittings at all water outlets shall be rigidly fastened to structure to prevent movement. Long runs of piping shall be installed with provisions for expansion and contraction.
- T. The air gap between party walls is to mitigate sound transference. Pipes placed within this air space air are to be isolated from the studs they pass through. Pipes serving any specific unit must be placed within the stud depth of the wall serving that unit only.
- U. Run all water lines in warm areas where possible, avoiding exterior walls and blind corners.
- V. The plumbing subcontractor is responsible to review plans to determine which walls, if any, should be increased in depth from that shown on the plans to accommodate the subcontractor's piping. The plumbing subcontractor shall meet with the superintendent and framer to coordinate this sizing with the requirements of other trades.
- W. The plumbing subcontractor will supply lead boot roof flashings for pipe penetrations prior to roofing as scheduled by the superintendent. Roof flashings mopped in by roofing contractor. For PVC roofing installations, PC to seal the pipe base with PVC Flashing or Prefabricated vent pipe boots per the roofing manufacturer's installation details.
- X. All HVAC condensate is provided by the PC. Review HVAC deliverables for fan coils with condensate.
- Y. Expansion/contraction:

1. Thermal Expansion: P.C. shall provide adequate thermal expansion compensation for all plumbing systems in accordance with UPC Section 312.2. Contractor is to design, provide calculations, and indicate locations of offsets on shop drawings. Design per 2021 UPC, and manufacturer guidelines. Utilize piping offsets where feasible. Bellows type expansion and contraction sleeves to be used where there is insufficient room to allow for offsets.
2. Accommodation for building shrinkage during dry out: All plumbing components are to accommodate the potential of a minimum of 3/8" shrinkage/compression at each floor level. Final criteria to be confirmed by structural. Provide for expansion and contraction of piping to accommodate building settlement/shrinkage during dry-out of wood frame structure:
 - a. Wherever possible, plumbing vertical pipe risers are not to be installed and glued until after the building dry-out shrinkage is complete to the full extent allowed by project schedule.
 - b. Utilize piping offsets where feasible.
 - 1) Where piping offsets are not feasible due to insufficient room for offsets - utilize either of the following:
 - a) One-piece expansion/ contraction sleeves: Fernco model XJ, Flexicraft Slip-on Drainage Expansion Joint model DWVxxxx or similar. Install such that the joint is in a neutral position (no expansion nor contraction) following building dry-out period.
 - b) Sleeve-type expansion/ contraction joint: Canplas Expansion joint model 21381#XXX. Install such that the joint is in a neutral position (no expansion nor contraction) following building dry-out period. Contractor is to design, provide calculations, and indicate locations of offsets and expansion joints on shop drawings. Design per 2021 UPC, and manufacturer's guidelines.
 - c) PVC waste and vent risers shall be provided with expansion compensation every 30 feet per IAPMO design standards and 2021 UPC. Provide mechanical slip joint or piping offset sized based on pipe lengths in contractor shop drawings. Offsets may

serve for both thermal expansion and building shrinkage compensation.

2.02 AMENITIES AREAS:

- A. PC to provide cold water, hot water, waste, vent, and fixtures for areas that are completely built out (include all common areas and all fixtures shown on Architectural drawings).
- B. Assume all public fixtures (where applicable) including lav faucets, urinal flush valves, and water closet flush valves are manually operated or metering type with low flow or dual flush capability.
- C. Domestic Hot Water (DHW) for public fixtures will be served from the central hot water plant (see Drawings).
 1. Public Lavatories (where applicable):
 - a. Provide ASSE 1070 mixing valves to ensure that the maximum temperature does not exceed 120°F per 2021 UPC Section 407.3.
 - b. Per 2021 UPC Sections 407.2.1, 407.4, and 407.2.2 respectively - The maximum flow rate shall not exceed 0.5 gpm at 60 psi, metering faucets shall be provided, and meters shall deliver a maximum of 0.25 gallons per metering cycle.
 - c. Per 2021 WSEC section C404.3.1, the maximum length of ½" piping that runs from the heated water source to the fixture shall extend no longer than 2' from the heated water source.
- D. Provide appropriately sized condensate trap and condensate lines as required by code for all HVAC units.
- E. HVAC condensate systems will be installed complete to an approved indirect drain connection by the plumbing contractor. Condensate trap depth will be per manufacturer requirements and sized per plumbing code criteria. Horizontal condensate piping shall be insulated copper or plenum rated CPVC (Charlotte Pipe plenum rated Flowguard Gold CPVC or equivalent). Vertical copper condensate requires insulation. Vertical CPVC condensate does not require insulation. Condensate risers through the residential units

including offset floors are provided and installed by the MC. Collection beneath residential units and in amenity & common areas is by the PC. Piping shall be routed to appropriately located open site drains.

2.03 WASTE AND VENT

- A. Per 2021 UPC section 709.0 Plumbing fixtures shall be drained to the public sewer by gravity. It is currently assumed that all fixtures may be routed to the sanitary sewer locations (per Civil Engineer), however final determination will be made by the contractor.
- B. Per 2021 UPC section 708.0 "Horizontal drainage piping shall be run in practical alignment and a uniform slope of not less than $\frac{1}{4}$ " per foot or 2% toward the point of disposal provided that, where it is impractical due to the depth of the street sewer, to the structural features, or to the arrangement of a building or structure to obtain a slope of $\frac{1}{4}$ " per foot or 2%, such pipe or piping 4" or larger in diameter shall be permitted to have a slope of not less than $\frac{1}{8}$ " per foot or 1%, where first approved by the Authority Having Jurisdiction."
 - 1. All drainage piping shall be run at 2% unless noted otherwise on the plumbing plans.
 - 2. Final approval for any piping to be sloped at 1% shall be the responsibility of the plumbing contractor.
- C. 2021 UPC section 710.1: "Fixtures installed on a floor level that is lower than the next upstream manhole cover of the public or private sewer shall be protected from backflow of sewage by installing an approved type of backwater valve. Fixtures on such floor level that are not below the next upstream manhole cover shall not be required to be protected by a backwater valve. Fixtures on floor levels above such elevation shall not discharge through the backwater valve." Contractor to provide backwater valve(s) downstream of any fixture draining to the public sewer by gravity and installed on a floor that is lower than the next upstream manhole. Preliminary evaluation is that a backwater valve shall not be required for this project. Final determination TBD.

- D. 2021 UPC Section 711: "Suds Relief. Drainage connections shall not be made into a drainage piping system within 8' of a vertical to horizontal change of direction of a stack containing suds-producing fixtures"
- E. Cleanouts shall be provided per 2021 UPC section 707.4 which shall include, but not be limited to: building drains and branches, runs longer than 100', all sinks, all urinals, all horizontal fixture branch lines longer than 5', and at all aggregate changes in direction exceeding 135°. Contractor shall coordinate with AHJ to ensure all required cleanouts have been provided. Final cleanout locations are to be indicated on the shop drawings for IMEG review. 2021 UPC 707.4 exception 3, Excepting the building drain and its horizontal branches, a cleanout shall not be required on a pipe or piping that is above the floor level of the lowest floor of the building. Level 1 will be considered the lowest floor.
- F. Materials: Waste piping to be cast iron or solid wall schedule 40 PVC. Vent piping shall be cast iron or schedule 40 PVC or ABS piping. See below for each type of material.
- G. Heavy duty no-hub couplings provide improved protection against leakage and potential for joint movement. Contractor shall provide heavy duty couplings for any below-grade (buried) cast iron installation, vertical sanitary waste risers, and piping installed over shell and core retail spaces. Standard duty couplings may be used in other locations.
- H. PVC and ABS for vent piping may not be utilized in return air plenums.
- I. PVC, where utilized as waste piping in garages, will be Schedule 40 Solid Wall Pipe and PVC DWV Fitting System. PVC Cellular Core product is not allowed except as noted in the materials matrix. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. Injection molded PVC DWV fittings shall conform to ASTM D 2665. Fabricated PVC DWV fittings shall conform to ASTM F 1866. Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564. Systems shall be hydrostatically tested after installation and before burial if below grade. Pipe and fittings shall conform to National Sanitation Foundation Standard 14.
- J. All below grade PVC will be installed in strict adherence to ASTM D 2321 and ASTM F 1668 protocol.

- K. PVC will not be utilized in any location where transport of 140°F water or greater can be expected now or in the future.
- L. Expansion compensation for PVC is required per 2021 UPC Section 312.2 and Table 313.1.
- M. All PVC piping will be supported with an approved hanger at intervals sufficiently close to maintain correct pipe alignment and to prevent sagging or grade reversal, but in no case shall the spacing exceed the spacing indicated in 2021 UPC Table 313.3. Pipe will also be supported at all branch ends and at all changes of direction. Support trap arms as close as possible to the trap.
- N. All waste pipes shall be isolated from the structure using 1/8" thick neoprene sleeve or strips. Where the hanger is rigidly connected to the structure, the piping shall be isolated from the hanger itself with neoprene liners or a pre-isolated products such as Holdrite Silencer series hanger system Openings shall be oversized for the full depth of the opening so that the pipe can be supported on both sides of the opening without contact. Riser clamps used to support vertical piping shall be isolated from the structure by neoprene pads.
- O. Center all vertical waste lines in the interior walls.
- P. Nail plates shall be installed wherever needed and when piping is within 1-1/2 inches of the edge of a framing member and as required by code. Leaks due to drywall nails/screws penetrating pipes due to omission of or incorrectly installed nail plates will be repaired at subcontractors' expense.
- Q. Indoor waste clean outs shall be installed in storage, mechanical, or unfinished space whenever possible. Otherwise locate within wall and cover by an approved metal access cap. PC is responsible for verifying wall thickness prior to installing pipe.
- R. All plumbing shall be plugged and capped during installation and kept free of contamination and debris.
- S. Sewer connections shall be coordinated with the civil engineer per superintendents' direction. The utility contractor is to make all side sewer connections.

- T. Preliminary calculations indicate that (1) 6" sanitary sewer connection will be required if main is routed at $\frac{1}{4}$ " per foot slope. If shallower slope is required, POC will need to be upsized to 6". Final location and elevations are to be verified and coordinated by PC.
- U. Provide floor drains in the common area laundry rooms and mechanical rooms. Drains to be installed with trap primers. Per 2021 UPC Section 418.5, floors shall be sloped to drains.
- V. Provide hub drains for sprinkler system blow down and trapped low points of sprinkler system as needed. Basis of design is for all primary sprinkler drainage to be routed to the hub drain in the fire sprinkler riser room – See division 21 narrative for additional details. Additional drains to be coordinated by sprinkler contractor for sections that are trapped.
- W. Trap primers shall be installed to serve all floor drains. See Section 2.1 for trap primer installation locations.

2.04 STORM DRAINAGE

- A. Building roof drainage is to be served by an exterior gutter and downspout system. Refer to architectural drawings for details. No interior storm piping is anticipated for this project.

2.05 DOMESTIC WATER METERING

- A. One domestic hot water meter will be provided and installed in each residence by the PC per 2021 Washington State Energy Code Section C404.9. Meter is to be Next Century M201 Series with NSF 372 and NTEP certifications or equivalent. Meter shall be rated for up to 194 Deg F.
- B. Install a standard manufacturer spool piece and couplings for a future domestic cold water meter in each residence. Cold water meters are excluded at this time.
- C. Provide deduct meters as necessary for irrigation uses.
- D. The PC will install a meter spool piece and couplings for each meter prior to final installation of the meter. After pressure testing and initial system startup to eliminate debris, the meters and meter bases will be installed by the PC to replace the spool pieces.

- E. The meters and spool pieces shall be located accessibly within the residential units. Meters and isolation valves shall be installed in the wall behind an access panel. Final location to be coordinated with the architect.
- F. The meters and meter bases are to be provided and installed by PC. Meters are to utilize wireless technology. Installation of wireless routers, central data logger, and phone line to central monitoring is by the EC.
- G. The PC will provide an Automated Meter Reading system (AMR) to collect the data from the meters. Meters and meter reading system shall be procured from a common vendor. EC is to provide receptacles for routers and central data logger.

2.06 DOMESTIC WATER

- A. All valves, piping, and equipment used in the domestic water system will be certified Lead Free and ANSI/NSF 61 & 372 approved per the 2021 UPC.
- B. The domestic water system (hot water, cold water, and recirculation) shall be sized using the Appendix M calculation method from the 2021 Uniform Plumbing Code.
- C. Materials: Hot and cold domestic water may be copper, stainless steel, or PEX for sizes 2" and under. Piping 2-1/2" and larger shall be copper or stainless steel. See below for each type of material.
- D. Individual residential unit DCW and DHW isolation valves shall be located with the water meters and be easily accessible after installation and provided with a pre-printed label "unit water shut off".
- E. UPC-listed AA arresters shall be installed at the dishwasher and washing machine boxes in all relevant locations.
- F. Supply mains and risers through studs or supported from studs within units will utilize 3/16" neoprene strips to isolate the pipe from direct contact with studs.
- G. PEX Plumbing System: Engle method A Crosslink polyethylene suitable and approved for potable water use. Manufacturers: Uponor
- H. PEX Pipe and fittings: The plumbing system used for potable water distribution and consisting solely of Wirsbo AQUAPEX® tubing, ProPEX® and/or APR Fitting Systems, and

Uponor EP manifolds and multi-port tees. The complete system installation will fully comply with the Uponor requirements for the associated 25 year warranty.

- I. Any brass fittings used for PEX piping shall be certified lead free and resistant to dezincification. Provide Wirsbo or approved equal.
- J. Plumbing insulation shall comply with 2021 Washington State Energy Code. Insulation shall be per WSEC and UPC code tables.
- K. Insulate all metallic domestic cold water mains with minimum ½" glass fiber insulation to prevent condensation.
- L. Provide sectional DCW & DHW isolation valves at risers serving multiple units.
- M. Balance valves used in the system shall be thermostatic type with stainless steel components and a wax thermostatic element providing a temperature accuracy of ±3.0°F. Provide valve with P/T ports. Valve shall have a fixed temperature setpoint of 120°F. The balance valve locations will be coordinated with access panels by PC as required. Utilize NSF/ANSI 61 certified ThermOmegaTech Circuit Solver or equivalent.
- N. Insulate and heat trace any cold or hot water plumbing exposed to unconditioned spaces (attics, etc.). Heat tracing, controls, and insulation are to be provided by PC. Power to heat trace termination is to be by EC. Hot and cold plumbing located in the garage may be located on the warm side of the insulation in lieu of providing heat tracing.
- O. Provide plenum rated materials for all plumbing systems exposed in areas that contain plenums.
- P. The water lines are to be connected to and coordinated with the service/supply lines at the meter location, trenching is by others. PC to include all piping from the building to the exterior meter box.
- Q. Current water pressure is not available for this site. A hydrant test for a nearby site dated 2013 indicates to expect 60 psi static pressure with 772 gpm at a residual pressure of 20 psi. Based on this information, preliminary calculations indicate that a domestic water booster pump will be required for this project.

- R. Provide appropriately sized duplex domestic booster pump on factory skid with listed VFD's, alternator, and control panel. Provide and install a pressure switch at an approved location which will provide adequate control without short cycling the pumps
- S. Provide an appropriately sized hydro-pneumatic tank for system.
- T. Provide dual 1-1/2", reduced pressure backflow assemblies (piped in parallel configuration) in water service entry room as indicated on plans and install in compliance with applicable local and state codes. Provide hub drain for backflow assembly relief discharge.
- U. Per the 2021 UPC Section 608.2, the maximum pressure allowed at any fixture shall not exceed 80 psi. PC to provide appropriately sized Pressure Reducing Valves (PRV's) as required to ensure that the maximum allowable pressure is not exceeded.
 - 1. PRV stations shall include fully piped low-flow bypasses as required by the manufacturer to ensure that the system operates properly at low-flow conditions. Main valves and bypasses shall be appropriately sized to deliver the minimum pressure to all fixtures within the pressure zone, with no supply pressures exceeding 80 psi.
 - 2. Provide maintenance shutoff valves at all PRV bypasses.
 - 3. Where inlet vs. outlet pressures fall within the cavitation zone per manufacturer, PRV's shall be utilized in series in order to meet the required outlet pressure. Refer to plumbing equipment schedule for location of series valves.
 - 4. All PRV's Pilot Operated Automatic Pressure Reducing Control Valves unless noted otherwise on plans. Provide Watts Model LFM115 or equivalent. Bypass valves shall be LF223 with -HP option as required.
- V. Non freeze hose bibs with isolation valve and removable keys are required at each level in garage, building exterior locations at each street as well as all public courtyards/terraces and at roof level where noted on the drawings. Provide Woodford Model B65 or equivalent.
 - 1. Provide standalone roof hydrants where roof structures do not allow for the installation of wall hydrants. Provide Woodford Model RHY2-MS or equivalent. PC to provide and install drainage piping from the drain port on the roof hydrant to the nearest indirect drain (sink tailpiece or washer drain box).

2.07 DOMESTIC HOT WATER

- A. Domestic hot water is to be supplied from a central building hot water plant located on level 1. The PC will supply the hot water generation plant for the project. Final sizing is by the design build PC.
- B. Central hot water plant will consist of the following:
 - 1. Primary heating will be provided by (1) air to water heat pump piped in parallel with (1) 300-gallon vertical hot water storage tank. Heat Pump Basis of Design = Transom Hatch HWV105.
Location of the plant is at level 1 in the mechanical room. Heat pumps shall be located on the exterior of the building to the north as shown in the plumbing drawings.
 - 2. The air-to-water heat pump shall be sized to meet all requirements of WSEC C406.2.6.3, including meeting 100 percent of calculated demand at 40°F
 - 3. Secondary heating will be provided by (1) 80 gallon 18 kW electric water heater piped in series with the primary storage tank. Basis of design = AO Smith DRE-120-18.
- C. Provide temperature gages and P/T ports at each heat pump supply pipe, common heat pump supply, common recirculation water, individual mixing valve outlets, and common supply piping to the building. P/T Ports to be NSF/ANSI 61 compliant Watts Series LFTP or accepted equivalent.
- D. Storage tank glass lining to be certified lead free. 18" clearance to be maintained from all sides and above storage tank.
- E. Contractor to include isolation valves, unions, and P/T ports on inlet and outlet of heater. Pipe ASME temperature and pressure relief valve to indirect drain. Install temperature gauge on outlet of each heater as well as on the combined DHW service to the thermostatic mixing valve.
- F. Hot water will be stored at 140°F to address legionella contamination potential and distributed at 120°F (adjustable) through a packaged mixing valve assembly listed for the specific usage. The mixing valve will have all current code ASSE listings. Utilize appropriately sized lead free Leonard NV Proton Megatron Series or approved

equivalent. Valve shall include sensors to monitor incoming hot, cold and recirculation temperatures, and incoming hot and cold inlet pressures. Unit shall control delivery water temperature to a minimum of 5°F temperature differential between inlet and setpoint during all flow conditions. Power to the valve is to be supplied by 120V outlet and provided with UL listed cord. Valve system shall shutoff in the event of a hot or cold water inlet supply failure. Control station to include test port on outlet with downstream shutoff valve, inlet isolation and check valves.

- G. Provide P/T port and threaded hose end connection with cap for test and drain down immediately downstream of the thermostatic mixing valve.
- H. Pipe size transitions between distribution piping and thermostatic mixing valve inlets & outlets shall occur within 12" of the valve assembly.
- I. A full recirculation system will be provided with hot water circulator(s) with ECM motor controlled by on-board controller. Balance valves will be provided as needed and installed in an accessible location. Balancing of the system is by the PC. Circulators shall be lead free.
- J. Wait times: Hot water runouts to individual fixtures shall be routed to minimize the hot water delivery time to the end user, and shall comply with the Maximum Allowable Pipe Volume Method per WSEC Section C404.3.2. PEX manifolds shall be located directly adjacent to the recirculated hot water riser. Each riser will extend from the top residence to the lowest residence and be completely recirculated. PEX runouts will be ½" unless noted otherwise. A dedicated PEX runout will be provided for each individual fixture from the manifold.
 - 1. Hot water runouts to public lavs shall not exceed the lengths provided in 2021 WSEC Table C404.3.1. Typical ½" runouts may not exceed 8'.

2.08 PLUMBING FIXTURES AND APPLIANCES

- A. Dishwasher rough in and hook-up is to be provided including UPC-listed AA arrester.
- B. Provide laundry boxes including UPC-listed AA arresters and isolation valves. Laundry boxes will be appropriately rated for the wall in which they are installed. Coordinate accessible location in laundry room.

- C. Plumbing fixtures will be low flow and in no case will be allowed to exceed flow rates indicated in Chapter 4 of the 2021 UPC. Final required fixture flow rates to be determined. Preliminary anticipated flow rates are as follows:
1. Water Closet: 1.28 GPF or Dual Flush
 2. Showerheads: 1.75 GPM
 3. Lavatories: 0.8 - 1.2 GPM
 4. Kitchen Sinks: 1.75 GPM
- D. All low flow fixtures shall be WaterSense certified. WaterSense-labeled products and services are certified to use at least 20 percent less water, save energy, and perform as well as or better than regular models.
- E. All plumbing fixtures which are to be used in ADA units are to be certified for this application per the Federal Americans with Disabilities Act.
- F. All handshowers in ADA units are to be provided with a non-positive shutoff per the most recent the Federal Americans with Disabilities Act.
- G. Per owner request, provide floor drains at all residential restrooms and below residential kitchen dishwashers. Floor drains shall be provided with trap primers served from sink tailpieces.
- H. Janitor sinks shall have integral check stems to prevent thermal cross over between hot and cold supply inputs (Symmons Symmetrix™ Service Sink Faucet S-2490-CHKS or equivalent)
- I. Plumbing fixtures and trim are to be provided and installed by PC. Final fixture package is yet to be determined.
- J. Check tub/shower rough openings to make sure they are plumb, square, are the proper size to allow for true and proper installation according to manufacturer's recommended installation instructions and provide adequate support and backing prior to installation of product.
- K. Fasten all tub/shower valves etc. securely to backing. Loose valves, gooseneck or tub spouts will be deemed unacceptable and shall be subcontractor's responsibility to repair.

- L. Provide backing at all tub or shower surrounds for installation of future ADA grab bars. When pre-manufactured tub or shower surrounds are used, they shall be provided with integral backing for grab bars whenever available. Refer to architectural drawings for all ADA requirements.
- M. Plumber is responsible for verifying finish floor elevations and setting all floor drains to the appropriate correct elevation. Per 2021 UPC Section 418.5, floors shall be sloped to drains.
- N. Exposed water supply and toilet handles shall be matched in finish to the faucet selection in that room unless specifically agreed to in writing.
- O. Spigot, gooseneck, and valve escutcheon rings shall be caulked to the tubs/showers/countertop/wall as applicable. Sinks and deck mount tubs shall be caulked to the decks using white silicone caulk. Showerhead goosenecks shall be set at 80 inches off the finished floor unless otherwise specified.
- P. Contractors are to provide rough in and final connections to all appliances and fixtures.
- Q. PC shall provide copper stub out at all plumbing fixture water supply rough-ins, with supply attached to adjacent framing.

PART 3 - EXECUTION

3.01 PREPARATION & INSTALLATION

- A. All work contracted for must be accepted by all applicable inspectors including site superintendent, GC quality control personnel, owner's representative (IMEG) or their assigns.
- B. Piping shall be run concealed in all areas with finished ceilings and locations must be coordinated with architect and interiors drawings.
- C. Design build plumbing contractor is to coordinate pipe routing with the architect, interiors architect, design team, and construction team with special attention to interior reflected ceiling and acoustical plans. Shop drawings shall be submitted with the above information for review and coordination prior to construction.

- D. In areas open to structure, piping shall be routed tight to structure. Piping shall not be run in front of windows or beneath skylights. Contractor to pay special attention to routing in lobby areas.
- E. All exposed piping shall be extensively labeled. Clearly label domestic cold water, hot water, hot water recirculation, natural gas piping, irrigation water and other non-potable water piping.
- F. As-builts: provide owner with electronic as-built drawings within two weeks of substantial completion. As-builts will reflect all changes from the construction drawing set and will comply with 2021 Washington State Energy Code project completion requirements. As-builts will also comply with architectural specification sections.
- G. O&Ms: provide hard copy and electronic copies of O&Ms for all systems within two weeks of substantial completion. O&M's will also comply with architectural specification sections.
- H. All plumbing piping shall be routed in a manner to avoid being within electrical rooms. Where piping in electrical room is unavoidable, and conditions require piping to be installed directly above electrical equipment :
 - 1. Per NEC 110.26(F)(1)(a) "Dedicated equipment space equal to the width and depth of the equipment and extending from the floor to a height of 6 feet above the equipment or to the structural ceiling shall be dedicated to electrical installation." No piping shall be installed within this zone.
 - 2. In the area above the zone required by 110.26(F)(1)(a): Provide pipe containment for piping as required by 110.26(F)(1)(b). Provide drain pan with moisture sensor and normally closed ball valve for tray drain.

3.02 TESTING & INSPECTION

- A. Contractor is fully responsible for engaging manufacturer's representatives for startup of domestic water system to intended function, including but not limited to:
 - 1. Domestic water booster system
 - 2. Thermostatic mixing valve
 - 3. Domestic water heating plant

- B. The Plumbing Contractor is responsible for all test, balance, and startup of plumbing systems.
- C. All plumbing systems are to be tested by the PC as required by the AHJ and UPC.
- D. A 3rd party commissioning agent (CxA) will execute Fundamental Commissioning of the plumbing systems in accordance with 2021 Washington State Energy Code section C408 ESDS requirements. These requirements apply to all residential and non-residential systems.
- E. The contractor will be expected to fully participate with the Cx process as part of their base contract. No change orders will be accepted for contractor participation.
- F. The PC will execute all pre functional testing of plumbing systems to identify and resolve deficiencies prior the final testing.
- G. The PC will document deficiencies and provide equipment, materials, and labor necessary to correct deficiencies found during the commissioning process to fulfill contract and warranty requirements.
- H. Owner training will be provided by the installing contractor.
 - 1. Water heaters and heat pumps
 - 2. Circulation Pumps and hot water recirculation system.
 - 3. Domestic hot water mixing valves

END OF SECTION

DIVISION 23 05 05

HVAC BASIS OF DESIGN SYSTEMS NARRATIVE

PART 1 GENERAL

1.01 INTRODUCTION

- A. The purpose of this section is to define the design and delivery approach upon which the Contractor is to base a budget and bid for preconstruction and construction services. Specifically the services for the mechanical work, including but not limited to: general provisions, applicable codes, coordination requirements, submittal requirements, shop drawing requirements, quality assurance, testing adjusting balancing requirements, commissioning requirements, completion requirements, and the warranty requirements.
- B. All work under this section shall comply with the requirements of General Conditions, Supplemental Conditions, Special Conditions, and Division 01 – General Requirements, and shall include all mechanical sections specified herein.
- C. This section includes a general narrative description of Division 23 systems with specific equipment and component criteria that are to be included in the project.
- D. Specific conflicts between drawings, this specification section, and other specification sections will not be used to define project or cost exclusions. Exclusions based on document conflicts will be accepted or rejected in the Engineer of Record's formal response to bid clarification requests or Requests for Information (RFIs).

1.02 APPLICABLE CODES AND STANDARDS

- A. Wherever an International, National, or Uniform Code is referenced in this Narrative, it means the 2021 WA State version of that code, including any local amendments, is the design standard for this Project. For example where the IFC is referenced, the 2021 WA State Fire Code will be used.
- B. Design and installation shall comply with rules and regulations of the following:

APPLICABLE WASHINGTON STATE BUILDING CODES			
ENERGY CODE	2021 WASHINGTON STATE ENERGY CODE (SEC) FOR COMMERCIAL BUILDINGS	WAC 51-11C	EFFECTIVE MARCH 15, 2021
BUILDING CODE	2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-50	EFFECTIVE MARCH 15, 2021
ACCESSIBILITY CODE	2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON STATE AMENDMENTS CHAPTER 11 AND ICC A117.1-2009	WAC 51-50	EFFECTIVE MARCH 15, 2021
SEISMIC CODE	ASCE 7-2016 AS REFERENCED BY 2018 INTERNATIONAL BUILDING CODE	WAC 51-50	EFFECTIVE MARCH 15, 2021
FIRE CODE	2021 INTERNATIONAL FIRE CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-54A	EFFECTIVE MARCH 15, 2021
MECHANICAL CODE	2021 INTERNATIONAL MECHANICAL CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-52	EFFECTIVE MARCH 15, 2021
PLUMBING CODE	2021 UNIFORM PLUMBING CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-56	EFFECTIVE MARCH 15, 2021
BOILER CODE	WASHINGTON STATE BOILER CODE	WAC 296-104	
ELECTRICAL CODE	2020 NATIONAL ELECTRICAL CODE WITH 2020 WASHINGTON AMENDMENTS (NFPA 70)	WAC 296-46B	EFFECTIVE NOVEMBER 1, 2020
ELECTRICAL	ELECTRICIANS AND ELECTRICAL INSTALLATIONS	RCW CHAPTER 19.28	
NFPA STANDARDS	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS AS REFERENCED BY THE CODES ABOVE OR AS SPECIFICALLY LISTED BELOW		

1.03 ORDER-OF-PRECEDENCE PROVISIONS

- A. In the case of inconsistency or ambiguities in design documents (all specifications and documents), compliance with the more stringent design requirement among conflicting criteria is required.
- B. If provided, alternate pricing for compliance with less stringent criteria will be evaluated in addition to the mandatory baseline most stringent criteria.
- C. Provide notice upon discovering potential design conflicts prior to bid where possible.

1.04 PROJECT DELIVERY

- A. This project is to be delivered design build. The Design Build Contractor will be the Engineer of Record and will create and stamp fully coordinated design documents for the project. The design build Engineer of Record is solely responsible for reviewing and vetting all design decisions with the Owner and Architect prior to installation.
- B. Pricing Set Bid Notes
 - 1. The intent is to procure MEP pricing packages that cover the full project though the documents are not at 100% CD level.
 - 2. Reference current MEP narratives as well as architectural and structural drawings.
 - 3. The architectural floor plans provided are not final. Pricing shall allow for equipment relocations due to minor interior layout modifications.
 - 4. Pricing is to include all MEP provisions as needed to completely buildout the project as defined in all referenced documents.

5. Provide specific scope clarification requests through the Owner's bid clarification request process.
 6. Bids will include a detailed list of scope exclusions.
 7. Provide breakout additive pricing for specific scope as required to address perceived scope gaps in the project documents.
 8. IMEG will participate in the Subcontractor selection process by reviewing proposals, interviewing, and strategizing with the team. Primary goals are to thoroughly identify potential gaps and contingency requirements and to build a strong partnership with the Subcontractors and GC.
- C. IMEG scope includes delivery of this Division 23 - HVAC Basis of Design Systems Narrative. Design efforts beyond this milestone are by Mechanical Contractor (MC).
- D. The Design Build Engineer of Record will create Construction Document drawings starting at the end of Design Development phase using Revit and Level 100 per AIA Level of Development (LOD) Document 2014 at a minimum beginning with the design development phase effort. Level 200 and 300 LOD are to be provided where needed for detailed coordination during the CD phase (mechanical rooms, typical constricted ceiling spaces, other space constrained areas). Shared model coordination with architectural, structural, and all trades is required.
1. Utilize the BIM model to print 2D Design development and CD phase drawings
 2. Use the 3D BIM model throughout the design by the entire project team to facilitate collaboration and coordination. The information contained in the model will be used to create Construction Documents.
 3. Give the 3D BIM design model to the Owner as a record model of the original design at the end of the project. Any modifications to the model to accommodate facilities management or other purposes are at the discretion of the Owner and outside the scope of this contract.
- E. Detailing coordination: The MC will produce a 3D model of all systems. The Contractors will coordinate their shop drawings with other trades. The MC will be lead in this effort and will get signed agreements on shop drawings from MEP and other Subcontractors prior to starting work. The MC is responsible for all trade coordination effort as required for shop drawing completion.

- F. Detailing coordination: There will be no change orders for field interference coordination modifications.
- G. If there is a conflict between design documents and the request for proposal (RFP), the Contractor will identify the discrepancy and request a clarification prior to RFP response.
- H. Submittals
 - 1. Transmittal Form indicating the following: project, Contractor, Subcontractor, Vendor, Supplier, specification section, submittal number, and submittal revision number.
 - 2. Complete equipment and materials submittals shall be provided in electronic format. PDFs should be searchable and bookmarks are required for each submitted product. Submittals shall be complete with all components included and customized to this Project's requirements. Include warranty provisions for all equipment. All submittals require Owner team approval prior to purchase.
 - 3. Equipment Submittals: Include only submittal information for equipment and products being used in Project scope. Consistent manufacturer should be used for similar products (i.e. all dampers from a single manufacturer, all GRDs from a single manufacturer, etc.).
 - 4. Materials Submittals: Include only submittal information for materials being used in Project scope. Identify the system and/or application in which each material is being used.
 - 5. Product submittals will all be subject to review under the requirements of ESDS submittal review requirements.
- I. The architectural floor plans provided are not final. Pricing shall allow for equipment relocations due to minor interior layout modifications.
- J. The budget/estimate response proposals will identify scope gaps the Contractor perceives and provide breakout pricing to cover these gaps.
- K. The MC shall submit final electronic as-built drawings to the General Contractor (GC) for submittal to Owner within agreed upon time frames.
- L. O&Ms: Provide hard copy if requested by Owner and electronic copies of O&Ms for all systems within two weeks of substantial completion.

- M. The mechanical systems will be designed to include scope of work for full standalone compliance with the Energy Code. This includes the Energy Code mandatory provisions.
- N. Codes, Permits, Inspections, and Fees:
1. All work and materials shall be in accordance with requirements of all applicable local and state codes, statutes, standards, and other regulations.
 2. The codes shall be construed as establishing a minimum or base level of requirements. Contract Documents shall not be construed to permit or direct work not in conformance with codes, statutes, standards, and other regulations. Where provisions of the various regulations conflict with each other, or with the Contract Documents, the more stringent provisions shall be included in contract pricing. Conflict shall be resolved with the Architect and Authorities Having Jurisdiction (AHJ) prior to completing the design.
 3. Where the Contract Documents call for material or construction of a better quality or higher capacity than required by the codes, statutes, standards, and other regulations, the provisions of the Contract Documents shall take precedence over the requirements of the codes and standards.
 4. Material and equipment within the scope of the UL Testing Laboratory Service shall be listed by the Underwriters Laboratories for the purpose for which they are used and shall bear their listing mark. ETL or CSA shall be allowed if acceptable to the AHJs.
 5. Mechanical, Electrical, and Plumbing Subcontractors are to include all permit fees and are responsible for document intake.
 6. MC shall call for all inspections by the local AHJs when they become due and shall not cover any work until approved by these authorities.

1.05 MISCELLANEOUS SCOPE ITEMS

- A. The MC is to review the Energy, Div 21, 22, 26, 27, and 28 narratives for scope impacts.
1. IMEG has attempted to delineate the scope of work between Contractors. Where there are questions or inconsistencies in scope delineation or scope overlap, please notify IMEG so this can be resolved prior to bid. The GC is responsible for final verification of Contractor scope delineation based on the most cost-effective approach for the Project.
 2. Below is a list of typical items that need to be coordinated between Contractors:

- a. Condensate piping and connections – provided by PC
 - b. Controls wiring
 - c. Electric heaters – calculated by MC, provided by PC
 - d. Heat tracing with controller
 - e. Heat tracing insulation
 - f. Freeze protection
 - g. Smoke detectors
- B. The Contractor is to provide complete pricing based on the scope described herein, the architectural drawings, and the other indicated references.
- C. Property line and interior acoustical calculations will be by the architectural design team's Acoustical Consultant prior to permit submittal. Acoustical Consultant to provide the requisite analysis to assure the team of acceptable acoustical performance of each system.
- D. The Structural Engineer is responsible for all structural design and calculations required for the supporting structure of all mechanical equipment and systems for permit intake.
- E. MC shall include structural tie-down calculations for all equipment as required by the IBC and ASCE 7. This is a deferred permit submittal.
- F. MC is to provide fire stopping of all through and membrane penetrations as required by the IBC and other applicable codes. Floor penetrations to include fire rated sleeves with either a 2" stand off water dam (Holdrite Pro Series Water Dam, Hilti-CFS-CID MD or approved equal), or a sleeving system with a built-in mid body waterproofing seal with a factory-provided W rating (Hilti CFS-680).
- G. All ductwork, piping, plumbing, and equipment are to be seismically restrained as required by the IBC.
- H. The Contractors will provide phenolic tags identifying each specific piece of equipment. Final tagging is to be approved by the Owner.
- I. All piping will be labeled extensively in compliance with accepted industry standards and building standards. Final labeling is to be approved by the Owner.

1.06 COORDINATION

- A. Installation will be in full compliance with acoustical specifications. The acoustical specification is to be fully followed regardless of conflicts with statements herein.
- B. The clear height per IBC 406.2.2 for each floor level is 7'-0", but other applicable ADA and code criteria require installation at no less than 7'-0". Vehicle pedestrian areas accommodating van-accessible parking required by Section 1106.5 of the IBC shall conform to ICC A117.1. Verify all ADA clearance requirements.
- C. All duct routing and equipment locations shall be coordinated with full design team.
- D. MC shall coordinate a minimum 42" clearance or more in front of mechanical equipment access panels for servicing as required by applicable code, NEC, and the AHJ.
- E. Cutting, framing, patching and painting of wall, ceiling, and floor openings shall be by Others.
- F. Final painting of grilles, registers, and diffusers, as may be required by the Architect, shall be done in the field by Others.
- G. Electrical Contractor (EC) shall provide magnetic motor starters for all equipment $\frac{3}{4}$ HP and greater unless an electrically commutated motor (ECM) is provided. Provide service and disconnect per code, and do all power wiring, including connecting to equipment. Holding coil circuit shall be powered by EC (120/1 unless indicated otherwise).
- H. Duct smoke detectors are not all shown on the mechanical plans. Duct smoke detectors are furnished by the EC. The Fire Alarm Engineer of Record is responsible for determining all duct smoke detector requirements. The MC is responsible for installing the duct detectors in the ductwork.
- I. Access panels are not yet shown. All access panels in walls and/or ceilings are furnished by the MC and installed by Others. MC to coordinate required locations and sizes with the Architect and GC.
- J. A fire and/or smoke detection and alarm system, as may be required by the Owner, Architect, or AHJs, is the responsibility of the EC.
- K. All conduit, line voltage, and low voltage smoke and fire alarm wiring for interlocks on all makeup air units, fire smoke dampers, exhaust systems, etc. are by the EC.

- L. Unit nameplate short circuit current rating (SCCR) to meet or exceed ampere interrupting capacity (AIC) rating of panel served. All small packaged equipment to be listed for a minimum of 5,000 AIC. Large equipment to be listed for a minimum of 64,000 AIC unless noted otherwise. Final rating is per EC coordination study.
- M. During ensuing design phases, it is the responsibility of the project Acoustical Consultant to provide the requisite analysis of mechanical systems to assure the team of acceptable acoustical performance of each system. The MC is required to submit all systems information in a timely manner to the Acoustical Consultant as needed to assure designs comply with criteria. The MC will coordinate in a timely manner to incorporate acoustical recommendations prior to building permit submittal.

1.07 ENERGY CODE COMPLIANCE PATH

- A. The project is pursuing Energy C406 Prescriptive Compliance Path. See the 2021 WSEC Stand Alone Energy Narrative for further details.
- B. No C406 options related to mechanical systems are being pursued as part of the C406 compliance strategy for the project.

1.08 2021 ENERGY CODE C409.1 ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

- A. The building is less than 25,000 SF and therefore does not require a meter and data procurement system.

1.09 2021 ENERGY CODE C411 RENEWABLE ENERGY

- A. Refer to the 2021 WSEC Energy Compliance Requirements Narrative for information related to C411 Renewable Energy Requirements.

1.10 SUSTAINABILITY PROTOCOLS

- A. Evergreen Sustainable Development Standard (ESDS)
 - 1. The project will achieve ESDS v4.1 certification. MC shall be involved in coordination efforts required for which points are to be achieved.
- B. The project is not pursuing any other green rating system.

PART 2 PRODUCTS

2.01 HVAC SYSTEMS GENERAL

- A. All ductwork is to be constructed and installed to appropriate SMACNA standards.
- B. All ductwork is to be insulated per Energy Code requirements.
- C. A complete engineered seismic restraint, hanger, and vibration isolation package will be provided by the MC. Fully stamped and engineered packages provided by a single vendor (such as ISAT) is preferred.
- D. All air intakes and exhaust outlets are to be located with no less than code minimum required separations from openings, intakes, grade, property lines, etc. Some project specific minimum distance requirements may be greater than code minimum if identified within this document. Final locations are subject to approval through the shop drawing submittal review process prior to construction.
- E. HVAC fan motors are to be selected so that normal operation is not in the motor service factor.
- F. Per Energy Code Section C403.8.4, all fractional HP fan motors for fans that are 62 watts or greater shall have electronically commutated motors or shall have a motor efficiency of at least 70% when rated in accordance with Department of Energy (DOE) 10 Code of Federal Regulations (CFR) 431. These motors shall also have the means to adjust the motor speed for either balancing or remote control. Belt-driven fans may use sheave adjustments for airflow balancing in lieu of varying motor speed.
- G. Fan power for Dedicated Outdoor Air Systems (DOAS) will comply with Energy Code Section C403.3.5.2. Total combined fan power is the sum of the fan power for each supply, exhaust, and other fans used for ventilation. For DOAS with one or more fan or fan arrays with fan electrical input power < 1 kW, the total combined fan power will not exceed 1 W per CFM of outdoor air.
- H. Per Energy Code Section C403.3.5.1 ERVs not serving Group R-2 dwelling units or other DOAS with energy recovery ventilation will have minimum 68% sensible recovery effectiveness or minimum 60% enthalpy effectiveness.
- I. Per Energy Code Section C403.8.4 and Table C403.8.4 Heat Recovery Ventilators (HRVs) and ERVs with an input power less than 1 HP will meet minimum 1.2 CFM/W efficacy where the CFM is outdoor air CFM and the watts are the total of all fans in the unit.

- J. System filtration efficiencies will comply with requirements per IMC Section 605.4 and as required per mandatory and selected credits for ESDS compliance path.
- K. HVAC motors shall meet the NEMA premium efficiency standard.
- L. All exterior ductwork is to be completely coated on all sides with RCD Corp. #15 weather barrier coating by MC. Ductwork to be prepared and weather barrier coating to be installed per manufacturer recommendations.
- M. All equipment attached to structure with isolators will have flex connections to ductwork. For general purpose indoor applications provide Duro Dyne DDFDC Neoprene flex connectors. For general purpose outdoor applications provide Duro Dyne DDFDC Durolon with Hypalon coating flex connectors.

2.02 BACK OF HOUSE AND MISCELLANEOUS SPACES

- A. Water Service Entry Room: Provide complete temperature controlled ventilation system including room intake and exhaust motorized dampers, louvers, thermostat, and exhaust fan to control temperature rise due to continual running and motor heat output from the domestic booster pumps. Provide a wall heater for freeze protection.
- B. Janitor/Maintenance Room: Exhausted via a corridor ERV. Refer to Corridor Supply Air section for more information. Janitor room locations are to be determined.
- C. Trash Room Exhaust System:
 - 1. There are no enclosed trash rooms. Trash containers are located outdoors adjacent to the surface parking lot. No exhaust is required.
- D. Community Laundry Room:
 - 1. There is one Communal Laundry Room on each floor.
 - 2. Dryer exhaust ducts will be routed in a dedicated chase behind the dryers to a common exhaust plenum with motorized damper at the exterior wall exhaust termination louver. Provide a backdraft damper at each dryer exhaust duct prior to common exhaust plenum.
 - 3. MC shall provide secondary dryer vent cleanouts in easily accessible locations to allow for maintenance and cleaning of dryer vent ducts.
 - 4. Dryer exhaust ducts shall have no internal protrusions.

5. Flexible or semi-rigid materials are not permitted for usage in dryer exhaust vents. Per ESDS Section 7.09 all dryer exhaust ductwork must be rigid-type ductwork from the dryer connection point to the exhaust termination.
 6. A makeup air exterior louvered opening shall be provided to allow transfer air from outside. Makeup air motorized damper operation shall be interlocked with either a pressure sensor within the laundry room or to a current sensor on each dryer in the laundry room served by the damper. Makeup air for Level 1 Laundry Room is from shared louver on Level 2 and through a vertical chase.
 7. The Engineer of Record/Design Build Subcontractor will provide a table in the drawings showing each dryer vent's calculated total equivalent length, standard radius elbow quantity, and long radius elbow quantity.
 8. If the MC's dryer vent layouts reflected in the shop drawings exceed the calculated dryer exhaust lengths due to field coordination requirements, the Engineer of Record is to be notified by the MC. Equivalent length calculations are to be modified by the Engineer of Record as needed to reflect the coordinated dryer vent layouts and to comply with the dryer manufacturer's maximum equivalent length.
 9. Provide a permanent label within 6' of the dryer per IMC 504.8.5 visible to building maintenance personnel with dryer model and equivalent length allowance for the installed dryer vent.
 10. Each Laundry Room has a dedicated ERV to provide room exhaust and supply air. Provide with combination termination fitting (BOD: Broan V14695).
- E. Electrical Rooms:
1. Main Electrical Room
 - a. There are no transformers in this room, therefore no cooling is required.

2.03 STAIRWELL SHAFTS

- A. The EC will provide electric cabinet heaters at the bottom level of both stairwells. Integral thermostats will be provided. Cabinet surface mount or recess requirements will be coordinated by the EC. MC will size and schedule the heaters.
- B. Stairs are not pressurized as they do not serve a floor more than 75 feet above the lowest level of Fire Department vehicle access per IBC 403.5.4.

2.04 GARAGE SUPPLY AND EXHAUST

- A. Parking is at a surface lot at the street level and is not enclosed. Exhaust is not required.

2.05 DWELLING UNIT HEATING SYSTEMS - ELECTRIC HEAT

- A. No mechanical cooling is provided to dwelling units.
- B. The EC will provide the heaters and thermostats.
- C. The MC shall size and specify the residential electric heaters and coordinate layouts with the Architect. Heater sizing to comply with WSEC Section C403.1.4 Exception 2 for dwelling and sleep units.
 - 1. Bathrooms located on the perimeter without fenestration will be provided with a 250 W wall heater as allowed per WSEC Section C403.1.4 Exception 2.3. BOD: King PAW Wall Heater
- D. All units shall be heated via electric heating units. Baseline product approach for living areas and bedrooms is King KCV Cove heaters. Manufacturers other than King may be utilized if approved as an equivalent substitution.
 - 1. The Design Building Contractor (EOR) is responsible for all heat load calculations and heater sizing/selections. Heater sizing will comply with Energy Code Section C403.1.4 Exception 2 for Dwelling and Sleeping Units.
- E. Thermostats - Remote mounted 7-day programmable thermostats shall be provided in the primary living space of each residence (King Model ESP MAX22 for 208V). Remote mounted manual digital display thermostats shall be provided in the bedrooms (King Model ES MAX22 for 208V). Thermostats shall be line voltage (208V) and rated for 22 amps.

2.06 DWELLING UNIT VENTILATION: IN-UNIT ERV

- A. Balanced airflow with heat recovery for supply and exhaust system is required per IMC and Energy Code. Provide one energy recovery ventilator (ERV) for each dwelling unit.
- B. All ductwork is to be constructed and installed to appropriate SMACNA standards.
- C. Ductwork shall be a minimum of 26 gauge or as required by IMC.
- D. Ventilation to each dwelling unit will be provided by an individual ERV in each residential unit. The MC will provide an Energy Recovery Ventilator (ERV) in all Residential Dwelling units with a minimum sensible recovery effectiveness of 60% in accordance with Section

C403.7.6 per Energy Code Section C403.3.5.1 Exception 3. Minimum ERV effectiveness will also be sufficient to provide a minimum of 55°F ventilation supply air at winter design conditions.

1. Per the requirements of Energy Code Table C403.8.4, the ERV shall meet the minimum efficacy of 1.2 CFM/W.
- E. Each habitable space within the dwelling unit will be provided with supply ventilation air. Ventilation air to be supplied in parallel with the heating system.
- F. Exhaust the bathroom with the ERV. The code required kitchen exhaust will be from the intermittent range hood ducted exhaust system.
- G. Ducted Dwelling Unit ERV:
 1. Manufacturer basis of design: Broan BLP150E75NS-HW
 - a. Approved equal may be submitted with confirming RFI with the understanding that all design changes shall be handled by MC in the shop drawing process.
 2. ERV unit to be installed in last perimeter joist bay. Coordinate joist bay depth with structural.
 - a. ERV unit will be hard-wired.
 - b. Outdoor air and exhaust air will have R-8 insulation. They will be located in the last perimeter joist bay and connect to the combination termination fitting, provided by Others (BOD: Broan V14695). Combination termination fitting location to comply with IMC Section 401.4.3. Inlet and outlet area to be sized to achieve a maximum free area velocity of 500 feet per minute per IMC Sections 403.4.6.1 and 403.4.6.2.
 - c. All ductwork supplying to dwelling unit and exhausting from bathroom is to be routed in joists. Provide ceiling radiation dampers on the supply grilles and exhaust grilles wherever they penetrate a rated floor/ceiling assembly.
 - d. Provide full-size rated access panel below the ERV, minimum dimensions of 36x24.
 - e. Coordinate with structural engineer if mounting ERV in other than last joist bay.
 - f. Coordinate any ducts that penetrate beams within floor/ceiling assembly with structural engineer prior to install.

3. ERV controls shall include 2-speed operation. The ERV shall operate continuously on low speed to satisfy the whole house ventilation requirements and high speed (boost mode) shall be activated by an occupancy sensor. High speed shall be set to operate for 20 min after the switch is deactivated.
4. A whole house fan "off" switch shall be provided. Provide signage adjacent to the fan switch notifying the occupants of 24/7 ventilation operation in accordance with IMC Section 403.4.5. Signage to read "LEAVE ON UNLESS OUTDOOR AIR QUALITY IS VERY POOR." Fan switch to be located on inside wall of coat closet at unit entry at same mounting height as light switches. Provide fan switch with semicircular toggle switch guard (non-lockable) to prevent accidental switch-off. Switch installation by EC.
5. Provide a supply grille for each habitable space and aluminum bathroom exhaust grille.
6. System filtration efficiencies will comply with requirements per IMC Section 605.4 and as required per mandatory and selected credits for ESDS compliance path.
7. The selected model shall comply with Energy Code. Where required motors shall be electronically commutated motors.
8. Purchase with factory isolation kit.

2.07 RESIDENCE EXHAUST SYSTEMS

- A. Exhaust ductwork pricing assumptions shall accommodate location changes within the unit floor plan as the architectural plans are not finalized.
- B. All ductwork is to be constructed and installed to appropriate SMACNA standards.
- C. The residence ventilation is by means of ERVs.
- D. Range exhaust ductwork is to be routed through soffits.
- E. Exhaust terminations shall be 3' minimum from building openings and property lines per IMC Chapter 5.
- F. Duct sizing
 1. Range exhaust duct size = 6" minimum
 2. Bathroom exhaust duct size = 4" minimum

G. Bathroom Exhaust:

1. The bathroom is exhausted via the in-unit ERV. Refer to Dwelling Unit Ventilation: In-Unit ERV section for more details.

H. Kitchen Range Hood:

1. The kitchen range hood is provided by Others. The Architect will specify the hood as part of the appliance package. The MC will provide a duct system that delivers manufacturer-specified minimum CFM. Per ESDS Section 7.07a, range exhaust hoods must be Energy Star labeled.
 2. Ductwork to the perimeter and connection to the range hood is by the MC.
 3. Operational exhaust rate and CFM requirements for the range hood vary by kitchen type and range type per IMC Tables 403.4.7 and Table 403.4.7.3.
 - a. Continuous exhaust in an open kitchen is not permitted.
 - b. Continuous exhaust in an enclosed kitchen requires minimum 5 ACH based on the kitchen volume.
 - c. Intermittent exhaust in open kitchens requires:
 - 1) Minimum 65% capture efficiency or minimum 160 CFM for a range hood over an electric range
 - 2) Minimum 80% capture efficiency or minimum 250 CFM for a range hood over a combustion range
 4. Per IMC 403.4.7.2.4 range exhaust hoods are limited to maximum sound rating of 3 sones at airflow settings not less than 100 CFM and at intended static pressure per HVI 916 Section 7.2.
 5. Range exhaust airflow will be tested and verified in accordance with IMC Section 403.4.7.3.1.
- I. Residential exhaust termination shrouds or louvers will be provided by Others. Backdraft dampers for range exhaust are by MC. Screens for range exhaust are by MC. Termination details within the shroud are by MC. Backdraft dampers will be Famco with gasketed edge seal for quiet performance. Gravity backdraft dampers for residential exhaust systems shall be provided with a gasketed seal per Energy Code Section C403.7.8.3 Exception 2.

2.08 CORRIDOR SUPPLY AIR

- A. Each corridor will be served by (1) ERV each. ERVs will be located at the far end of each wing.
 - 1. Each ERV will use a combination termination fitting (BOD: Broan V14695) that meets separation requirements per WSMC Section 401.4.
 - 2. ERV BOD: Broan BLP150E75NS-HW
 - 3. The ERV will also exhaust the Janitor Closet on its associated floor.
- B. The MC will provide an Energy Recovery Ventilator (ERV) with a minimum sensible recovery effectiveness of 68% or minimum enthalpy recovery ratio of 60%. Minimum ERV effectiveness will also be sufficient to provide a minimum of 55°F ventilation supply air at winter design conditions.
 - 1. Per the requirements of Energy Code Table C403.8.4, the ERV shall meet the minimum efficacy of 1.2 CFM/W.
- C. The corridor ERVs will shutdown upon any return air smoke detection.
- D. Accessories include supply fan EC motor, local space temperature controller, and standalone controls.
- E. System filtration efficiencies will comply with requirements per IMC Section 605.4 and as required per mandatory and selected credits for ESDS compliance path.
- F. Supply grilles will be Titus MCD or equivalent manufacturer's.
 - 1. Include cable operated damper (COD) or electronically operated balancing damper (EOD) at corridor supply for balancing.
 - 2. The supply grille will not include an opposed blade damper (OBD) without approval by the Acoustical Consultant.
- G. Wall heaters will be provided by EC in the corridor at each level and sized to comply with Energy Code Section C403.1.4 Exception 1. See Plans for heater counts.

2.09 CONTROLS

- A. Each HVAC system will be provided with standalone controls. There will be no BMS or DDC controls for the building.

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. All work contracted for must be accepted by all applicable inspectors including site Superintendent, GC quality control personnel, Owner's Representative, or their assignees.
- B. As-builts: Provide Owner with electronic as-built drawings within two weeks of substantial completion. As-builts will reflect all changes from the construction drawing set and will comply with Energy Code project completion requirements.
- C. O&Ms: Provide hard copy and electronic copies of O&Ms for all systems within two weeks of substantial completion.

3.02 TESTING AND INSPECTION

- A. All testing, balancing, startup and commissioning is by the MC. All hydronic and air systems including all heat pumps, dwelling ceiling fans, range hoods, etc. will have water and airflow measurement and balancing conducted by the MC.
- B. All commissioning will be in compliance with the methodologies and practices outlined in Energy Code Section C408. Commissioning will also comply with ESDS mandatory commissioning requirements and optional credits being pursued as part of the ESDS compliance path.
- C. A 3rd party commissioning agent (CxA) will execute Commissioning of the MEP systems in accordance with Energy Code Section C408. These requirements apply to all residential and non-residential systems.
- D. The members of the commissioning team consist of the Commissioning Authority (CxA), the Owner's Representative (OR), the designated representative of the Owner's Construction Management firm (CM) (if applicable), the GC, the Architect and Engineer of Record, the MC, the EC, the Testing and Balancing (TAB) representative, and any other installing Subcontractors or Suppliers of equipment. Project Superintendent and Subcontractors, Installers, Suppliers, and Specialists deemed appropriate by the CxA or others. If known, the Owner's building or plant Operator/Engineer is also a member of the Commissioning Team.
- E. The CxA may assist with problem-solving deficiencies, but ultimately that responsibility resides with the A/E, GC, and the Subcontractors. The primary role of the CxA is in regards to Divisions 22, 23, and 26 and is to develop and coordinate the execution of a testing plan,

observe and document performance—that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents.

- F. The MC will fully participate in the commissioning process as follows:
1. The MC will participate in all commissioning meetings.
 2. MC will verify that coordination, installation, quality control, and final testing have been completed such that installed systems and equipment comply with Construction Documents.
 3. The MC will execute and document complete calibration of sensors and actuators and point-to-point testing of control systems.
 4. Provide preliminary and final TAB reports indicating all actual field values recorded to the Commissioning Authority prior to initiation of functional testing. TAB will not be complete until the TAB report is accepted by the A/E/Ownership team.
 5. Provide Commissioning Authority with controls system wiring diagrams and narrative sequences of operation in time for use in preparing the functional test procedures.
 6. Generate and provide blank pre-functional tests and checklists for review by CxA. Incorporate changes recommended by the CxA.
 7. MC is to execute pre-functional performance testing (FPTs) in an effort to eliminate deficiencies prior to final testing and witness witnessing stage and inform CxA that the system(s) are ready for witness testing.
 8. Execute final FPTs to be witnessed and documented by the CxA.
- G. The Contractor will be expected to fully execute the Cx process.
- H. Per Energy Code Section C403.10.2.3, all ductwork designed to operate at a static pressure in excess of 3 inches of water column shall be subjected to a high pressure duct leak test. This scope is by MC.
- I. Owner training will be provided by the installing Contractor.

END OF SECTION

DIVISION 26 05 05

ELECTRICAL SYSTEMS SYSTEMS NARRATIVE

PART 1 - GENERAL

1.01 INTRODUCTION

- A. The purpose of this section is to define the design approach upon which the contractor is to base a budget/estimate and establish the design criteria, and design submittals, which will be required in the preparation and execution of the design.
- B. All work under this section shall comply with the requirements of General Conditions, Supplemental Conditions, Special Conditions, and Division 01 – General Requirements, and shall include all mechanical sections specified herein.
- C. This section includes a general narrative description of Division 26 systems with specific equipment and component criteria that are to be included in the project. Reference all other specification sections, floor plans, drawing notes, drawing equipment schedules, and drawing matrices for additional equipment and project criteria.

1.02 APPLICABLE CODES AND STANDARDS

- A. Design and construction shall comply with the eh following Codes:

APPLICABLE WASHINGTON STATE BUILDING CODES			
ENERGY CODE	2021 WASHINGTON STATE ENERGY CODE (SEC) FOR COMMERCIAL BUILDINGS	WAC 51-11C	EFFECTIVE MARCH 15, 2021
BUILDING CODE	2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-50	EFFECTIVE MARCH 15, 2021
ACCESSIBILITY CODE	2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON STATE AMENDMENTS CHAPTER 11 AND ICC A117.1-2009	WAC 51-50	EFFECTIVE MARCH 15, 2021
SEISMIC CODE	ASCE 7-2016 AS REFERENCED BY 2018 INTERNATIONAL BUILDING CODE	WAC 51-50	EFFECTIVE MARCH 15, 2021
FIRE CODE	2021 INTERNATIONAL FIRE CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-54A	EFFECTIVE MARCH 15, 2021
MECHANICAL CODE	2021 INTERNATIONAL MECHANICAL CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-52	EFFECTIVE MARCH 15, 2021
PLUMBING CODE	2021 UNIFORM PLUMBING CODE WITH WASHINGTON STATE AMENDMENTS	WAC 51-56	EFFECTIVE MARCH 15, 2021
BOILER CODE	WASHINGTON STATE BOILER CODE	WAC 296-104	
ELECTRICAL CODE	2020 NATIONAL ELECTRICAL CODE WITH 2020 WASHINGTON AMENDMENTS (NFPA 70)	WAC 296-46B	EFFECTIVE NOVEMBER 1, 2020
ELECTRICAL	ELECTRICIANS AND ELECTRICAL INSTALLATIONS	RCW CHAPTER 19.28	
NFPA STANDARDS	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS AS REFERENCED BY THE CODES ABOVE OR AS SPECIFICALLY LISTED BELOW		

1.03 RELATED DOCUMENTS

- A. Architectural, Civil, Structural, and MEP Drawings and Narratives

1.04 ORDER-OF-PRECEDENCE PROVISIONS

- A. In the case of inconsistency or ambiguities in design documents (all specifications and drawings), compliance with the strictest design requirement among conflicting criteria is required.
- B. If provided, alternate pricing for compliance with less strict criteria will be evaluated in addition to the mandatory baseline strictest criteria.
- C. Provide notice upon discovering potential design conflicts prior to bid where possible.

1.05 GENERAL ELECTRICAL PROVISIONS

- A. Definitions:
 - 1. Electrical Contractor – This term as used in the Contract Documents shall be considered as synonymous with Electrical Contractor, or the Contractor where in reference to providing, furnishing, and/or installing electrical equipment or systems.
 - 2. Low Voltage Contractor- This term may be used in the Contract documents to refer to the low voltage systems integrator for telecommunications, security systems or Fire Alarm.
 - 3. Complete System: The Contract Documents do not attempt to address all materials, devices, equipment, and work that shall be required for completion of the electrical systems. All materials, devices, equipment, and work not addressed in the Contract Documents shall be provided by the Contractor to provide complete and functional systems, shall meet the applicable industry standards, and shall be equal or better than that normally provided for similar buildings in the same geographical area.
 - 4. The Electrical/ Low Voltage Contractor is responsible for providing the finished electrical work, tested, and ready for normal operation.

5. Unless otherwise noted, all materials shall be new. Electrical Contractor shall properly store all materials and equipment in order to protect materials from physical damage or damage due to the elements or corrosion.
6. Materials shall be provided, installed, and/or used in conformance with the manufacturer's recommendations. If manufacturer's recommendations are not in conformance with the intent of the Contract Documents, obtain clarification from the Architect and Engineer prior to proceeding.
7. Coordination: Check drawings of other trades to verify spaces in which work shall be installed. Establish exact locations of piping and ducts in such a manner as to conform to structure, avoid obstructions, and keep openings and passageways clear. Lines that must pitch or that must have a constant elevation, shall have the right-of-way over lines not so restricted. Maintain maximum headroom. If space conditions appear inadequate, notify the Architect before proceeding with the work. Make reasonable modifications in the work without extra cost as needed to prevent conflict with work of other trades and for proper execution of the work.
8. For installation of equipment furnished by Others, that requires electrical connection, Electrical Contractor shall obtain rough-in dimensions from approved shop drawings, by measurement from the actual equipment to be installed, or as otherwise directed by the Architect. Provide all electrical services to and within equipment in a manner that maintains accessibility, operation, as well as maintenance and repair options.
9. Contractor shall ensure adequate equipment space and required clearances based on actual equipment selected for installation. Any modifications required to accommodate electrical equipment selected shall be at the Contractor's expense.
10. Drawings and Narratives shall be considered as a single entity, identified as the Contract Documents. Consider work indicated in one as required by both.

B. Codes, Permits, Inspections, and Fees:

1. The Electrical / Low Voltage Contractor shall obtain all permits and inspections and pay all fees required by State and Local authorities, except as noted.
2. All work and materials shall be in accordance with requirements of all applicable local and state codes, statues, standards and other regulations. Date of regulations

shall be as adopted by local authorities at the time of permit intake, unless indicated otherwise.

3. The codes shall be construed as establishing a minimum or base level of requirements. Contract Documents shall not be construed to permit or direct work not in conformance with codes, statues, standards and other regulations. Where provisions of the various regulations conflict with each other, or with the Contract Documents, the more stringent provisions shall be included in contract pricing. Conflict shall be resolved with the Architect and Authorities Having Jurisdiction (AHJ) prior to completing the design.
4. Where the Contract Documents call for material or construction of a better quality or higher capacity than required by the codes, statues, standards, and other regulations, the provisions of the Contract Documents shall take precedence over the requirements of the codes and standards.
5. Material and equipment within the scope of the UL Testing Laboratory Service shall be listed by the Underwriters Laboratories for the purpose for which they are used and shall bear their listing mark. ETL or CSA shall be allowed if acceptable to the Authorities Having Jurisdiction (AHJs).

C. Construction Coordination Drawings

1. It shall be the Contractor's responsibility to work out and coordinate all conflicts and to provide all transitions and offsets required to facilitate installation of work. Provide construction coordination drawings for congested areas requiring close coordination with other trades and the general construction. Electrical work that is fully coordinated and that can be installed generally per the contract documents will not require coordination drawings. Failure to provide coordination drawings, when needed, shall be considered nonperformance, and progress payments will be suspended until the drawings are reviewed and accepted by the Architect/Owner.
2. The construction coordination drawings shall show all related trades, structure, and ceiling, walls, and partitions. Provide cross sections of all congested areas.
3. The final as-built drawings shall be submitted at the completion of the project for record purposes in hard copy as well as AutoCAD electronic files.

D. Submittals and Trade Coordination

1. The Contractor shall coordinate their shop drawings with other trades prior to shop drawing approval and construction.
2. No cutting or drilling of joists or beams will occur without Structural Engineer approval.
3. Architectural drawings shall be checked for ceiling heights, walls, and cabinets that are intended to conceal work of this section. Where conflicts occur, the Architect shall be notified prior to rough-in or installation of the work. Location of exposed work such as diffusers, grilles, and piping outlets shall take precedence over concealed work.
4. Submittals: Mark submittal literature and show drawings clearly, and include all equipment and material shown on drawings and specified. Indicate the following:
 - a. Index, followed by specification reference and/or drawing reference for which literature is submitted for review.
 - b. Manufacturer's name and address, and supplier's name, address and phone number.
 - c. Catalog designation or model number.
 - d. Rough-in data and dimensions and cut sheets clearly identifying the specific model and options.
 - e. Installation as well as operation and maintenance manuals with specific model and features applicable to this installation identified.
 - f. Warranties.
 - g. Spare parts lists as recommended by manufacturer for equipment.
 - h. Factory certifications.
 - i. Troubleshooting guides.
 - j. Complete customized listing of characteristics, equipment, accessories, etc., specified.
 - k. Indicate whether item is "As Specified" or "Proposed Substitution". Indicate any deviations on submittal. Mark out all non-applicable items and/or clearly identify applicable items. The terminology "As Specified" used without clearly identifying applicable items is not acceptable. Show exactly what will be provided and include options or deletions.

- i. Contractor agrees that Shop Drawings Submittals processed by the architect are not Change Orders, that the purpose of Shop Drawing Submittals by the Contractor is to demonstrate to the Architect that the Contractor understands the design concept and demonstrate its understanding by indicating which equipment and material it intends to furnish and install and by detailing the fabrication and installation methods it intends to use.
- m. Contractor further agrees that if deviations, discrepancies, or conflicts between Shop Drawings and Specifications are discovered either prior to or after Shop Drawing Submittals are processed by the Architect, the Design Drawings and Specifications shall control and shall be followed.
- n. Shop drawings shall be provided for all voice/data and power work, including detailed layout drawings of all devices and raceways.
- o. Warranty period to extend for one year from date the project is occupied by the Owner, not from the date of completion of the work. Warranty not applicable to defective items due to faulty work of subsequent trades.
- p. As-builts: Contractor shall maintain up to date as-built drawings showing all construction installation with any/all design changes. Drawings shall be maintained in the project office for inspection by the Architect/Owner at any time. Provide Owner with reproducible and electronic (AutoCAD and PDF files) as-built drawings within 4 weeks of substantial completion.
- q. Provide manufacturers product, installation and warranty information for all products supplied with signed contract documents per an agreed upon schedule at the time of contract award. This is of particular importance for GC to forward appropriate information to Subcontractors to facilitate coordinated installation of his products.

PART 2 - SYSTEMS

2.01 GENERAL ELECTRICAL DESIGN CRITERIA

A. Load Calculations:

1. The load calculation assumes a VRF mechanical system for residential unit heating/cooling, as well as a gas cooktop/electric oven for cooking in all units and a central hot water system. A dummy load for heat (4w/sf) and for gas cooking (8kw) is included so the optional NEC calculation may be utilized per 2023 NEC 220.80.
2. If furnished, Sizing for residential stepdown transformers is based on the same unit calculation as described above.

B. Electrical Service:

1. The building is in City of Port Angeles and will be served via a secondary electrical service that comprises a pad mounted transformer furnished and installed by the Port Angeles Public Utilities.
2. The Electrical Contractor shall provide the secondary connections between the pad mounted service transformer and the main electrical room. The contractor shall furnish and install all conduit, conductors, trenching, and backfilling associated with all secondary conductors. Contractor shall include coordination with local power utility company to determine responsibility matrix for electrical service and adjust bid accordingly.
3. 1200A switchboard will be utilized to service both the residential units and house loads. Residential units will be powered via 800A metering center located inside the main electrical room
4. House loads will be powered one (1) 600A panel fed from the service switchboard and located in the electrical room on level 01
5. Provide grounding and bonding as required by NEC article 250.

C. The service voltage to the building will be 120/208V, 3 Phase, 4 Wire

2.02 SECONDARY ELECTRICAL DISTRIBUTION SYSTEM:

- A. Load calculations will be continued through the design process to ensure service sizes are sufficient. All final electrical room layouts to be detailed by EC and confirmed with selected gear manufacturer.

- B. Provide a digital meter and circuit breaker in the house switchboard to serve the required future electric vehicle charging capacity per City code.
- C. Provide fully rated electrical distribution equipment. Contractor to obtain available fault from utility company prior to order of switchgear, distribution, and panels and adjust AIC ratings accordingly prior to bid. No exceptions. Series rated meter stacks for the residential units are allowed.
- D. 208Y/120V-3Ph panelboards shall be provided to serve house power, lighting loads and other loads. House power panels shall be 3-phase, four wire, sized to accommodate the designed systems, with minimum 25% spare panel circuit breakers and load capacity.
 - 1. Neutral Bus: Provide 100% rated neutral for 208Y/120V branch panels.
 - 2. Ground Bus: Provide code sized ground bus.
 - 3. Bus Bars: Panels shall have copper bus bars or copper clad Aluminum.
- E. Load center panels shall be provided at 100 or 125 amp 1-phase with MLO (AIC rating TBD based upon AFC from utility, but not less than 10,000A) to serve residential units. All branch circuits for residential spaces must be equipped with Arc Fault Circuit Interrupters (AFCI) circuit breakers installed in accordance with NEC. Size of panel varies with square foot size of unit and quantity of electrical connections. Provide pre-finished white in lieu of standard finish for unit load centers.

2.03 GROUNDING:

- A. Provide a complete National Electrical Code (NEC) grounding system, including UFER ground. Ground conductors shall be sized in accordance with the (NEC).
- B. Ground conductors shall be provided for all feeders and branch circuits, except for lighting branch circuits. Conduit or raceway shall not be sole means for equipment grounding.

2.04 EQUIPMENT CONNECTIONS:

A. Provide the following equipment connections as listed, but not limited to:

1. HVAC equipment.
2. Plumbing equipment.
3. 120V power connections for irrigation control system.
4. Empty raceway for irrigation control system.
5. 120V smoke and CO alarms in residential units.
6. Owner furnished equipment.
7. Circuit Loading: Each 20 amp circuit shall not be loaded to more than 80% or 16A for a 120V circuit, unless circuit feeds a single piece of equipment. Circuit load shall be calculated in compliance with the following:
 - a. Lighting: The volt-ampere rating of each fixture connected, in accordance with the NEC.
 - b. Convenience Receptacles: 180 VA per duplex receptacle.
 - c. Dedicated Receptacle: Nameplate rating of equipment connected.
 - d. Motors and all hard wired equipment: Nameplate rating of equipment connected.
8. Provide all interconnect wiring between controls, equipment, and major mechanical and electrical equipment, except where identified "By Owner".
9. Provide all disconnects for mechanical, plumbing, and electrical equipment in accordance with the NEC.
10. Label all receptacles, equipment hard wire connections, and power junction boxes with the appropriate panel name and circuit number.

2.05 EMERGENCY POWER SYSTEM:

A. Emergency power system shall consist of individual battery/inverter units installed in selected light fixtures for egress lighting to maintain average of 1.0-fc and a minimum of 0.1-fc light level along egress path as per NFPA 101. Refer to architectural drawings for final path of egress.

2.06 RESIDENCE HVAC SYSTEMS

- A. Refer to mechanical narrative for residential HVAC systems and required connections.

2.07 RESIDENCE EXHAUST SYSTEMS

- A. Refer to mechanical narrative for residential HVAC systems and required connections.

2.08 MECHANICAL & PLUMBING EQUIPMENT CONNECTIONS:

- A. Provide wiring, starters (except where available integral to the equipment), disconnects and OCP devices. See mechanical drawings/ narratives for equipment.
- B. Refer to mechanical and plumbing plans for exact locations.
- C. Coordinate with mechanical criteria and Mechanical Contractor to provide complete power wiring and connections for all required mechanical equipment. Provide control power for mechanical system control.
- D. Electrical Contractor to provide Emergency Power Off (EPO) button to shunt trip boilers at each entrance to boiler room as required by State and local codes, (WAC 296-104-303 and 2005 Seattle Boiler and Pressure Vessel Code Section 170). Shut down is to comply with the requirements of AMSE CSD-1 Code Part CE.
- E. Provide GFCI connections to all heat trace equipment. Refer to plumbing narrative for heat trace requirements. Outdoor heat trace for hot water heating system will need to be on the optional standby branch of emergency power.
- F. Provide motor controls for mechanical equipment in accordance with the Trade Coordination Schedule requirements.
- G. Provide all disconnect switches, fused or non-fused, in accordance with the requirements of the NEC.

- H. Electrical contractor to provide 120V circuits for control panels provided by Mechanical for controls contractor.
- I. Refer to Div 22 and 23 narratives for electrical requirements and equipment schedules.

2.09 ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

- A. Each house panel shall be provided with energy metering system to separately meter house lighting, receptacles and HVAC loads.

2.10 ENERGY CODE C411 RENEWABLE ENERGY AND SOLAR READINESS

- A. New PV system will be required per WSEC C411.1, On-site renewable energy systems requirements for new buildings and additions larger than 10,000 ft² of gross conditioned floor area.
- B. PV system sizing criteria is 0.5 watts rated peak PV energy production per square foot of conditioned space at minimum, which will require installing 7.5KW PV system based on 15,000-SF gross conditioned area.
- C. Contractor shall provide PV system, rough-in, power cabling and NEC 705 load-side source connection system via CB installed inside the service switchboard.
- D. In addition, and per Energy Code C411.3 - Option 1., 40% of facility roof space shall be designated for solar readiness zone. PV system can be installed inside of this zone.
- E. Contractor to provide additional space within the main switchboard at the end of the bus for future PV in compliance with C411.3.7 interconnection.

2.11 MISCELLANEOUS

- A. Doors
 - 1. Provide electrical connections to all ADA doors.

2. Coordinate all electrical requirements with the Architect

B. Security/ Access Control

1. Provide electrical connections to Access Control and CCTV systems. Coordinate power requirements to the CCTV and access control systems with equipment provider. Coordinate head-end equipment location with Client.

2.12 UNIT POWER AND LOW VOLTAGE FEEDER ROUTING

A. Unit power feeders shall not be routed through another unit.

2.13 WIRING DEVICES:

A. Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for given applications which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards.

1. In residential units, provide 20A rated receptacles in the Kitchens and baths; 15A elsewhere.

B. Receptacles: Comply with UL 498 and NEMA WD 1, 20A, 125 Volt, Duplex - NEMA 5-20R, Heavy Duty in commercial and common areas; Residential grade in units.

C. Dedicated Receptacles: Comply with NEMA and voltage recommendations from manufacturer of equipment to be installed. Provide dedicated circuits and dedicated, 20A receptacles for Owner furnished equipment with a load 1200W or greater.

D. Ground-Fault Circuit Interrupter (GFCI) Receptacles: Provide "feed-thru" type ground-fault circuit interrupter, with integral heavy-duty NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide GFCI protection for all receptacles located where within six feet of the outside edge of a sink or in wet areas. In residences provide GFCI circuit breakers in lieu of receptacles, so that all devices are accessible and consistent throughout the space.

- E. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Code requires all receptacles in the units to be Tamper resistant.
- F. Equipment Disconnect Toggle Switches: NEMA WD 1, totally enclosed with rectangular bodies of thermosetting plastic and a mounting strap. Handles shall be white. Wiring terminals shall be of the screw type, side wired. Switches shall be rated quiet-type, 120/277 volts, with number of poles indicated and shall be fully rated for the ampere rating of the installed equipment. Not more than one switch shall be installed in a single gang position. Toggle switches for motor disconnecting means shall be motor rated snap switches, heavy duty, specification grade.
- G. Provide maximum of eight (8) general convenience receptacles per 20 amp, 120 volt circuit along with AFCI circuit breaker for residential units only as required by the NEC 2017.
- H. Provide dedicated circuit for the smart box panel provided with AFCI breaker.
- I. Receptacles shall be installed 18" above finished floor (AFF) to center of receptacle, unless noted otherwise.
- J. Residential Unit Receptacles – Baseline approach: Provide receptacles in residential units as required by NEC section 210.50. Receptacles shall be provided at the following areas, but are not limited to:
 - 1. Every 12' on center and no more than 6' from wall breaks in all bedroom and living areas,
 - 2. (1) receptacle in every hallway longer than 10',
 - 3. (1) receptacle in foyers at walls 3' or greater in width and at 12' on center in foyer,
 - 4. (1) dedicated laundry receptacle,
 - 5. (1) Receptacle at all kitchen islands and peninsular countertops 24" or greater. Receptacle shall be located no more than 12" below the countertop with no more than a 6" overhang
 - 6. Within 3' of every restroom water basin

7. Every 4' on center at kitchen counters for all counters that are 12" or wider
8. Electrical contractor shall refer and coordinate with interior, architectural, and other discipline drawings when developing final device layouts per NEC 210.50. All device locations should be coordinated with other equipment, pocket doors, window and column locations, and construction details prior to rough in.
9. Provide (1) USB outlet in every bedroom at bedside table outlet location, at the kitchen counter and at each desk location.
10. Provide switched outlet in bedrooms instead of overhead lighting.

K. Additional Unit Requirements:

1. EC to provide and install air button switch for all garbage disposals located on kitchen islands. Kitchens without islands will receive regular on/off switch.
2. Unit panels are assumed to be located behind the bedroom door where possible.
3. Refer to architectural drawings for assumed kitchen appliance connections required.

L. Receptacles shall be installed 18" above finished floor (AFF) to center of receptacle, unless noted otherwise.

M. Coordinate the location of all electrical items with architectural and mechanical layout to avoid interference etc. Any items installed that will not allow the installation of the designed features shall be connected at no additional cost.

N. Label all receptacles, equipment hard wire connections, and power junction boxes with the appropriate panel name and circuit number in all building areas, except residential units.

O. Refer to section 261400 for additional details.

2.14 LIGHTING SYSTEMS:

A. Scope of New Work:

1. Provide new lighting and controls that comply with the City codes referenced below.
2. Provide 100% LED lighting package for an energy efficient design.

3. Electrical engineer of record shall be responsible for lighting summary permit forms, emergency egress lighting layouts and photometrics, exit sign layouts, circuiting, code required control specifications and wiring diagrams.

B. Lighting Allowance:

1. GC/Owner to provide lighting allowance for interior and exterior lighting and controls.

A. Applicable Codes & Guidelines for New Lighting:

1. 2021 Washington State Energy Code – Interior Lighting:
 - a. The 2021 Washington State Energy Code (WSEC) shall be applicable for all interior lighting.
 - b. Provide an energy efficient lighting design with a lighting power density that is less than the WSEC Table C405.4.2(2) Interior Lighting Power Allowances: Space-By-Space Method
 - c. Table C405.4.2(2) Interior Lighting Power Allowances: Applicable Spaces
 - d. Interior common area hardwired lamps (retrofit) must have a minimum efficacy of 60 lumens per watt per WSEC section C405.4.1.

Primary Interior Function	Allowed Watts/SF Option 2 C406.2.3.2 Tar- gets: 20% LPD Reduction	Allowed Watts/SF Option 1 C406.2.3.1 Tar- gets: 10% LPD Reduction	Allowed Watts/SF Code Baseline
Corridors	0.32	0.36	0.41
Electrical / Mechanical Rooms	0.34	0.38	0.43
Laundry/Wash Room	0.42	0.48	0.53

Stairwell	0.39	0.44	0.49
Storage Rooms			
< 50 SF	0.41	0.46	0.51
50+ SF	0.30	0.34	0.38
Dwelling/ Sleeping Units	<p>Code Baseline requirement: No less than 90% of the installed lamps must have a minimum efficacy of 65 lumens per watt or luminaires with a minimum efficacy of 45 lumens per watt per WSEC section C405.1.1.</p> <p>C406 requirement: No less than 95% of the installed luminaires must have a minimum efficacy of 90 lumens per watt per SEC section C406.2.3.3.</p>		

2. 2021 Washington State Energy Code – Exterior Lighting
 - a. The 2021 Washington State Energy Code (WSEC) shall be applicable for all exterior lighting which includes all building mounted exterior lighting and site lighting.
 - b. Project is classified under Zone 2 of Table C405.5.3(1) in the Washington State Energy Code. Zone 2 best describes this project’s location in a predominantly residential area with limited nighttime use.
 - c. Provide an energy efficient lighting design that complies with WSEC Table C405.5.3(2) Lighting Power Allowances for Building Exteriors.

<u>Primary Exterior Function</u>	<u>Zone 2</u>	<u>Zone 3</u>
Walkways less than 10ft wide	0.07 Watts/ Linear Foot	0.10 Watts/ Linear Foot
Uncovered Parking Areas and Drives	0.026 Watts/SF	0.037 Watts/SF

Entry/ Exit Doors	9.8 Watts/ linear foot of opening	14.0 Watts/ linear foot of opening
Entry Canopies	0.126 Watts/SF	0.180 Watts/SF
Building Facades	0.075 Watts/SF of gross above grade wall area.	0.113 Watts/SF of gross above grade wall area.

3. IESNA Illumination Recommendations

- a. Target illumination values for all interior and exterior spaces are recommended in the IESNA Handbook.
- b. IESNA Lighting Handbook (2020 Edition) Recommended Foot Candles:
- c. ANSI/IES RP-28-20 Recommended Practice

Primary Function	Recommended Foot-Candles
Corridors	5 average at the floor
Entry Vestibule	15 average at the floor (Day) 4 average at the floor (Night)
Laundry	30 average at 42" AFF
Stairwells	10 minimum at treads
Storage Spaces / Janitor Closet	5-10 average at the floor
Mechanical Rooms	20 average at the floor
Electrical Rooms	30 average at 30" AFF
Exterior Walkways	3-5 average at the floor

Entrance Canopy	3-4 average at the floor
Exterior Exits/Entrances	3-4 average at the floor
Exterior Parking	0.2 average at the floor

4. IBC Illumination for Egress Requirements

- a. Engineer of record shall provide photometric calculations to ensure that under normal power, illumination levels are not less than 1 foot-candle at designated paths of egress. Under emergency power, illumination levels shall be an average of 1 foot-candle and a minimum of 0.1 foot-candle at all designated paths of egress. Refer to IBC section 1008.1-1008.3.5 for additional information.
- b. Per IBC reference to ASME 17.1, all elevator lobby thresholds shall have 10FC of emergency illumination when the elevator is in service.
- c. Electrical contractor to provide UL-924 devices as required for all emergency egress illumination.
- d. Refer to Section 2.05 for emergency lighting power requirements.

5. Lighting Controls – 2021 **Washington** Energy Code Requirements: Interior and Exterior Lighting Controls:

- a. Provide code compliant lighting controls in accordance with the IMEG Control Sequence of Operations.

6. Provide one of the following lighting control systems for common area interior lighting and exterior lighting.

- a. nLight by Acuity
- b. Athena by Lutron
- c. Wattstopper DLM by Legrand
- d. Or Equal control system.

7. Provide Claro style wall switches for any interior lighting areas with standalone controls.

8. See IMEG Basis of Design luminaire schedule and luminaire cutsheet package for dimming protocol designation per luminaire

9. See IMEG electrical drawing set for control sequence of operations

B. Lighting Concepts Space by Space

1. See IMEG electrical drawing set for lighting layouts and luminaire specifications

C. Extra Materials

1. Furnish extra materials described below that match lighting products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Lamps: 10% of each type and size used.
 - b. Diffusers and Lenses: Furnish at least one of each type.
 - c. Drivers: Furnish one of each type.
 - d. Globes and Guards: Furnish one of each type.

PART 3 - EXECUTION

3.01 PREPARATION & INSTALLATION

- A. All work contracted for must be accepted by all applicable inspectors including site superintendent, GC quality control personnel, owner's representative (IMEG) or their assigns.
- B. As-builts: provide owner with electronic as-built drawings within two weeks of substantial completion. As-builts will reflect all changes from the construction drawing set and will comply with 2021 Washington Energy Code project completion requirements.
- C. O&Ms: provide hard copy and electronic copies of O&Ms for all systems within two weeks of substantial completion.

3.02 TESTING & INSPECTION

- A. A third party will act in the role of Project Commissioning Authority (CxA) and will participate with the EC in final execution of functional testing for the electrical systems in accordance with 2021 Washington State Energy Code section 1416 commissioning. These requirements apply to all residential and non-residential systems.
- B. Test the entire electrical installation to ensure compliance with the Contract Documents.
- C. All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein.
 1. American Society for Testing and Materials – ASTM

2. International Electrical Testing Association – NETA
 3. National Fire Protection Association – NFPA
 4. 2021 Washington State Energy Code (including but not limited to Section 1513.8 and 1416.)
 5. State and *Local* Codes and Ordinances.
- D. The EC is responsible for all test, balance, and startup of electrical systems.
- E. The EC is responsible for coordination study and arc-flash studies.
- F. The EC will create functional witness tests for the electrical systems for review by the CxA. The contractor will incorporate the review comments. The EC will execute all pre-functional testing to assure system readiness for final functional testing.
- G. Installing contractors will document deficiencies and provide equipment, materials, and labor necessary to correct deficiencies found during the commissioning process to fulfill contract and warranty requirements.
- H. The Contractor shall be responsible for implementing all final settings and adjustments of protective devices and electrical equipment in accordance with Manufacturer recommended or Engineer's specified values.
- I. Any system material or workmanship which is found defective on the basis of electrical tests shall be reported directly to the Engineer and shall be corrected by the Contractor at no additional cost to the Owner.
- J. The Contractor shall maintain a written record of all tests and upon completion of the project. Assemble and certify a final test report. The test report shall include:
1. Summary of the Project
 2. Description of the equipment tested
 3. Description of tests performed on each equipment or system
 4. Test results
 5. All conclusions and recommendations
 6. An appendix including appropriate test forms
 7. List of *test* equipment used and calibration date
- K. Owner training will be provided by the EC.
- L. The contractor will be expected to fully comply with the observation process and no change orders will be accepted for the contractor's participation.

- M. The contractor will provide Section 1416 mandated documentation at the appropriate stages of planning, testing, and project closeout.
- N. The EC will provide mandated life safety system testing as needed.
- O. Owner training will be provided by the installing contractor.

END OF SECTION

SECTION 310000

EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work includes but is not limited to the following:
 - 1. Layout of project per plans.
 - 2. Accomplishing indicated and required stripping, excavation, filling, compaction, subgrade preparation, rough and finish grading, and the like.
 - 3. Removing materials from the site which are either:
 - a. Not approved for use or are in excess of that required.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including and Supplementary Conditions and Division 01 Specification Sections, apply to this section. Coordinate related work specified in other parts of the Project Manual, including but not limited to the following:
 - 1. Section 012200 – Unit Prices: Description of unit prices affecting the work of this Section.
 - 2. Section 311000 – Site Clearing
 - 3. Section 331000 – Water Utilities
 - 4. Section 333000 – Sanitary Sewage
 - 5. Section 334000 – Storm Drainage Utilities
 - 6. Section 321200 – Flexible Paving
 - 7. Section 321200 – Rigid Paving

1.03 REFERENCES

- A. Ecology 2005 Stormwater Management Manual of
Western Washington
- B. Clallam County Engineering Design Standards (current edition)

- C. WSDOT/APWA 2022 Standard Specifications for Road, Bridge, and Municipal Construction
- D. Standard Details Clallam County Standard Details
- E. ASTM C136 Standard Method for Sieve Analysis of Fine and Coarse Aggregate
- F. ASTM D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/cu ft.)
- G. ASTM D2922 Standard Test methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D3017 Standard Test methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- I. ASTM 2023 Annual Book of Standards
- J. Geotechnical Report Site Geotechnical Report

1.04 SUBMITTALS

- A. General: Comply with Section 013300. Samples: Submit a minimum 50-pound sample for each material 4 business days prior to placing material.
- B. Quality Assurance/Control Submittals.
- C. Test Reports: Sieve analysis for each material.
- D. Certificates: WSDOT pit certification for each pit.

1.05 QUALITY ASSURANCE

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. WSDOT Standard Specifications. Washington State Department of Transportation 2022 Standard Specifications for Road, Bridge, and Municipal Construction.
 - 2. ASTM D1556-90 Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM C136 Standard Method for Sieve Analysis of Fine and Coarse Aggregate.
 - 4. ASTM D-422 -90 Method for Particle Size Analysis of Soils.

5. ASTM D1557-91 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Ef-fort (56,000 ft-lb/cu ft).
6. ASTM D2922-91 Standard Test methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
7. ASTM D3017-88 Standard Test methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
8. ASTM D698-91 Standard Test method for Moisture-Density relations of soils and soil-aggregate mixture using 5.5-lb. Rammer and 12-inch Drop.
9. ANSI/ASTM D1557-78 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-pound Rammer and 1 18-inch Drop.
10. AASHTO T176 Plastic Fines in Graded Aggregates and Soils by use of the Sand Equivalent Test.
11. ASTM D3017-78 Test Methods for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

PART 2 PRODUCTS

2.01 GENERAL

- A. All imported fill materials shall be from a Washington State Department of Transportation (WSDOT) approved source.

2.02 UTILITY TRENCH BACKFILL

- A. On-site material should not be used for trench backfill. The Contractor shall import material for trench backfill. Moisture content shall be between -2 and +1 percent of their optimum. Utility Trench Back-fill shall be imported Gravel Borrow in accordance with WSDOT 9-03.14(1).

2.03 PIPE BEDDING

- A. Bedding shall conform to Section 9-03.12(3) of WSDOT-APWA.

2.04 CRUSHED SURFACING

- A. Base course and top course shall conform to section 9-03.9(3) of WSDOT-APWA.

2.05 WASHED DRAIN ROCK

- A. Shall conform to Section 9-03.12(4) of WSDOT-APWA, Gravel Backfill for Drains.

2.06 STRUCTURAL FILL

- A. All fill placed under buildings, footings, slab-on-grade floor, utility trenches, roadways, sidewalks, walkways, and all other paved areas shall be "structural fill" as defined herein, unless specified otherwise for particular applications. Structural fill shall be imported materials that conform to the grading re-querulents of Gravel Borrow, Section 9-03.14(1) of the Standard Specifications. The contractor is to assume that all structural fill is to be imported structural fill.

2.07 APPROVAL OF FILL MATERIAL

- A. All fill placed under footings, slab-on-grade floor, asphalt paving, sidewalks, walkways, and other paved areas shall be "Imported Structural Fill" as defined herein, unless specified otherwise for particular ap-plications.
- B. Approvals of fill material: All material that is proposed to be used as fill and backfill shall be graded and tested for moisture content. Gradation and test results shall be submitted for review and approved by the Geotechnical Engineer or Testing Agency prior to placement. The encountered fill exhibits a wide range of soil densities and appears to consist of materials derived on-site and moved or disturbed during earlier site work. Below the existing fill is medium dense to dense silty sand with gravel. Reuse of the on-site soils for structural fill is not allowed.
- C. It is the sole responsibility of the Contractor to protect existing ground, prepared subgrade, and any stockpiled material from inclement weather, surface runoff, construction traffic and other conditions that may preclude the re-use of the material.
- D. The on-site material is not suitable for fill or backfill, the Contractor shall import an acceptable fill material conforming to these specifications at no additional cost to the owner.

2.08 QUARRY SPALLS

- A. Quarry Spalls shall meet the following requirements for grading:

1. U.S. Standard Sieve Size	Percent Passing
2. 4-inch square	100
3. 2-inch square	50
4. ¾ inch square	10 max

2.09 FILTER FABRIC

- A. Filter fabric for silt fences shall be Mirafi 140N or approved equivalent.

2.10 TRACER TYPE

- A. Utility pipe tracer tape shall be detectable below ground surface, color coded, with utility name printed on tape. Conductive warning tape required over all sewer, drainage, water and irrigation pipe. Tape shall be manufacturer's standard permanent, bright-colored, continuous printed plastic tape, aluminum backed, intended for direct-burial service. The tape shall be not less than 6" wide x 4 mils thick.

- 1. Tape Schedule:

a. Piping	Color	Wording
b. Domestic Water Water	Blue	Caution Domestic
c. Fire Water	Blue	Caution Fire Water
d. Irrigation Water Water	Blue	Caution Irrigation
e. Storm Sewer	Green	Caution Storm Sewer
f. Sanitary Sewer	Green	Caution Sanitary Sewer

2.11 SEEDING

- A. Not included. See Section 311000 – Site Clearing.

PART 3 EXECUTION

3.01 PERMITS

- A. Obtain all required permits and inspections. Pay any and all fees or costs for permits and inspections.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL (TESC)

- A. All work shall conform to the Contract Documents and Clallam County requirements.
- B. The TESC facilities indicated by the project plans are the minimum requirements for the anticipated site conditions. During the construction period, these facilities shall be

upgraded as needed for unexpected storm events and modified to account for changing site conditions.

- C. Adequate temporary and permanent control of surface water runoff and subsurface seepage will be re-quired in order to allow site access, grading, and construction of underground utilities to proceed. Site preparation and initial construction activities should be planned to minimize disturbance to the existing ground surface particularly during extended wet weather periods when the presence of excess moisture may render the site soils more prone to disturbance. During wet site conditions, equipment traffic should not be allowed on exposed subgrade areas. The Contractor shall be responsible for protecting prepared surfaces from surface ponding, storm water runoff, and construction traffic. The Contractor will be solely responsible for any repairs required to these surfaces at no additional cost to the owner.

3.03 PROTECTION OF EXISTING FACILITIES

- A. Utilities: The Contractor shall protect from damage private and public utilities in accordance with 1-07.17 of WSDOT-APWA.
- B. Pavement: The Contractor shall protect all pavements or paved areas intended to remain.
- C. Access Streets and Roadways: Maintain wheel cleaning stations to clean wheels and undercarriage of trucks before leaving site, as necessary to prevent dirt from being carried onto public streets. Provide new wheel cleaning stations prior to driving on paved surfaces. If the streets are fouled, they must be cleaned immediately in conformance with the Clallam County and all governing requirements and regulations.
- D. Repair and/or replacement of damaged facilities will be accomplished at the Contractor's expense.
- E. Dust Control: Contractor shall sprinkle water as necessary to control dust during dry weather conditions. Do not use water to extent cause flooding, contaminated runoff, or icing.

3.04 STABILIZATION OF EXCAVATIONS AND TRENCHES

- A. The Contractor shall exercise sound engineering and construction practices for excavations and trenches and maintain them so that no damage will occur to any foundation, structure, pole line, pipeline, or other facility because of sloughs or slopes, or from any other cause. If, as a result of the excavation or trenching, there is disturbance of the ground that may endanger other property or require repair, the Contractor shall take remedial action at no additional cost to the Owner.

- B. The Contractor shall anticipate and provide dewatering, shoring or other types of stabilization, in addition to the shoring required for safety by State codes, as required to maintain the integrity of the trench or excavation and to protect nearby existing utilities and structures. Caving the site soils should be anticipated in excavations through loose surficial on-site soils. All earthwork shall conform to the Washington Administrative Code (WAC) 296-155 requirements for Excavation, Trenching, and Shoring. Cuts should meet the requirements of federal, state, local ordinances, such as OSHA and WISHA. The use of temporary bracing and/or sloped cuts should be anticipated. If the Contractor elects to provide stabilization by open pit excavation or flatter side slopes, no additional compensation will be made for the work including excavation, select backfill material, backfilling, and protection of existing facilities.

3.05 SITE GRADING

- A. General: Required contours and elevations are indicated and noted on Drawings; should indicated figures conflict with actual conditions, notify Owners Representative and obtain direction before proceeding with grading of area in conflict. Stripping:
1. Strip and remove topsoil, roots, organic debris, and unsuitable material from areas to be developed. The Contractor shall exercise care to completely avoid mixing topsoil and other organic matter with the underlying soil.
 2. The Testing Agency or Geotechnical Engineer shall approve final stripping depth. The Contractor assume that at least 6 inches of in-place thickness or more topsoil shall be removed. However, additional material may need to be removed beneath the proposed buildings as noted. Haul and dispose of materials off-site in a legal manner. See Section 31 10 00, Site Clearing for recycling of material.
- B. Grading:
1. Shape surface of site to grades and contours as noted.
 2. Remove debris, rocks over 4-inch in size, vegetation, and other organic matter from material to be re-used.
 3. Control grading around building areas and building excavations at all times to prevent flow of water into excavated areas and ponding adjacent to building.
 4. For paving and other site improvements, shape subgrades to lines, grades, and cross sections indicated. After design grade is reached, exposed soils shall be scarified to a depth of at least 6 inches; moisture conditioned if necessary and then compacted to the required relative minimum. Any soft soils encountered shall be moisture

conditioned and recompact or excavated and replaced with compacted fill, whichever is necessary to reach the required compaction at no additional cost to the Owner. Bring low areas up to required elevations with approved fill materials.

5. Subgrade: Grading shall conform to Section 2-06 of WSDOT-APWA.

3.06 EXCAVATION

A. General

1. Provide excavation of whatever nature required for construction of the work; verify character, quality, and disposition of material to be excavated prior to commencing. Blasting is not permitted.
2. Cuts should meet the requirements of federal, state, and local ordinances, such as OSHA and WISHA. The Contractor shall anticipate the use of temporary bracing, "trench boxes," and or sloped cuts per geotechnical recommendations as needed at no additional cost to the Owner.
3. Contractor shall keep excavations free from water while construction is in progress. Per the Geotechnical Analysis for ground water conditions, the Contractor shall anticipate the use of sump pumps and other methods for de-watering at no additional cost to the Owner.
4. All earthwork for utilities shall conform to the Washington Administrative Code (WAC) 296-155 requirements for Excavation, Trenching, and Shoring.
5. All excavated excess soil shall be exported from the site and disposed of at an approved location at no additional cost to the Owner.

B. Excavation for Utilities

1. Trench excavation shall conform to Section 7-08 of WSDOT-APWA. Grade and smooth bottoms of trenches to provide uniform bearing and support for each length of utility pipe. All trenches shall be excavated to true and smooth bottom grades and in accordance with the lines given by the engineer. Remove rocks and similar material to provide a minimum 6-inch clearance under and around all portions of the pipe. Placement of bedding material shall precede installation of pipe. This shall include the necessary leveling of the native trench bottom or top of foundation material as well as placement and compaction of required bedding material to a uniform grade so the entire length of pipe will be supported on a uniformly dense and unyielding foundation.

2. Catch basins, manholes and similar structures (as indicated): Excavate to furnish a minimum of 12 inches between sides and bottom of excavation and outer surfaces of structure. Take care to excavate to exact depths required; fill over-excavation with compacted gravel for trench backfill.
- C. Excavation for Structures: Extend excavation to depth as required for footings to bear on suitable material for structural bearing. Fill to planned grades with structural fill.
1. Proof-roll exposed native sediments and fill soils with heavy equipment or hand probe with a steel bar to identify soft or unstable areas requiring further over-excavation.
 2. Extend over-excavation of unsuitable material as determined by the Geotechnical Engineer, to width equal to depth of excavation below footing grade, except where width of excavation is restricted by adjacent existing foundation. Do not disturb support soils for existing foundations. Support soils are considered to be those soils within a prism projected downward and outward from existing footings at inclinations of 1 foot horizontal to 1 foot vertical (1H:1V).
 3. Following the over-excavation, backfill with imported structural fill to planned foundation grade and to planned subgrade for slabs-on-grade. Existing on-site fill soils are shall not be re-used as structural fill.

3.07 BACKFILL AND COMPACTION

A. General

1. All areas that are to receive compacted fill shall be field reviewed by the Testing Agency and the Geotechnical Engineer prior to the placement of new fill.
2. Soil surfaces that will receive compacted fill shall be scarified to a depth of at least six inches. The scarified soil shall be moisture-conditioned to obtain soil moisture near optimum moisture content. The scarified soil shall be compacted to a minimum relative compaction as listed in this Section. Relative compaction is defined as the ratio of the in-place soil dry density to the maximum dry density as determined by the ASTM D1557 test method.
3. Place fill in controlled layers the thickness of which is compatible with the type of compaction equipment used. The loose thickness of each fill layer shall not exceed eight inches. Compact each layer to a minimum relative compaction as listed in this Section. Determine the field density of compacted soils by the ASTM D2922 and D3017 test method or equivalent.

4. Fill soils shall consist of imported soils approved by the Testing Agency. All imported fills shall be granular and shall meet the gradation requirements stated herein. The Testing Agency shall evaluate and/or test imported material for its conformance with specifications before delivery to the site. The Contractor shall notify the Testing Agency 72 hours prior to importing fill to the site. Rocks larger than six inches shall be segregated from fill material and removed from site.
 - a. The Testing Agency shall observe the placement of compacted fills and conduct in-place field density tests on the compacted fill to check for adequate moisture content and the required relative compaction. Where less than the required relative compaction is indicated, remove and replace the substandard soil or apply additional compactive effort and moisture-condition the soil as necessary until the relative compaction as specified in this Section is attained. Provide level testing pads for the conducting of field density test by the Testing Agency.
5. Compaction Requirements: Compact all fill and backfill to prevent subsequent settlement. Water settling or jetting is not permitted as a means of compaction. Furnish heavy rollers or compactors except as follows:
 - a. Use pneumatic hand tampers for trenches and areas not accessible to heavy equipment.
 - b. Compact areas within 5' of footings, foundations and walls with hand vibrators.
6. Required compaction: Compact fill and backfill to the following minimum relative compaction (per-centage of maximum dry density determined in accordance with ASTM D1557):

a. Locations	Required Minimum
Relative Compaction	
b. Under slabs on grade & footings	95%
c. Under walks and paving	95%
d. Under gravel roadways	95%
e. Beddings for utility lines	95%
f. Against walls	90%
g. Against footings and foundations	90%
h. Planting and landscape areas	90%

i. Other 90%

B. BACKFILLING FOR UTILITIES

1. Bedding for utility pipes: Properly place material in trenches in accordance with the depths shown on the plans. Do not disturb the sides of trenches. Compact and shape material to conform to the barrel of the pipe to ensure continuous firm bedding for full length of pipe.
2. Pipe zone backfills shall be placed in loose layers and compacted to 95 percent maximum density. Back-fill shall be brought up simultaneously on each side of the pipe to the top of the pipe zone. In backfill-ing the pipe zone bedding Contractor shall use compactive measures such as vibratory plate compactor or hand implements to protect the pipe from any damage or shifting. Backfill above the pipe zone shall be accomplished in such a manner that the pipe shall not be shifted out of position nor damaged by im-pact or overloading.
3. Backfilling of trenches near structures shall not take place until the cement in the masonry has become thoroughly hardened. Walking on the pipe shall not be allowed until at least one foot of earth has been placed upon it.
4. Trench backfills shall be spread in uniform layers and be compacted by mechanical tampers. The back-fill material shall be placed in successive layers not exceeding 6 inches in loose thickness, with each layer being compacted in accordance with this section.
5. Compaction control tests shall be performed as specified in this Section.
6. If the required compaction density has not been obtained, the Contractor shall remove the backfill from the excavation, and recompact using heavier compaction equipment or more passes, until the required density is achieved.

C. Backfilling for Structures:

1. Footings: Fill over-excavated volume under new footings with compacted imported structural fill in accordance with over-excavation and compaction requirements, as specified in this Section.
2. Areas under New Slabs on Grade: Place imported structural fill to bring to grade and compact as specified in this Section.

3.08 FINISH GRADING

- A. General: Remove all concrete, rocks, rubble and debris larger than 2-1/2 inches from surface. Finish grades flush with adjacent surfaces unless indicated otherwise. Finish grades for landscaped areas adjacent to sidewalks shall be 1 inch below elevation of sidewalk unless noted otherwise. Execute any fine grading as may be necessary or incidental to all subsequent work.
- B. Grading Tolerance: Finish grades shall match contours and elevations shown within 1/10 foot.
- C. Approval of Finish Grading: Finish grades will be inspected and subject to approval by Owner's Representative. Contractor shall correct work not approved by Owner's Representative at no additional cost or time.
- D. Protection of Finished Surfaces: Allow no heavy objects to be moved over finished grade surfaces. At no additional cost to Owner, repair any ruts or holes in finished surfaces, and any obstructions to positive drainage. The contractor shall repair all areas showing settlement.

3.09 FIELD QUALITY CONTROL

- A. Special Inspections: Testing Agency or Geotechnical Engineer will approve fill materials, observe placement of compacted fill, and conduct in-place field density tests on compacted fill, checking moisture content and relative compaction. Where less than required relative compaction is indicated, remove and replace substandard soil, or further compact and moisture-condition soil until specified relative compaction is attained. Furnish level testing pads for conducting field density test by Testing Agency or Geotechnical Engineer.

3.10 ADJUSTMENTS

- A. Repair ruts and holes in finished graded surfaces.
- B. Correct slopes and obstructions to positive drainage.
- C. Repair areas showing settlement.
- D. Make corrections and adjustments to finish grading, as directed by the Owner's Representative.

3.11 PROTECTION

- A. Do not permit heavy objects or construction traffic to be moved over graded surfaces.

- B. Protect graded and disturbed areas from run-off, ponding water, and other conditions which may alter finish grades and that may preclude a suitable surface for the next phase of construction. Subgrades shall be sealed with a smooth drum roller before wet weather leads to their deterioration. Protect existing soils with BMP's outlined in the King County Surface Water Design Manual. BMPs shall be updated as needed to maintain soil protection. Accumulated water and any unstable soils shall be immediately re-moved and replaced with an equivalent amount of Imported Structural Fill at no additional cost to the Owner. Contractor shall repair all areas showing settlement at no additional cost to the Owner.
- C. Private and Public Utilities: Protect from damage in accordance with 1-07.17 of WSDOT-APWA.
- D. Paved Areas Intended to Remain: Protect from damage.

END OF SECTION

D. Standard Details

Clallam County Engineering Design Standards

1.04 SUBMITTALS

- A. Demolition procedures and operational sequence for review and acceptance by Owner.
 - 1. Permits for transport and disposal of debris as required.

1.05 DESCRIPTION

- A. Construct and maintain erosion and sedimentation control in accordance with contract documents and Clallam County requirements. Clear and grub site as indicated and as necessary to construct improvements. Save and protect from harm any trees, vegetation, or other objects or existing improvements selected to remain, refer to Landscape Plans. Remove from area to be cleared all other growth unless otherwise indicated or directed. Remove underground utilities as shown and specified on plans and within specifications, and as necessary to construct improvements. Plug and abandon in-place utilities to be taken out of service but to remain in-place.

1.06 EXISTING CONDITIONS

- A. Protection of Existing Improvements:
 - 1. Provide, erect, and maintain barricades, coverings, or other types of protection necessary to prevent damage to existing improvements.
 - 2. Provide safe access to all areas to remain in use during Construction.
 - 3. Restore any existing improvements damaged by this work to their original condition, as acceptable to Owner's Representative.
- B. Construct and maintain temporary erosion and sedimentation control plan in accordance with the contract documents, and Clallam County requirements.
- C. Objectionable Noises: Conform with local governing requirements regarding Noise Control.
- D. Maintain safe vehicular and pedestrian traffic routes:
 - 1. Ensure minimum interference with roads, streets, and adjacent facilities.
 - 2. Do not close or obstruct streets, fire lanes, sidewalks, or passageways without permission from owner or authorities having jurisdiction.

3. If required by Owner or governing authorities, provide alternate routes around closed or obstructed traffic ways.
4. Obtain all permits required for work within the public right of way. Coordinate all improvements within public right of way with governing authority.
5. Provide safe access around buildings to remain in service during construction per architectural plans and specifications.

1.07 DIMENSIONS AND LAYOUTS

- A. The Contractor will be responsible for furnishing, setting and marking all line and location stakes, including offsets and general construction staking. When work requiring control is being performed, all necessary related equipment, supplies and instruments shall be on site. A qualified layout engineer, surveyor, or technical specialist must be assigned to the Contractor's crew for this work. This equipment and personnel must be available, at no additional cost to the Owner for the purpose of verifying layout and certifying the accuracy of work on the site.
- B. The Contractor is responsible for preserving all benchmarks and stakes and the replacement of any that are displaced or missing.
- C. The Contractor is responsible for review of all utility purveyor, project survey, and City or State records relative to the existing underground utilities. The Contractor is responsible for avoiding damage to these facilities and shall restore all utilities at no additional cost to the Owner.
- D. The Contractor is to notify the Owner's Representative immediately if underground utilities not shown on the Agency's record are encountered.

1.08 LIABILITY

- A. The Contractor is an independent contractor and not an employee of the owner. The owner shall have no liability to the Contractor or any third persons for Contractor's failure to faithfully perform and follow the provisions of these Specifications and the requirements of the governing agencies. Notwithstanding the failure of the owner to discover a violation by the Contractor of any of the provisions of these Specifications, or to require the Contractor to fully perform and follow any of them, such failure shall not constitute a waiver of any of the requirements of these Specifications which shall remain fully binding upon the Contractor.

- B. Subcontractors employed by the Contractor shall be bound to all the work and safety standards specified. Subcontractor's personnel shall meet the requirements as specified and shall be supervised by the Contractor during performance of this work.

PART 2 PRODUCTS

2.01 TEMPORARY FENCING

- A. Temporary chain link fencing: minimum 6' height, line posts at 8' o.c. maximum. 2" chain link mesh fence.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify clearing and grubbing and site improvement removal may safely and appropriately begin.
- B. Obtain required permits and permission from local governing authorities and Owner prior to commencing work.
- C. Prior to beginning site removals and clearing, meet with Owner's Representative and review all pro-posed utility layouts on site. Indicate all existing trees, shrubs, and landscaping as well as site improvements that will be affected by construction. Coordinate removals of landscape materials with Owner.
- D. Provide appropriate fencing and/or barricades for safety and protection in the vicinity of the work area.

3.02 EROSION CONTROL

- A. The implementation of the Erosion Control system and the maintenance, replacement and upgrading of these facilities is the responsibility of the Contractor until all construction is approved. The Temporary Erosion and Sediment Control (TESC) facilities must be maintained in conjunction with all clearing and grading activities, and in such a manner as to ensure that sediment laden water does not enter the drainage system or violate applicable water standards.
- B. The TESC facilities shown on the plans are the minimum requirements for anticipated site conditions. During the construction period, the erosion control facilities installed may require maintenance or upgrading (e.g. additional sumps, relocation of ditches and silt fences, etc.) as shown on the plans or as needed. All work associated with the

construction, maintenance, upgrading and removal of the erosion control system throughout project duration shall be at no additional cost to the Owner.

- C. The Contractor is responsible to provide temporary and permanent control of surface water and subsurface seepage to allow for site access, grading, construction of underground utilities, and paving. The contractor is solely responsible for protecting disturbed areas from inclement weather and surface runoff during construction process to provide a suitable working platform for all phases of the construction. Ground water from up gradient sources shall be intercepted and routed around work area per geotechnical recommendations. The Contractor shall be familiar with and shall follow the geotechnical recommendations concerning subgrade protection.
- D. All pumped construction de-watering shall be drained through a pump discharge mat or other approved or specified method to remove sediment.
- E. Access Streets and Roadways: Provide wheel cleaning stations to clean wheels and undercarriage of trucks before leaving site, as necessary to prevent dirt from being carried onto public streets and other areas of the site not currently under construction. If streets are fouled, clean immediately in conformance with the Clallam County and all governing requirements and regulations.

3.03 CLEARING

- A. Remove growth and underbrush within the clearing limits as required for new construction and as indicated. Perform removal operations in a manner to protect existing property to remain, refer to Land-scape Plans.
- B. Remove all stumps and associated roots.
- C. Save and protect trees indicated on plans to remain, refer to Landscape Plans for notes and details.
- D. Protect all off-site trees along adjacent roadways and on surrounding properties, refer to Landscape Plans for notes and details.
- E. Provide and maintain tree protection per Landscape Plans.

3.04 STRIPPING OF ON-SITE MATERIALS

- A. General: Grub or otherwise prepare areas where clearing has occurred to receive construction or other improvements.

- B. Excavate and remove all stumps to a minimum depth of 2'-0" below finished grade. Replace void with Structural Fill.
- C. Excavate and remove roots larger than ½ inch in diameter, rocks, and boulders greater than 4 inches, and any remaining paving, and the like, as well as other unsuitable materials. Replace void with Structural Fill.
- D. Strip and remove and stockpile, if necessary, cut material to be exported offsite:
 - 1. Contractor shall exercise extreme caution not to mix on-site stockpiled materials during construction
- E. Areas to be occupied by proposed building: Contractor shall assume for bidding that the existing soils shall be excavated, removed and replaced in accordance with Section 310000 Earthwork. The Owner will provide on-site testing and Geotechnical recommendations to determine the actual depth of stripping required.
- F. Stripping depths:
 - 1. Strip not less than 1'-0" min. below existing grade at paved areas.
 - 2. Strip not less than 0'-6" min. below final grade at landscape areas.
- G. Use only hand methods for grubbing inside the greater of a 10-foot radius or the drip line of trees indicated to remain

3.05 REMOVAL OF UNDERGROUND UTILITIES

- A. Remove underground utilities as shown on the project plans and as necessary to construct improvements. Remove and dispose of material from the site according to regulatory requirements. Contact Engineer immediately if conflicting information appears on plans of existing utilities to be re-moved/abandoned prior to proceeding.
- B. Plug and abandon in accordance with WSDOT/APWA Section 7-08.3(4) all pipe to be taken out of service but to remain in place. Note locations of all utilities to be abandoned in place on Project Record Documents.
- C. See irrigation demolition plan for portions of the existing irrigation system that are to be removed and disposed of.

3.06 TREE PROTECTION

- A. Refer to Landscape Plans in the contract documents for details and notes on tree and vegetation protection.

3.07 DUST CONTROL

- A. Sprinkle excavated material and access roads as necessary to limit dust to lowest practicable level. Do not use water to extent causing flooding, contaminated runoff, and exposed pipe.

3.08 SEEDING

- A. Seeding between July 1 and September 1 may require additional irrigation to grow adequate cover. Contractor is responsible for ensuring adequate growth for cover and to prevent erosion no matter when areas are seeded. Mulch is required for slopes greater than 3:1 and shall be provided for all areas seeded between October 15 and April 1. Any seeded areas that fail to establish at least 80 percent cover within one month shall be re-seeded at no additional cost to the Owner. If reseeded is ineffective, an alternate method, such as sodding, or nets/blankets shall be used at no additional cost to the Owner. Any area that experiences erosion shall be re-seeded and protected by mulch. Seeded areas shall be supplied with adequate moisture, but not to the extent to cause runoff, to establish planting.
- B. Fertilization for Temporary Erosion and Sediment Control and final grading plan shall be landscape architects' recommendations. The seed bed should be firm but not compacted such that the seeds will not vegetate quickly. Slopes steeper than 3H:1V shall be roughened surface.
- C. Temporary Erosion and Sediment Control seeding shall be provided for all disturbed areas to limits of disturbance and not developed with landscape covering.
- D. In planting areas and lawns as indicated on the plans. Screened, sandy loam, weed-free, min. 6% organic material, free of sticks and rocks over 2-inches in diameter, weeds, sod clumps, and other deleterious materials as approved. Contractor shall have import topsoil tested for pH, trace minerals, N, P and K at a minimum.

3.09 DRAINAGE

- A. Always keep designated drainage ways open for drainage. Maintain and/or adjust erosion control facilities as required to prevent sediment from entering the on-site system or off-site. At no time shall more than one foot of sediment be allowed to accumulate within catch basins, ditches or swales.
- B. All catch basins and conveyance lines shall be mechanically cleaned prior to project completion. Mud/sediment build-up shall be mechanically removed, and the cleaning operation shall not flush sediment-laden water into the downstream system.

- C. Keep open pits and holes caused because of demolition work free of standing water.

3.10 DISPOSAL OF MATERIALS

- A. Refuse from clearing, grubbing and stripping shall be disposed of by the Contractor in a manner consistent with government regulations. In no case shall refuse material be left on the project site, shoved onto abutting private properties, or buried in embankments or trenches on the project site. Debris shall not be deposited in a stream or body of water, any public right of way or upon private property except by written consent of the private property owner. On-site burning is not allowed. Maintain hauling routes clean and free of debris resulting from work of this Section.

END OF SECTION

SECTION 312500

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This section includes but is not limited to the implementation and maintenance of a comprehensive erosion control plan that complies with the Clallam County regulations. The contractor is re-sponsible for implementing Best Management Practices (BMP's) in accordance with the Clallam County requirements. The information provided on the contract plans should be considered a mini-mum for the anticipated construction and conditions. The contractor shall be responsible for adding additional BMP's as conditions change at no additional cost to the Owner. The Contractor shall coordinate installation and inspections of the BMP's with the Clallam County Inspector. Additional BMP's shall be stockpiled on site as requested by the Inspector.
- B. This Section includes the following:
 - 1. Silt Control Measures.
 - 2. Temporary Stormwater Runoff Control.
 - 3. Measures to keep streets clean.
 - 4. P.E. sheeting cover for exposed soil.
 - 5. Maintaining, monitoring, and supplementing silt control, storm water runoff control measures and additional BMP's as required by the Clallam County and other local jurisdictions.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 310000 "Earthwork."
 - 2. Section 334000 "Storm Drainage Utilities."

1.03 REFERENCES

- | | |
|--|--|
| A. Clallam County | Engineering Design Standards |
| B. Ecology
Washington | 2005 Stormwater Management Manual of Western |
| C. Ecology | NPDES |
| D. WSDOT-APWA
Municipal Construction. | 2022 Standard Specifications for Road, Bridge, and |
| E. Standard Details | Clallam County Engineering Design Standards |
| F. Geotechnical Report | Site Geotechnical Report |

1.04 SUBMITTALS

- A. Product Submittals: Product catalog cuts for silt fence, and silt sack inserts. Aggregate Materials: Coarse aggregate for gravel construction entrance.

1.05 REGULATORY REQUIREMENTS

- A. Work to comply with Clallam County standards. The Contractor shall coordinate with the Clallam County Inspector.
- B. The Contractor shall apply for and maintain the Ecology Construction General Stormwater Permit (NPDES Permit) and operate in accordance with the requirements of the permit.

1.06 SEQUENCING AND SCHEDULING

- A. Install erosion control measures in work areas prior to any clearing, grubbing, demolition, general site grading, or other construction in the area. Erosion control items shall be installed and removed at various times throughout the duration of the project.

1.07 MAINTENANCE

- A. Maintain erosion control through the duration of the project.
- B. Maintain erosion control after substantial completion per this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Filter Fabric Fence: In accordance with WSDOT Standard Specifications Section 9-33, Permanent Erosion Control, High Serviceability, Class B.

- B. Straw Mulching: In accordance with WSDOT Standard Specifications Section 9-14.4(1).
- C. Filter Fabric: Mirafi 140N or equal.
- D. Filter Bag Inserts: Commercially manufactured filter bags specifically manufactured for silt filtering, and which will provide filtering performance required. Contractor to verify current standards with the Clallam County Inspector.
- E. Polyethylene (PE) Sheeting: In accordance with WSDOT Standard Specifications Section 9 14.5(3).
- F. Quarry spalls: Per Section 9-13.6, WSDOT Standard Specifications.
- G. Storm Drain Pipe: Per Section 334000.

PART 3 EXECUTION

3.01 TESC FACILITIES

- A. The implementation of the Erosion Control system and the maintenance, replacement and upgrading of these facilities is the responsibility of the Contractor until all construction is approved. The Temporary Erosion and Sediment Control (TESC) facilities must be maintained in conjunction with all clearing and grading activities, and in such a manner as to insure that sediment laden water does not enter the drainage system or violate applicable water standards in accordance with the Clallam County requirements and the contract documents.
- B. The TESC facilities shown on the plans are the minimum requirements for anticipated site conditions. During the construction period, the erosion control facilities installed may require maintenance, relocation or upgrading (e.g. additional sumps, relocation of ditches and silt fences, etc.) as shown on the plans or as needed. All costs associated with the construction, maintenance, upgrading and removal of the erosion control system throughout project duration shall be at no additional cost to the Owner.
- C. Adequate temporary and permanent control of surface water runoff and subsurface seepage will be re-quired to allow site access, grading, and construction of underground utilities to proceed. Site preparation and initial construction activities should be planned to minimize disturbance to the existing ground surface particularly during extended wet weather periods when the presence of excess moisture will render the site soils more prone to disturbance. During wet site conditions, equipment traffic should not be allowed on exposed subgrade areas. Erosion of the soil will occur as exposed surfaces are disturbed due to construction activity and exposure to climatic conditions. The Contractor

shall be re-sponsible for protecting disturbed or prepared surfaces by some form of weather cover if left exposed for more than 2 days. Contractor shall also protect disturbed or prepared surfaces from surface ponding, storm water runoff, and construction traffic. The Contractor will be solely responsible for any repairs required to these surfaces at no additional cost to the owner.

- D. Access Streets and Roadways: Provide wheel cleaning stations to clean wheels and undercarriage of trucks before leaving site, as necessary to prevent dirt from being carried onto public streets. If streets are fouled, clean immediately in conformance with Clallam County and all governing requirements and regulations.

3.02 TURBIDITY MONITORING

- A. The contractor shall be responsible for meeting turbidity requirements as required by the Clallam County. Additional TESC measures may be required to achieve discharge requirements. The contractor shall be responsible for providing additional measures as work progresses to meet turbidity requirements. All required provisions of the Department of Ecology Construction General Stormwater Permit shall be performed.

3.03 EXAMINATION

- A. Verify locations of existing catch basins and related storm drainage features that may be impacted by construction activities.

3.04 PREPARATION

- A. Locate existing utilities, avoid damage or disturbance. For aid in utility location call "Dial Dig 1 800 424 5555," 48 hours (two working days) prior to beginning construction. Provide and pay for additional marking as required.
- B. Survey limits of work to install silt fence.
- C. Perform clearing or other work required to installing erosion control.

3.05 CONSTRUCTION

- A. Filter Fabric Fence:
 - 1. Field adjusts location to perimeter of clearing and stripping. Location shown on drawings is schematic. Cast all trench excavation soils from fence installation to the Construction side of fence. Overlap filter fabric fence joints minimum 1 foot prior to backfilling trench.
- B. Polyethylene Sheeting:

1. Overlap joints minimum 28 inches. Overlap in direction of drainage and prevent water from draining onto material being protected. Secure in place to prevent movement and damage. Provide sandbags at 2.5 feet spacing and tie the sandbags together with rope on slopes greater than 3:1. Minimize driving stakes through plastic.
- C. Diversion Swales and Berms:
1. Construct in a manner to intercept, divert, and channel runoff to sediment ponds. Plan locations are schematic. Field adjust, move, and reconstruct as necessary during construction to maintain drainage to sediment ponds and allow construction to proceed. Provide Straw bale check dams at minimum 100 feet spacing.
- D. Straw Bale Check Dams:
1. Construct such that drainage flows through bales. Bevel bale edges or fill gaps to ensure drainage passes through straw filter. Larger flows may flow over top on occasion. Key bales into ground to prevent drainage under bales. Raise elevations of ends of check dams to prevent drainage around ends. Provide splash pad on downstream side to prevent scouring from high flows or overtopping.

3.06 ADJUSTMENTS AND REVISIONS

- A. Adjust or move swales, berms, pipes, culverts, bales, and silt fences as necessary during construction to direct site runoff to temporary ponds, silt filters, and grass swales.

3.07 PROTECTION AND MAINTENANCE

- A. Protection:
1. Where possible, maintain natural vegetation for silt control.
 2. Prevent silt-laden water from leaving site or from entering off-site storm sewer systems.
 3. All slopes, cut, or fill areas where Work has stopped for more than 30 days shall be stabilized by mulching, polyethylene sheeting or other method to prevent erosion and sediment transport.
 4. Paved surfaces shall be kept clean by the use of mechanical sweeping equipment, hand shovels and brooms or other accepted methods suitable of removing dirt, rock, silt and sand. No street washing will be allowed.
- B. Supplementary measures

1. Provide additional silt control and temporary erosion control measures as required to protect soils and prevent silt laden runoff from leaving project site at no additional cost to the Owner.

C. Maintenance

1. Monitor and maintain silt control measures. Remove accumulations of sediment when more than 50 per-cent of silt storage capacity is filled. Maintain all temporary erosion control facilities until need for each facility has been superseded by other stabilization methods or until Architect authorizes removal.
2. Inspect and repair temporary erosion control facilities. Inspect the entire system to ensure proper operation a minimum of once per week, during and after storms, and prior to weekends and holidays.

END OF SECTION

SECTION 321200

FLEXIBLE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work includes but is not limited to the following:
 - 1. Crushed surfacing for asphalt concrete paving.
 - 2. Crushed surfacing for gravel roadway
 - 3. Asphalt concrete paving.
 - 4. Asphalt patching for Utilities.
 - 5. Products furnished but not installed.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including and Supplementary Conditions and Division 01 Specification Sections, apply to this section. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
 - 1. Section 310000 "Earthwork".
 - 2. Section 321600 "Rigid Paving".

1.03 REFERENCES

- A. Ecology 2005 Stormwater Management Manual for Western Washington
- B. Clallam County Engineering Design Standards
- C. WSDOT-APWA 2022 Standard Specifications for Road, Bridge, and Municipal Construction.
- D. Standard Details Clallam County Standard Details
- E. ASTM D1557 Methods of Test for Moisture-Density Relations of Soils, Using 10 lb. (4.5 kg) Rammer and 18 In. (457 mm) Drop.

- F. APAW Designs and Specifications for Asphalt Concrete Pavements and Bases, 1990 Edition
- G. Geotechnical Report Site Geotechnical Report
- H. This work shall consist of one or more courses of plant mixed asphalt concrete placed on a prepared foundation or base in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross-sections shown in the plans or established by the Owner's Representative.
- I. Asphalt concrete shall be composed of asphalt and aggregate which, with or without the addition of mineral filler and blending sand as may be required, shall be mixed in the proportions specified to provide a homogenous, stable and workable mixture.

1.04 PROJECT SITE CONDITIONS

- A. Environmental Requirements:
 - 1. In accordance with referenced standard specifications and the following:
 - a. Do not pave in rain or when subgrade or base is wet or frozen.
 - b. Do not apply tack coats when the temperature is below 50 degrees F. or when base is wet.
 - c. Apply asphalt concrete paving only when the temperature is above 40 degrees and when base is dry.

1.05 DIMENSIONS AND LAYOUTS

- A. See Section 311000.
- B. The Contractor is to notify the Owner's Representative immediately if underground utilities not shown on the Agency's record are encountered.

1.06 QUALITY ASSURANCE

- A. Contractor shall correct any work that exhibits aggregate separation, soft spots, and excess porosity at no additional cost to the Owner.
- B. Repair cracks and unsatisfactory elevation irregularities immediately upon notification.
- C. Replace any paving not draining properly.

1.07 WORK WITHIN THE RIGHT-OF-WAY

- A. All work within the public Right-of-Way shall meet Clallam County Road Standards.
- B. Contractor is responsible for obtaining all permits for work within the Right of Way and coordinating with the Clallam County inspectors.

1.08 SUBMITTALS

- A. Submit under provisions of Division 013300.
- B. Submit product data for all materials specified.

PART 2 PRODUCTS

2.01 GENERAL

- A. Comply with "Quality Control" provisions, "References," Specifications, and Manufacturer's data. Where these may be in conflict, the more stringent requirements govern.
 - 1. Conform to APWA - Section II, "Specifications for Asphalt Paving" of above referenced manual. Provide bases, type and thickness of asphalt concrete as required by type of soils for indicated use.

2.02 CRUSHED SURFACING BASE COURSE

- A. Base course shall be 1-1/4" maximum crushed surfacing, per WSDOT/APWA 9.03.9(3). The gradation of the base course shall be.

	U.S. Standard Sieve Size	Percent Passing by Dry Weight
1.	1-1/4 inches	100
2.	1 inch	80-100
3.	5/8 inch	50-80
4.	No. 4	25-45
5.	No. 40	3-18
6.	No. 200	7.5 max.
7.	% Fracture	75 min.
8.	Sand Equivalent	32 Min.

- B. The fracture requirement (75% minimum) shall be at least one mechanically fractured face and will apply to material retained on each sieve size No. 10 and above if that sieve retains more than 5 percent of the total sample. The portion of crushed surfacing retained on a 1/4-inch square sieve shall not contain more than 0.15 percent wood waste.

2.03 CRUSHED SURFACING TOP COURSE

- A. Top course shall be 3/4" maximum crushed surfacing, per WSDOT/APWA 9.03.9(3). Gradation of the top course shall be:

U.S. Standard Sieve Size	Percent Passing by Dry Weight
1. 3/4 inch	100
2. 1/2 inch	90-100
3. No. 4	46-66
4. No. 40	8 - 24
5. No. 200	10.0 Max.
6. % Fracture	75 min.
7. Sand Equivalent	32 Min.

- B. The fracture requirement (75% minimum) shall be at least one mechanically fractured face and will apply to material retained on each sieve size No. 10 and above if that sieve retains more than 5 percent of the total sample. The portion of crushed surfacing retained on a 1/4-inch square sieve shall not contain more than 0.15 percent wood waste.

2.04 TACK COAT

- A. Tack coat shall be a diluted emulsion, type SS-1, SS-1h, CSS-1 or CSS-1h, with equal parts of water.

2.05 ASPHALT BINDER

- A. Asphalt binder shall be AR-4000W meeting the requirements of Section 9-02.1(4) of WSDOT-APWA.

2.06 ASPHALT CONCRETE

- A. All onsite paving shall be Class 1/2" Hot Mix Asphalt Aggregate per WSDOT.

- B. Asphalt concrete mixing and proportioning shall comply with Section 9-03.8 of the WSDOT-APWA.

2.07 SOIL STERILANT

- A. Herbicide shall be an EPA approved dry, free flowing, dust free chemical compound which is non-flammable, non-poisonous and non-corrosive. The chemical shall be a chlorate borate compound, such as polyborchlorate and 68 percent sodium metaborate or 73 percent disodium octaborate, suitable for application in powder form or in a solution.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes your acceptance of conditions as satisfactory.
 - 1. Construction shall conform to the details, dimensions and grades specified. Maximum variations in finished grade of paving shall be +/- 0.05 feet.
 - 2. Grade and compact all areas to be paved in accordance with Section 31 10 00.

3.02 PREPARATION

- A. Protect surrounding areas and surfaces to preclude damage from work of this Section.
 - 1. Protect work of other trades. Take exceptional care in work adjacent to buildings.
 - 2. Should any defacement or damage occur, repair or replace as directed
- B. Preparation of Asphalt Patches
 - 1. Where existing asphalt concrete pavement upon a granular base is required to be removed due to deterioration, settlement, concrete curb construction or trenching, uniformly define the area in size and shape. Remove the existing asphalt by cutting pavement vertically at a sufficient distance of at least 6" over the undisturbed base surface and then break up and remove the affected pavement.
 - 2. Replace the granular base under the removed pavement as shown on the plans.
- C. Preparation of Parking Lot for Paving: Prepare parking lot subgrade in accordance with Section 31 10 00. Place crushed surfacing in accordance with WSDOT-APWA Section 4-04, to the thicknesses shown on the drawings.

- D. Traffic Control: Traffic Control shall be provided as required in accordance with the Clallam County requirements, the Manual on Uniform Traffic Control Devices, and WSDOT requirements

3.03 SOIL STERILANT

- A. Sterilize all areas to be paved with a relative application of material at a minimum of twenty (20) pounds of polyborchlorate per 1,000 sq. ft. of surface, mixed with water and applied with power spraying after grading is completed, or as recommended by the manufacturer. Apply soil sterilant in accordance with Section 8-02.3(2) of WSDOT-APWA

3.04 CRUSHED SURFACING BASE AND TOP COURSE

- A. Place aggregate base and top course in accordance with Section 4-04 of the WSDOT-APWA. Relative dry compaction shall be a minimum of 95 percent of modified proctor maximum dry density as determined in accordance with ASTM D1557
- B. Prior to asphalt concrete placement, treat the prepared surface in accordance with Section 5-04.3 of WSDOT-APWA

3.05 TACK COAT

- A. Apply a tack coat to all existing pavement surfaces to be overlaid or abutted with new asphaltic pavement. Apply tack coat at a rate of 0.05 to 0.15 gal/sy. Allow enough time for complete breaking to occur before the overlay is placed. Place no more tack coat than can be covered the same day. Place no tack coat when the surface temperature of the pavement is below 50 degrees F or when rain is imminent.

3.06 ASPHALT CONCRETE

- A. Place asphalt in accordance with Section 5-04 of WSDOT-APWA. Spread, finish and compact in accordance with Sections 5-04.3(9) and 5-04.3(10).
- B. Construct joints in accordance with Section 5-04.3(11).
- C. Provide surface smoothness and grading in accordance with Section 5-04.3(13). Accomplish paving in accordance with the weather limitations outlined in Section 5-04.3(16).
- D. Sample and test asphalt concrete in accordance with Sections 5-04.3(10)B and 5-04.3(12).
- E. Contractor shall completely flood by fire line or tank truck paved area in the presence of the owner's representative to verify that no ponding is occurring. Any areas of bird baths

or ponding must be re-paired or replaced in accordance with the Asphalt Institute's "Asphalt in paving Maintenance" Manual Series No. 16.

3.07 CLEANING

- A. After completion of paving operations, clean surfaces of excess or spilled asphaltic materials.
- B. Contractor shall phase the final lift of pavement in a manner to limit Construction traffic within this area after completion.
- C. Do not permit vehicular traffic on asphaltic paving until it has cooled and hardened, and in no case sooner than twelve (12) hours after placing.

3.08 RECYCLING OF ASPHALT MATERIALS

- A. Recycling some waste asphalt paving materials may be possible at some off-site locations.
- B. No waste materials can be recycled on-site. All waste paving materials must be disposed of off-site.

END OF SECTION

SECTION 321300

RIGID PAVING

PART 1 GENERAL

1.01 THIS SECTION INCLUDES THE FOLLOWING:

- A. Provide cement concrete sidewalks, concrete paving, and curb ramps as shown on the Contract Documents.
- B. Coordinate and provide miscellaneous concrete for footings for site furnishings, equipment, and signs.
- C. Aggregate and soil materials.
- D. Protection and conditioning of onsite materials.
- E. Exporting and disposing of unsuitable and excess soil material.
- F. Recycling and processing concrete rubble for aggregate (Contractor Option).
- G. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 310000 "Earthwork."
 - 2. Section 321200 "Flexible Paving."

1.02 REFERENCES

- 1. WSDOT Standard Specifications Washington State Department of Transportation 2022 Standard Specifications for Road, Bridge, and Municipal Construction.
- 2. Current Clallam County Engineering Design Standards
- 3. Current Clallam County Standard Details
- 4. Site Geotechnical Report

1.03 SUBMITTALS

- A. General: Comply with Section 013300. Samples: Submit minimum 50-pound sample for each material-al 4 business days prior to placing material.
- B. Quality Assurance/Control Submittals.

- C. Test Reports: Sieve analysis for each material.
- D. Certificates: WSDOT pit certification for each pit.
- E. Samples: Joint filler material.

PART 2 PRODUCTS

2.01 CEMENT CONCRETE PAVING, SIDEWALKS, ADA RAMPS, CEMENT CONCRETE EXTRUDED AND VERTICAL CURB

- A. Construct cement concrete sidewalks and integral curb and sidewalks and ADA ramps with air entrained concrete Class 3000 conforming to the requirements of WSDOT-APWA Sec. 6-02. Portland cement, aggregates, joint filler and curing materials shall conform to Section 8-14.2 of WSDOT-APWA. Calcium Chloride is not allowed as an admixture.
- B. Pavement, sidewalks, and ADA ramps located in the Right-of-Way shall be constructed in accordance with the Clallam County construction standards.
- C. At locations where slab on grade abuts pile supported paving the two paving sections shall be dowelled together per structural details and recommendations.
- D. Construct cement concrete extruded vertical curb with air entrained concrete Class 3000 conforming to the requirements of WSDOT-APWA Section 8-04.3. Portland cement and aggregates shall conform to Section 8-04.2 of WSDOT-APWA. Calcium Chloride is not allowed as an admixture.

2.02 PREFORMED JOINT FILLERS.

- A. Non-extruding type; ASTM D1751; Sonneborn "Expansion Joint Filler," WR Meadows "Sealtight Fiber," "Burke" by Edoco Fiber expansion joint or approved.
- B. Joint Cap: Strippable plastic type; W.R. Meadows "SealTight Snap-Cap," Burke by Edoco "Joint Cap," or approved: width to match expansion joint filler material.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes your acceptance of conditions.
 - 1. Verify proper compaction of subgrade, Section 310000, for on-grade work.

3.02 PREPARATION

- A. Field Measurements.
 - 1. Carefully verify and coordinate with all Clallam County and WSDOT/APWA requirements Identify existing structural foundations near excavations. Verify excavation will not undermine footings or supports and cause damage to structures.
 - 2. Verify existing dimensions and shapes. Conform to existing where applicable.

3.03 INSTALLATION

- A. Install cement concrete vertical curbs and curb and gutter in accordance with Contract Documents and WSDOT/APWA Section 8-04.3(1). Provide expansion joints at maximum 15-foot maximum spacing. Coordinate expansion joints with the Architects scoring pattern. Perform the work in a manner that results in a curb constructed to specified line and grade, uniform in appearance and structurally sound. Re-move curbs found with unsightly bulges, ridges or other defects and replaced at no additional cost to the Owner if Owner's representative considers them irreparable. When checked with a 10-foot straight-edge, grade shall not deviate more than 1/8 inch, and alignment shall not vary more than 1/4 inch. Curb repairs shall match existing grades.
- B. Cement concrete sidewalks and walkways shall be installed in accordance with the plan drawings and WSDOT-APWA Section 8-14. Expansion joints shall be provided at a maximum 15-foot spacing and shall be coordinated with the Architectural scoring pattern. Sidewalks paving shall be divided to match existing scoring pattern, by scoring 1/4 inch deep. Sidewalks and walkways shall be installed flush with adjacent walks. Sidewalks shall be sloped away from adjacent buildings or crowned in the middle if landscaping on either side.
- C. Concrete sidewalks and paving shall be finished as specified in Section 321320 – Site Concrete Finishes.
- D. Form expansion joints with preformed joint filler. Install strippable joint at joints to receive sealant specified in Section 079200.

3.04 DEFECTIVE WORK

- A. Remove and replace defective work not conforming to the plans and specifications to specified tolerance at no additional cost to the Owner.
- B. Remove and replace, as directed, any sidewalks or walkways that show excessive cracking, and which do not freely drain, at no additional cost to the Owner.

3.05 CLEANING

- A. Leave premises clean and free of residue of work of this Section.

END OF SECTION

SECTION 321723

PAVEMENT MARKINGS AND SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work includes but is not limited to following:
 - 1. Furnish and install pavement markings upon asphalt surfaces.
 - 2. Furnish and install site, traffic and reserved parking signs as indicated.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including and Supplementary Conditions and Division 1 Specification Sections, apply to this section. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
 - 1. Section 32 12 00 - Flexible Paving.
 - 2. Section 32 16 00 - Concrete Curbs and Gutters.

1.03 REFERENCES

- A. Clallam County Engineering Design Standards (Current Edition).
- B. WSDOT/APWA 2022 Standard Specifications for Road, Bridge, and Municipal Construction.
- C. Standard Details Clallam County Standard Details
- D. Manual On Uniform Traffic Control Devices (MUTCD) Current Edition.
- E. Federal Specification TT-P-115, Traffic Paint.

1.04 SAMPLING AND TESTING

- A. Store materials proposed for use on the project site in sealed and labeled containers or segregated at source of supply, sufficiently in advance of needs. Clearly identify materials by designated name, specification number, batch number, intended use and quantity formulation number, project contract number, intended use, and quantity involved. At the discretion of the Owner's Representative, material may be approved for use based on the following data furnished by the Contractor.

1. A test report showing that the proposed batch meets all specified requirements.

1.05 TEMPORARY TRAFFIC CONTROLS

- A. Place suitable warning signs for alerting approaching traffic. Place traffic cones or markers along newly painted lines to control traffic and prevent damage to newly painted surfaces.
- B. The contractor is responsible for obtaining all permits and coordinating with the Clallam County for installation of signs and striping within public Right of Way.

PART 2 PRODUCTS

2.01 TRAFFIC PAINT

- A. Paint shall be lead free. Acceptable products, or approved equal:
 1. Morton International (503) 364-2277, Duraline 2000, Rapid-Dry, Lead-Free, water-based
 2. Farwest Paint (206) 244-8844, TTP85 Lead-Free yellow, alkyd and water-based, 1070 Lead-Free White, 1076 Lead-Free Red, 1073 Lead-Free Black
 3. C & C Paint, (206) 783-8835, Rodda's Lead-Free Traffic Paint, yellow, red, white, black, and blue available in alkyd and water-based
- B. Paint shall be delivered and stored in sealed containers that plainly show the designated name, formulation, or specification number, batch number, color, date of manufacture, manufacturer's name, formulation number and directions, all of which shall be printed legibly at time of use. The paint shall be homogeneous, easily stirred to a smooth consistency, and shall show no hard settlement or other objectionable characteristics.
- C. Paint for pavement marking shall conform to Federal Specification TT-P-115, color: white, yellow.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes your acceptance of conditions as satisfactory.
 1. Pavement markings shall conform to WSDOT/APWA Section 8-22.
 2. All permanent signs shall conform to WSDOT/APWA Section 8-21.

3.02 PREPARATION

- A. All surfaces to be marked shall be thoroughly cleaned before the application of the paint. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of the methods as required. Large areas of tar, grease, rubber deposits, or foreign material shall be completely removed with scrapers, wire brushes, sandblasting, steam cleaning, power brooming or approved chemicals or mechanical abrasion.

3.03 APPLICATION

- A. Paint Application:
 - 1. Two applications of paint will be required to complete all paint markings. Apply paint evenly to the pavement surface to be coated at the rate of 105, plus or minus 5, square feet per gallon. Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees. Maintain paint temperature within these same limits. Apply paint pneumatically with approved equipment.
 - 2. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking letters and symbols. Sharply outline edges of marking. The maximum drying time requirement of the paint specifications shall be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the marking, until cause of the slow drying is determined and corrected.
- B. Parking Area:
 - 1. Parking stall striping shall be 4 inches wide painted white unless otherwise noted on the plans.
 - 2. Painting for fire lane shall be 4-inches wide painted red unless otherwise noted on the plans.
 - 3. Letters for fire lane striping shall painted red and be 18-inches in height.
 - 4. Stop Bar and Handicapped Parking Stall Symbol shall be in accordance with Section 8-22.1 of WSDOT/APWA.
 - 5. Accessible/ADA Parking Stall Symbol shall be in accordance with project plans and Section 8-22.1 of WSDOT/APWA.

3.04 SIGN INSTALLATION

- A. Install signs at locations as shown on plans and in accordance with Section 8-21.3(2) of WSDOT/APWA and MUTCD.

3.05 CLEANING

- A. Leave premises clean and free of residue of work of this Section.

END OF SECTION

SECTION 323113
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Line Posts: 1.9 inch diameter.
- B. Corner and Terminal Posts: 2.38 inch diameter.
- C. Gate Posts: 3-1/2 inch diameter.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- E. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.
- F. Gate Frame: 1.66 inch diameter for welded fabrication.
- G. Fabric with Pre-Inserted Slats: 2 inch diamond mesh interwoven wire, 9 gauge, 0.1483 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.
 - 1. Privacy Slats: High-density polyethylene (HDPE), woven into fabric.
 - a. Visual Barrier: 95 percent.
 - b. Slat Color: As selected from manufacturer's full range of colors.
- H. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.
- I. Tie Wire: Aluminum alloy steel wire.

2.02 MATERIALS

- A. Posts, Rails, and Frames:
 - 1. ASTM A1011/A1011M, Designation SS; hot-rolled steel strip, cold formed to pipe configuration, longitudinally welded construction, minimum yield strength of 50 ksi; zinc coating complying with ASTM F1043 and ASTM F1083.
 - 2. Line Posts: Type I round in accordance with FS RR-F-191/1D.

3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.
- B. Wire Fabric:
1. ASTM A392 zinc coated steel chain link fabric.

2.03 MANUAL GATES AND RELATED HARDWARE

- A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; Self-closing spring hinges; adjustable tension and pitch.

2.04 AUTOMATIC GATE OPERATORS

- A. Sliding Gates: Pre-wired, pedestal mounted gate operator for horizontal sliding gates, per ASTM F2200 and UL 325.
1. Class: Class I.
 2. Operating type: drive belt.
 3. Control Functions: Open, Pause, Close.
 4. Maximum Open/Close Time: 10 seconds.
 5. Access: Access control system and Knox key switch on remote pedestal.
 6. Maximum gate weight: 500 pounds (187 kilograms).
 7. Horsepower Rating: Suitable for connected load, 110 VAC.
 8. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
 9. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - a. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - 1) Outdoor Locations: Type 3R.

2.05 ACCESSORIES

- A. Access Control Housing
1. Steel box, 14 gauge, with black powdercoat finish and 18 gauge stainless steel faceplate for mounting two single gang devices, with tubular key lock, for welding to fencepost, to house Knox key switch and access control card reader as scheduled.

2. Manufacturer: Keedex.com. Model: # iCan.
 3. Provide one adjacent to jamb fencepost of each pedestrian gate, welded to fencepost on non-secure side, and one for each remote pedestal. Where only one device is scheduled, provide 18 gauge stainless steel blank cover plate over unused opening.
- B. Panic Device Gate Box
1. Weldable steel gate box to for panic device mounting, 12 gauge steel.
 2. Manufacturer: Keedex.com. Model: As required for scheduled panic device.
 3. Provide one each pedestrian gate, welded to gate.
- C. Electric Strike Device Gate Box
1. Weldable steel gate box to for electric strike mounting, 12 gauge steel
 2. Manufacturer: Keedex.com. Model: As required for scheduled device.
 3. Provide one each pedestrian gate, welded to fencepost on latch side of gate.

2.06 PROVIDE ONE EACH PEDESTRIAN GATE, WELDED TO GATE.

- A. Welded wire security mesh, finished to match fence, 1/2 inch x 1/2 inch, 16 gauge minimum.
1. Provide on full width pedestrian gates x 3 feet tall, centered on panic device, and in 18 inch radius half-moon area of fence directly adjacent to latch side of pedestrian gates, aligned to prevent outside access to panic device.
- B. Remote Pedestal
1. Gooseneck pedestal, 42 inches tall, with 5 x 5 x 1/4" inch baseplate and 4 x 4 inch 12 gauge universal face plate. 2 x 2 inch 12 gauge steel tube, powdercoated.
 2. Provide one for each sliding vehicle gate.

2.07 FINISHES

- A. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing.
- B. Accessories: Same finish as framing.
- C. Color(s): To be selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

- B. Place fabric on outside of posts and rails.
- C. Set intermediate posts plumb , in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- D. Brace each gate and corner post to adjacent line post with horizontal center brace rail. Install brace rail one bay from end and gate posts.
- E. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- F. Install hardware and gate with fabric to match fence.
- G. Repair finish at all field welded locations with cold applied galvanizing, primer, and vinyl coating to match factory finish.

END OF SECTION

SECTION 323119
DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets on each product to be used.
- B. Shop Drawings:
 - 1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
 - 2. Foundation details.

PART 2 PRODUCTS

2.01 FENCES

- A. Fences: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating, and having the following performance characteristics:
 - 1. Capable of resisting vertical load, horizontal load and infill performance requirements for fence categories defined in ASTM F2408.
- B. Electro-Deposition Coating: Multistage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.
- C. Steel: ASTM A653/A653M; tensile strength 45,000 psi, minimum.
 - 1. Hot-dip galvanized; ASTM A653/A653M, G60.

2.02 MECHANICALLY FASTENED STEEL FENCE

- A. Provide fence meeting requirements for Residential class as defined by ASTM F2408.
- B. Fence Panels: Mechanically fastened with internal reinforcement and tamperproof fasteners; 6 feet high by minimum 6 feet long panels.
 - 1. Panel Style: Two rail.
- C. Posts: Steel tube.
 - 1. Size: 2 inches square by 16 gauge with manufacturer's standard cap.
- D. Rails: Manufacturer's standard, double-wall steel channel; 1 inch square by 18 gauge with pre-punched picket holes.

- E. Pickets: Steel tube. 5/8 inch square, 18 gauge.
 - 1. Style: Square top pickets extend above top rail.
- F. Flexibility: Capable of following variable slope of up to 1:4.

2.03 SPECIALTY HARDWARE

- A. Hinges: Finished to match fence components.
 - 1. Closing: Self.
 - 2. Mechanism: Spring, adjustable tension and pitch.
 - 3. Material: Steel.
 - 4. Provide (3) at each pedestrian gate.
- B. Access Control Housing
 - 1. Steel box, 14 gauge, with black powdercoat finish and 18 gauge stainless steel faceplate for mounting two single gang devices, with tubular key lock, for welding to fencepost, to house Knox key switch and access control card reader as scheduled.
 - 2. Manufacturer: Keedex.com. Model: # iCan.
 - 3. Provide one adjacent to jamb fencepost of each pedestrian gate, welded to fencepost on non-secure side, and one for each remote pedestal. Where only one device is scheduled, provide 18 gauge stainless steel blank cover plate over unused opening.
- C. Panic Device Gate Box
 - 1. Weldable steel gate box to for panic device mounting, 12 gauge steel.
 - 2. Manufacturer: Keedex.com. Model: As required for scheduled panic device.
 - 3. Provide one each pedestrian gate, welded to gate.
- D. Electric Strike Device Gate Box
 - 1. Weldable steel gate box to for electric strike mounting, 12 gauge steel.
 - 2. Manufacturer: Keedex.com. Model: As required for scheduled device.
 - 3. Provide one each pedestrian gate, welded to fencepost on latch side of gate.
- E. Remote Pedestal
 - 1. Gooseneck pedestal, 42 inches tall, with 5 x 5 x 1/4" inch baseplate and 4 x 4 inch 14 gauge universal face plate. 2 x 2 inch 12 gauge steel tube, powdercoated.

2. Provide one for each sliding vehicle gate.

2.04 AUTOMATIC GATE OPERATORS

- A. Sliding Gates: Prewired, pedestal-mounted gate operator for horizontal sliding gates, per ASTM F2200 and UL 325.
 1. Class: Class I.
 2. Operating type: Drive belt.
 3. Control Functions: Open, Pause, Close.
 4. Maximum Open/Close Time: 10 seconds.
 5. Access: Access control system and Knox key switch on remote pedestal .
 6. Maximum gate weight: 500 pounds (187 kilograms).
 7. Horsepower Rating: Suitable for connected load, 110 VAC.
 8. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
 9. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
 - a. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
 - 1) Outdoor Locations: Type 3R.

2.05 ACCESSORIES

- A. Welded wire security mesh, finished to match fence, 1/2 inch x 1/2 inch, 16 gauge minimum.
 1. Provide on full width pedestrian gates x 3 feet tall, centered on panic device, and in 18 inch radius half-moon area of fence directly adjacent to latch side of pedestrian gates, aligned to prevent outside access to panic device.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Set fence posts in accordance with the manufacturer recommended spacing.

- C. Repair finish at all field welded locations with cold applied galvanizing, primer, and painted finish to match factory finish.

END OF SECTION

SECTION 323313
SITE BICYCLE RACKS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Installation methods.

PART 2 PRODUCTS

2.01 BICYCLE RACKS

- A. Exterior Bicycle Racks: Device allows user-provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.
 - 1. Style: Round loop.
 - 2. Capacity: As shown on drawings.
 - 3. Mounting, Ground: In-ground anchor.
 - 4. Finish: Hot-dipped galvanized, maintenance-free and weather-resistant.
 - 5. Accessories: In-ground grout cover.
- B. Materials:
 - 1. Pipe: Carbon steel, ASTM A53/A53M, Schedule 40.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install level, plumb, square, and correctly located as indicated on drawings.
- C. In-Ground Anchor Installation:
 - 1. Prepare holes in size according to manufacturer's instructions.
 - 2. Place anchoring bolts through the holes in pipe.
 - 3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch from the ground.
 - 4. Place concrete.

5. Level rack before concrete sets.
6. Support until dry.

END OF SECTION

**SECTION 323500
SCREENING DEVICES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Provide data on posts, panels, accessories, fittings, and hardware.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wood Screening Devices:
1. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 2. Dimensional Lumber: Cedar, premium grade, tight knot, S4S, size and profile as indicated on drawings.
 3. Timbers: Pressure treated hem-fir, #2 or better, S4S, rated for full in-ground contact.
- B. Concrete Footings:
1. Normal Weight Concrete:
 - a. Compressive Strength: 2,500 psi when tested in accordance with ASTM C39/C39M at 28 days.
 - b. Water-Cement Ratio: Maximum 40 percent by weight.
 - c. Maximum Slump: 3 inches.
 - d. Maximum Aggregate Size: 5/8 inch.
- C. Hardware
1. Galvanized or stainless steel hardware for exterior exposed use.
 2. Provide hinges, padlock hasp, cane bolts, and sleeves for cane bolts. Size and quantity of hinges to support full weight of gates in open and closed positions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wood Screening Devices:
1. Post Framing:
 - a. Embed posts two feet in concrete footings or as indicated on drawings.

2. Framing and infill: Frame square and plumb, smooth cut edges, frame to profiles as indicated on drawings. Secure with exposed screw fasteners coated for exterior exposure.
3. Install gate hardware and verify smooth operation in open and closed positions.
4. Provide cane bolt sleeves in paving to secure gates in open and closed positions.

END OF SECTION

SECTION 328000

IRRIGATION COMPONENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials equipment and related items necessary to complete the work identified in these Specifications. Provide a complete and operable, underground, automatic irrigation system with complete and uniform water coverage for all new landscape areas identified on the Landscape Plan. The items of work to be performed include, but are not limited to:
1. Provide trenching and backfilling for piping/wiring.
 2. Provide and install irrigation sleeving.
 3. Provide and install pipe, sprinkler heads, fittings, valves and valve boxes.
 4. Provide and install valve control wire and controller.
 5. Guarantee, maintenance, protection and system testing.
 6. All other related items required to complete the work in the best-accepted trade practices.

1.2 SYSTEM COVERAGE CRITERIA

- A. Coverage: The irrigation system shall provide 100% coverage of all and tree planting areas and shrub/groundcover planting areas as directed. Irrigation heads shall be located and adjusted to avoid over-spray on paved surfaces.
- B. Zoning: Number of zones shall be determined by designer and shall be based on available water pressure at the site. Contractor shall inform Landscape Architect of any and all problems with pressure and/or flow to site.

1.3 PROTECTION OF WORK, PROPERTY, UTILITIES AND PERSONS

- A. Provide protection of all property, persons, work in progress, structures, utilities, walls, walks, curbs and paved surfaces from damages incurred arising from this Contract. The Contractor shall pay for any repair of such damage at no additional cost to the Owner. Verify locations of all underground utilities prior to commencement of work. Existing known utilities have been shown on the Architectural/Engineering or Survey Drawings. The Contractor shall be responsible for the protection of said utilities. Promptly notify the General Contractor and Owner of any conflict between proposed work and obstruction(s).

- B. Notify local utility companies a minimum of 48 hours prior to beginning work.

1.4 SUBMITTALS

- A. At least 30 days prior to beginning work described in this section submit the following data for products submitted for review.

1. Manufacturer's descriptive data including operating materials used in products, test certificates, special features, guarantees and other data required to completely describe the product.
2. Samples of the proposed substitution when requested. Samples will be returned to Contractor whether or not approval is given.

- B. Product Data: Material and equipment composite data sheets shall be submitted for the following:

1. Galvanized pipe
2. PVC pipe
3. Gate valves
4. Double check assembly
5. Pressure gauges
6. Manual drain valve
7. Quick coupling valves (inc. key and hose swivel)
8. Master valve
9. Flow sensor
10. Control valves
11. Communication, control, and trace wire
12. Wire splices (all types)
13. Swing joints
14. Sprinkler heads/nozzles
15. Landscape Drip system
16. Valve boxes
17. Controller

18. ET Water HermitCrab Smart Controller

- C. Submit the number of copies required by the Contract Documents. Clearly index, label, and highlight products to be utilized.

1.5 VERIFICATION OF SITE CONDITIONS

- A. Before proceeding with any work, the Contractor shall verify all dimensions pertaining to the location of irrigation equipment. Contractor shall verify location and depth of service lines, existing irrigation mainline and available static water pressure. Should any error or conflicts in the Drawings and/or Specification be found, the Contractor shall immediately notify the Owner's Representatives.
- B. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Owner no fewer than (2) working days in advance of any proposed interruption of water service. Do not proceed with interruption of water service without Owner's written permission.
- C. Utilities and Existing Structures: The exact location of existing structures and overhead or underground utilities, shall be determined by the Contractor and he shall conduct his work so as to prevent interruption of service or damage to them. Protect existing structures and utility services and repair damages.
- D. Finish Grades: Verify the correctness of all finish grades within the work area to insure the proper soil-coverage depth over pipe lines.

1.6 CLEANUP

- A. All paved surfaces shall be kept clean of soil and debris on a daily basis.
- B. Contractor shall be responsible for cleaning all paved surfaces affected by irrigation work prior to final acceptance.

1.7 GUARANTEE AND REPLACEMENT

- A. All materials and workmanship shall be guaranteed for a period of one year. Guarantee period shall commence when written Final Acceptance is granted. This guarantee does not apply to work or damage done to the system by others after Final Acceptance. Guarantee shall also cover repair of damage to any part of the premises (including planting) resulting from leaks, settlement or other defects in materials, equipment and workmanship to the satisfaction of the Owner.

1.8 SYSTEM PROTECTION

- A. During the one-year guarantee period, the Contractor shall be responsible for deactivating and draining the system prior to freezing weather. A compressor shall be used to blow the

system dry. Contractor shall reactivate the system at the onset of the Spring growing season. Both operations shall be performed once during the guarantee period.

- B. Contractor shall notify the Owner in writing of the dates the system was winterized and reactivated, and shall be held responsible for any damages resulting from the failure to comply with the above procedure.
- C. When using compressed air to winterize the system, do so in two (2) short cycles at no more than 75-psi pressure. Do not allow pipe to compressor to get hot to the touch. The Contractor shall winterize the system prior to irrigation system substantial completion approval and acceptance if freezing weather occurs or is forecast. In such an event, the Contractor shall, as directed by the Landscape Architect, reactivate the system for final inspection and acceptance.
- D. Winterization and reactivation prior to final acceptance will not satisfy the warranty period requirement to deactivate (winterize) and reactivate the irrigation system.
- E. Fill and repair depressions and replace construction materials damaged from settlement or repair of irrigation trenches, throughout the warranty period.
- F. Adjust sprinkler heads as necessary to maintain complete, 100% overlap coverage, and to keep spray off structures, out of roadways, and off pavements throughout the warranty period.
- G. Replace defective parts throughout the warranty period.

1.9 SYSTEM MAINTENANCE

- A. Provide maintenance of the irrigation system until Final Acceptance including head and nozzle adjustment, setting and adjusting controller times, and replacing defective materials.
- B. Operations and Maintenance Manual:
 - 1. At, or before, Substantial Completion review of irrigation system, submit for review one (1) manual, bound in hardback, 3-ring notebook, to Owner's Representative. At a minimum, the following information/items are required to be in the manual:
 - a. List of authorized distributors and service representatives for each item of irrigation equipment, including names, addresses and telephone numbers.
 - b. Guarantee/warranty certificates for all equipment used and Contractor's written warranty for entire system one (1) year guarantee.
 - c. Instruction manuals for all equipment used. Including ET Water HermitCrab.
 - d. Parts lists for each item with exploded views of each item showing part numbers.
 - e. A pocket for one (1) blue-line print of the reviewed mylar record drawings laminated in clear plastic. This print shall be added at time of Final Inspection.
 - f. Controller cabinet keys.

1.10 PERMITS, CODES AND ORDINANCES

- A. Obtain and pay for all necessary permits and fees as required by applicable codes and ordinances for this work.
- B. Comply with all applicable codes, regulations and ordinances.
- C. City of Tumwater shall inspect and approve the backflow prevention device.

1.11 SUBSTITUTIONS

- A. Specific reference to manufacturer's' names and products specified in the Section are used as standards, but this implies no right to substitute other material or methods without written approval of the Owner's Representative.
- B. Installation of any approved substitution is Contractor's responsibility. Any changes required for installation of any approved substitution must be made to the satisfaction of the Owner's Representative and without additional cost to Owner.
- C. No substitutions will be permitted which the Owner's Representative has not submitted for prior review and comment.
- D. Review by Owner's Representative of substituted equipment and/or dimensional drawings do not waive these requirements.

1.12 REVIEWS

- A. Contractor shall coordinate all review processes and dates with Owner's Representative. Contractor shall give the Owner's Representative 48 hours notice prior to any inspection. Contractor is responsible for uncovering/unearthing any sections of installation upon request from Owner's Representative. Contractor is responsible for providing inspections of trench depths, head layout, pressure tests and performance tests.
- B. Contractor shall provide a written Irrigation Installation plan summarizing proposed sequences of installation, methods of installation and estimated dates of completion. This work plan shall accompany requested Submittals and will be approved prior to installation of Irrigation System.
- C. Mainline trench depth, component placement and pressure tests may be accomplished concurrently. Mainline may be installed and tested in sequences, three (3) sequences maximum. Each section shall remain uncovered at all connections and valve assemblies. Each subsequent section shall be tested in conjunction with preceding section (not isolated).

1.13 OWNER TRAINING

- A. Prior to Final Acceptance of work, Contractor shall provide the Owner with all keys, tools and maintenance manuals necessary to operate/deactivate the irrigation system. The Contractor shall train and instruct the Owner's Representative as to the operation and maintenance of the irrigation system.

1.14 RECORD DRAWINGS

- A. Furnish Record Drawings of the complete irrigation system in accordance with the following conditions:
1. Contractor will be provided with CD/USB drive with PDF showing irrigation work as designed under this contract.
 2. Maintain the blue-line prints on site at all times during construction. Make a daily record of all work installed on the prints.
 3. On the prints, show actual locations of valves, master valves, gate valves, risers, piping and sleeving. Dimension from easily identified permanent features such as buildings, curbs, fences, walks or property lines.
 4. Show approved manufacturer's name and catalog number on prints.
 5. Make drawings to scale with all notations neat in appearance.
 6. After testing and review of mainlines and laterals for backfill, transfer all information noted on blue-line prints to the mylar in a neat, orderly way.
 7. Turn the Record Drawings over to the Owner's Representative in PDF format on CD/USB for review after Final Inspection of the Project. Record Drawings must be submitted, reviewed and corrected if required prior to final payment.

1.15 EXTRA MATERIALS

- A. Prior to final acceptance, the Contractor shall provide to the Owner (at no additional cost to the Owner), the keys and/or other tools necessary to activate, operate, and drain the system, including:
1. Two (2) quick coupling valve keys w/ hose swivels.
 2. Two (2) quick coupling valve cover keys.
 3. Two (2) manual gate valve keys.
 4. Two (2) of each type of rotor head installed.
 5. Five (5) of each type of spray head installed.
 6. All extra nozzle sets not utilized during the installation.
 7. Two (2) valve box cover keys.

PART 2 - PRODUCTS

2.1 PLASTIC PIPE

A. Polyvinyl Chloride Pipe (PVC):

1. Pressure Mains, Laterals and Sleeving - All Sizes: Polyvinyl chloride (PVC) 1120, 1220, Schedule 40, solvent weld and shall conform to ASTM D1785.
2. Threaded Pipe, Adapters and Nipples: PVC 1120 or 1220, Schedule 80, conforming to ASTM D1785.

B. Pipe shall be marked with manufacturer's name, class of pipe, NSF seal and date and shift of manufacturing run. Pipe shall bear no evidence of interior or exterior extrusion marks.

C. Pipe walls shall be uniform, smooth and glossy. Pipe may be pre-belled or with individual solvent-weld couplings.

D. Fittings shall be PVC Schedule 40, full size unless otherwise noted. Fittings shall be of brand(s) recommended by manufacturer of pipe.

2.2 DUCTILE IRON PIPE

A. Ductile iron pipe shall comply with WDOTSS 9-30.1(1).

2.3 GALVANIZED PIPE AND FITTINGS

A. Galvanized Pipe shall be Schedule 40, domestic manufacture, and shall conform to ASTM A 53. Fittings shall be malleable galvanized.

1. All galvanized pipe and fittings installed below grade shall be painted with Fields A470 "Rainstop", nonfibered, asphalt coating.
2. All galvanized pipe fittings installed above grade shall be painted with one coat of galvanized metal primer followed by one coat matte black alkyd oil enamel.

2.4 PIPE THREAD TAPE / COMPOUND

A. All galvanized pipe threads shall be wrapped at least three (3) times, but no more than four (4), with Teflon tape. A thin coat of Rector Seat T+2, Teflon paste shall be applied on top of the Teflon tape prior to assembly

2.5 PIPE AND WIRE SLEEVES

A. Pipe sleeves shall be twice the diameter of the pipe passing through it, but no smaller than 4 inches (4") in diameter. No more than one pipe shall be installed in each sleeve.

B. Control and communication wire shall be installed in separate 2 inches (2") diameter CL-200 PVC sleeves.

- C. Sleeve under all paved surfaces and where indicated on Drawings.
- D. Extend sleeves minimum 24 inches (24") past both sides of pavement edge.
- E. Mark sleeve ends with a 2x4 wooden stake driven 18 inches (18") into grade with 24 inch (24") exposed. "IR Sleeve" shall be imprinted in on each stake in black, waterproof ink. The top of each stake shall be painted with fluorescent pink marking paint and shall be further marked with three wraps of fluorescent pink flagging tape. Remove stakes after irrigation lines are installed.
- F. No additional payment shall be made under any circumstances for locating sleeves.
- G. Mainline and lateral piping shall be sleeved using Ductile Iron Pipe.

2.6 SOLVENT WELD COMPOUND

- A. Two-step application using Weld-on P-70 purple primer and Weld-on 727 Clear, fast setting PVC glue or as recommended by pipe manufacturer to meet site conditions encountered. Submit product information for approval.

2.7 REMOTE CONTROL VALVES

- A. Valves shall be Rainbird 100-PEB-Series: size as shown on the Drawings. Supply each valve with PRS pressure-regulating valve and adjust pressure as shown on plan.
- B. Each Remote Control Valve shall be supplied with an identification tag . Each valve shall be numbered as shown on Plan.
- C. Master Control Valve shall be Hunter IBV-201G-FS-As-R brass body, 24 Volt solenoid mechanism, normally closed.

2.8 QUICK COUPLER VALVE

- A. Quick coupler valves located on Pressure Mainline shall be Rainbird 44 LRC with locking rubber cover. Provide with valve key and hose swivel for each quick coupler valve.

2.9 MANUAL DRAIN AND CONTROL VALVE

- A. Manual On/Off Valves shall be Kennedy-Ken Seal II #8561ASS. Size to match mainline size.

2.10 AUTOMATIC CONTROLLERS

- A. Refer to Irrigation Plan for controller location and specifications. Coordinate exact location with Building Electrician and Construction Manager.
- B. Web-based smart controller by ET Water, model HermitCrab, 1-888-685-5505.

2.11 COMPATIBLE SENSORS & VALVES

- A. Flow Meter: Hunter Flow-Click FCT-200.
- B. Solar Sensor: Hunter WSS-SEN Wireless Solar Sensor. Not shown on plans. Provide at Location Determined by Owner.

2.12 IRRIGATION HEADS

- A. Spray heads for landscape areas shall be Rainbird 1800 Series with 6" pop-up heights. Nozzles as indicated on Plan.

2.13 CONTROL WIRE

- A. Control Wire shall be Hunter Two-Wire. Valve wire shall be direct burial wire, Copper, insulated. Wire to be twisted red/blue pair.
- B. Splice: Watertight electrical splices shall a dry splice 3M-DBYconnector or approved equal. Submit sample for approval.
- C. Electrical Tape: Black plastic, 3/4" wide, spec. grade, minimum .007" thick, all weather type.
- D. Duct Tape: All weather cloth tape.
- E. Plastic Ties: Clear plastic locking ties. Size to allow for pipe diameters.
- F. Locator wires for below-grade piping shall be #14 bare copper, U.L. approved as UF, ASTM B-3 rated.

2.14 BACKFLOW PREVENTION DEVICE

- A. Double Check Valve Assembly: Febco #850U, bronze valve body with flanged end gate valves or approved equal.

2.15 METER

- A. Irrigation Meter per the City of Tumwater. See Civil Drawing Utility Plan for additional information.

2.16 VALVE BOXES AND VAULTS

- A. Valve Boxes shall be a combination of polyolefin and fibrous material. Extensions may be required to bring the valve box to the proper level. Utilize drop in style covers unless specified otherwise. Boxes shall be as follows:
 - 1. Double Check Valve Assembly: Carson 17"x30" Super Jumbo Rectangular Box, model #1730-24 HDPE w/1730-24 Purple "RCWDNDES" label reading Reclaimed Water-Do Not Drink (English and Spanish) with Locking Bolt.
 - 2. Manual Drain Valve, Quick Coupler Valve, Master Control Valve, and Flow Meter : Carson 10" Diameter Valve Box, model #0910-18 HDPE w/6" extension #910T Cover

Purple, "RCWDNDES" label reading Reclaimed Water-Do Not Drink (English and Spanish) with Hex Bolt.

3. Automatic Control Valve: Carson 14"x19" Standard Rectangular Box, model #1419-12 HDPE Purple wit 12" extension w/ #1419T Purple "RCWDNDES" label reading Reclaimed Water-Do Not Drink (English and Spanish) with Hex. Bolt.
4. All Valve Boxes on Green Roof: Carson 6" Round Valve Box 6" Extension, model #38005610 w/Purple Lid.
5. Concrete pavers for Valve Box support shall be Contractor's choice; confirm with OWNER'S REPRESENTATIVE

2.17 MISCELLANEOUS KEYS

- A. Provide three (3) of each of the following keys: Manual drain key, valve box cover lock key, controller cabinet key.

2.18 DRAIN ROCK

- A. Gravel Backfill for Drains.

2.19 ELECTRICAL CONDUIT

- A. This specification pertains only to low voltage wiring. All 120-volt power specifications are referred to Section 16000 – Electrical.
- B. Conduit above finish grade shall be rigid galvanized steel with zinc-protected threads. Fittings shall be of the same material with hot dipped galvanized finish.
- C. Conduit within a building shall be EMT where permitted by Code. Fittings shall be suitable for this product.
- D. Conduit within the ground shall be Schedule 40 Rigid PVC. Fittings shall be suitable for this product.
- E. Conduit for underground communication cable for centrally-controlled systems, when not buried with irrigation piping, shall be Schedule 40 gray PVC, 1-1/2" diameter, with pre-manufactured sweeps. Above grade conduit for PE89 shall be rigid steel as described above.
- F. All equipment furnished and installed shall be in accordance with National, State, and City Electrical Codes, established safety codes and applicable local codes and ordinances.
- G. Conduit runs shall be a maximum 400 feet without a pull box. Pull boxes shall be located every 400 feet.
- H. Pull boxes shall be as noted in herein with "ELECTRICAL" permanently branded on the lid.

- I. Flow sensor cable (PE-89) shall be enclosed in a separate 1-1/2" Schedule 40 conduit.
- 2.20 MAINTENANCE EQUIPMENT
- A. Provide two (2) manufacturer's service wrenches for each head type requiring wrenches for servicing or adjustment.

PART 3 - EXECUTION

3.1 VERIFICATION

- A. Prior to installation, verify that adequate gallonage and pressure is available to properly operate the irrigation system. Immediately notify Owner's Representative of inadequate conditions.

3.2 LAYOUT

- A. Layout work as accurately as possible to Drawings. Contractor will be provided with electronic drawing to accurately place Turf Rotors. Drawings are diagrammatic to the extent that swing joints, offsets and all fittings are not shown. No changes to irrigation system will be made by the Contractor without approval of the Landscape Architect.
- B. Accurately stake head locations, following the design shown on the Drawings. Do not exceed manufacturer's recommended spacing. Alterations and changes to the layout may be expected in order to conform to ground conditions and to obtain full and adequate coverage of water. No changes or alterations in the Irrigation Plan shall be made without the prior authorization of the Owner's Representative.
- C. Adjust layout as necessary to install around existing work. Where piping is shown to be under paved areas, but running parallel and adjacent to planted areas, intention is to install piping in planted areas. Do not install piping directly over another line in common trench. Offset piping to opposite sides of the trench.
- D. Install irrigation to avoid proposed and existing tree and root locations. Plant locations will be field adjusted to avoid irrigation equipment, at direction of Owner's Representative.

3.3 TRENCHING

- A. Provide all excavations as required for installation of work included in this Section, including shoring of earth banks, if necessary. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavation, to their original condition.
- B. Contractor shall submit a written schedule of Trenching and Irrigation Pipe installation for approval by Owner's Representative prior to beginning trenching. This schedule shall include, at the very least the proposed dates of beginning of mainline trenching, completion of mainline pipe installation, beginning of lateral pipe trenching and completion of lateral

pipe installation. Trenching and installation may be phased to facilitate Pressure Testing, 2 phases only permitted.

- C. Dig trenches wide enough to allow a minimum of 4" between parallel pipe lines. Trenches shall be of sufficient depth to provide minimum cover from finish grades as follows:
 - 1. Over PVC mainline pipe and control wires: 18" minimum cover.
 - 2. Over pipe on non-pressure side of irrigation control valve (lateral lines): 18" minimum cover.
 - 3. Over all sleeving: 24" minimum cover.
 - 4. Excavate to depth required in any material encountered with no extra compensation. Backfill all irrigation trenches with clean sand.
 - 5. Install pipe with manufacturer's markings facing up (12 o'clock).
 - 6. Where multiple irrigation pipes share a common trench, trench shall be sufficiently wide (or piping shall be arranged) to allow four inches (4") minimum of horizontal separation and six inches (6") minimum of vertical separation between piping, while maintaining specified minimum and maximum cover over piping. Irrigation pipes shall be located in a separate trench from any domestic water piping.
- D. Dispose of all surplus suitable excavation from trenches off-site.

3.4 SLEEVING

- A. Install sleeves under all paved surfaces as required to facilitate installation of the irrigation work.
- B. Irrigation mainline and lateral sleeves shall have one sleeve per irrigation pipe. Wire chase sleeves are not shown on the drawing but shall be installed adjacent to all mainline sleeves. Wire chase sleeves shall be a minimum of 2" in diameter.
- C. Extend sleeves a minimum of 24" beyond the edge of curbs, walks, walls and/or other paved surfaces. Cap and identify sleeve ends.
- D. Plug ends of sleeves around insert piping with fiberglass insulation material to prevent soil from entering ends. Complete this prior to backfilling of trenches.
- E. Compact backfill to a minimum of 92% per ASTM D1557.
- F. Bore underneath existing pavements to install sleeves for wiring and mainline. Minimum depth of top of sleeve to pavement elevation is twenty four inches (24").

3.5 QUICK COUPLERS

- A. Install on triple swing joints as detailed and specified. Set top of all quick coupler valve boxes flush with final finish grade. Set all quick coupler valves perpendicular to finish grade. Valve box shall be no closer than 12" to pavement except as noted.
- B. Quick Coupling Valve shall be installed a minimum of twelve inches (12"), and maximum of thirty-six inches (36") from pavement or lawn edge (except at point of connection). The maximum distance from the top of the quick coupler to the top of the valve box shall be three inches (3"). Make sure quick coupler key easily passes the top of the valve box when fully engaged. The valve shall be installed inside a ten inch (10") round valve box. Care must be taken to prevent excessive water backup within the valve box.
- C. A six-inch (6") layer of washed gravel backfill for drains shall be placed in the bottom of the valve box, encased in a layer of geotextile fabric.
- D. Thoroughly flush mainline before installing Quick Coupling Valves.

3.6 DRAIN VALVES

- A. Install manual drain valve per detail and as described herein.
- B. All valves to be installed at locations shown on plans, verify with OWNER'S REPRESENTATIVE prior to installation.

3.7 CONTROL WIRING

- A. Wiring between automatic controller and automatic control valve shall comply with National Electric Code, latest edition.
- B. Splices will be permitted only at junction boxes, valve boxes, or at control equipment. A minimum of 2' of excess conductor is to be left at all splices, terminal and control valves. Encapsulate all splices with approved connectors.
- C. All control wire that is not installed within mainline trench shall be buried at 24" depth minimum and sleeved with appropriately sized Schedule 40 PVC conduit (or better). Sleeve shall be continuous from mainline trench to mainline trench and from mainline trench to controller. All control wire installed above ground shall be encased (sleeved) within intermediate metal conduit and fittings (or better). All such sleeves shall be marked on "as-built" drawing.

3.8 AUTOMATIC CONTROLLERS

- A. Coordinate location of Controller with Owner. Contractor shall determine that w-fi connection is available in Administration Building. If not connection is available Contractor shall coordinate with Owner's Representative an alternate location for controllers.
- B. Contractor is responsible for providing 120/230 VAC power to Controller if necessary. All electrical modifications shall be approved by Owner's Representative prior to installation.

- C. Mount Controller per manufacturer's specifications. Final installation shall be plumb, secure and with finished appearance. All conduit shall be secured to wall or framing with galvanized pipe clamps. Provide material descriptions and shop drawings for all mounting procedures.
- D. Mount Solar Sensor at location determined by Owner's Representative.

3.9 COMPATIBLE SENSORS AND VALVES

A. Flow Meter

1. Connect Flow Meter to Mainline with as detailed.
2. Provide individual control and common wires to Controller with spare common. Splice wires as detailed.
3. Control wires from Flow Meter to controller shall be sized and colored as specified by Flow Meter manufacturer. There shall be no other buried splices allowed between controller and Flow Meter.

B. Master Valve

1. Install Master Valve similar to typical Electric Control Valve. Provide spare common wire continuous from Controller to Master Valve and signal wire.

3.10 DOUBLE CHECK VALVE ASSEMBLY

- A. Install Double Check Valve Assembly securely and level. Provide adequate clearance as detailed or per manufacturer's specifications (whichever is greater).
- B. Shall be certified by State of Washington Backflow Assembly Tester, after installation.

3.11 REMOTE CONTROL VALVES

- A. Install in approximate locations shown on plan, outside of paved areas and grouped together where possible.
- B. Where valves occur adjacent to paved areas, install so that the valve box will be no closer than 12" to paving and perpendicular or parallel to it. Grouped valves shall be spaced evenly to present a neat appearance. Valve boxes shall be installed 1/2 inch above finish grade.
- C. Enclose all valves in individual valve boxes. Use valve box extensions as required. Install as per detail and locate precisely by dimensions from two (2) fixed objects on Record Drawings.
- D. Valve bonnet packing and bolts shall be checked and tightened.

- E. Provide sufficient room within valve box to service or replace all equipment. Place Valve Boxes on concrete pavers on all four corners. Valve Boxes shall be level and exhibit zero movement. Backfill around boxes and compact to 95%.

3.12 PIPE AND FITTINGS

- A. Transport and store pipe on a flat and even surface.
- B. Seal all threaded joints with 3 wraps minimum of Teflon tape. No PVC pipe shall be threaded or connected to a threaded fitting without an adapter.
- C. Prior to construction of this project, Contractor shall provide the Owner's Representative with written evidence that all Contractor staff assigned to solvent welding duties of PVC pipe or fittings are in possession of an up-to-date certification card issued by manufacturer representative of specified solvent cement. If Contractor's staff are not in possession of current certification cards, the Contractor shall schedule and complete a training seminar (conducted by solvent cement manufacturer representative) and provide written evidence of training completion for each staff member, to the Owner's Representative prior to construction. Only staff that are certified shall be permitted to solvent weld pipe and fittings.
- D. All gasketed and solvent weld plastic pipe shall be installed in accordance with manufacturer's installation instructions. Great care shall be taken to ensure that the inside of the pipe is absolutely clean. Pipe ends (not being worked) shall be protected and not left open. Cleaning of cutting burrs is mandatory.
- E. For solvent weld pipe, PVC pipe ends shall be cut at a 90-degree angle to the pipe length and shall be cleaned (use approved reaming tool) of all burrs prior to cementing. Pipe ends shall be wiped clean with a rag that has been lightly wetted with PVC thinner. Joints shall be completely free of moisture or condensation.
- F. Cement shall be applied with a light coat on the inside of the fitting and a heavier coat on the outside of the pipe (no further back from the end of pipe than the fitting would slip). Application of cement on the interior of the fittings shall be quantified to ensure no cement shall be pushed into the flow stream of the pipe. Pipe shall be inserted into the fitting and given a quarter turn to seat the cement. Excess cement shall be wiped from the outside of the pipe. Cement that becomes unduly thick or heavy shall not be thinned and re-used. CONTRACTOR SHALL DISPOSE OF SAME. Pipe shall be tested as indicated elsewhere in these specifications.
- G. Allow 15 minutes (minimum) set-up time for solvent weld joints before moving or handling. Pipe shall be partially center-loaded to prevent arching or slipping. No water shall be permitted in the pipe for at least 10 hours to permit solvent weld set and cure. Backfilling shall be done when the pipe is not in an expanded condition due to heat or pressure. Cooling of the pipe can be accomplished by operating the system for a short period of time before backfilling, or by backfilling in the early part of the morning before the heat of the day. Before pressure testing, allow 24 hours cure time for solvent weld joints.

- H. Lateral line pipe may be longitudinally bent at a ratio of 200 times the outside diameter (o.d.) of the pipe over the length of one (1) full stick of pipe [i.e.: 1-1/2" pipe (1.9" o.d.) can be bent to a minimum radius of 1.9 x 200 or 380 inches (31.7') over 20'].

3.13 FLUSHING

- A. Flush all mainlines once prior to the installation of valves, and again after the installation of valves and prior to pressure testing.
- B. Flush all lateral lines prior to the installation of sprinkler nozzles.

3.14 PRESSURE TEST

A. General:

1. To be valid, all tests must be observed by the Owner's Representative.
2. Submit verbal requests for review to Owner's Representative at least 48 hours prior to anticipated testing. Do not request testing until satisfied that work will pass test.

B. Preparation:

1. Prior to request for preliminary testing, accomplish the following:
 - a. Install all piping, valves and other equipment except sprinkler heads.
 - b. (Cap all risers except first riser downstream from valve on each lateral.
 - c. Purge all air from mainlines.

- C. All joints and connections shall be left exposed until after completion and acceptance of pressure test.

- D. Entire mainline shall be capped and pressurized to 100 PSI for a period of 30 minutes without introduction of additional service or pumping pressure. Lines that show loss of pressure exceeding 5 PSI at the end of specified test period shall be rejected.

E. Test of Laterals:

1. Purge all air from laterals and cap all risers. Open valves and bring system to available static line pressure. Lateral lines will be visually reviewed. Lines that exhibit visible leakage shall be rejected.
2. Rejected systems or portions of system shall be repaired and retested until testing requirements are met. Do not request retest until satisfied that system will pass testing requirements.
3. Plug all test cocks on double-check valves after testing by Water Department. Plugs shall be brass and threads shall be sealed with Teflon tape.

3.15 SPRINKLER HEADS

- A. Install pop-up sprinklers flush with finish grade in landscape areas. Adjust radii of sprinklers to obtain optimum coverage.
- B. Backfill around heads shall be approved native or import topsoil, well compacted. Sprinklers shall be installed flush with sidewalks and curbs and no closer than three inches (3") from any paved edge. All heads shall be set perpendicular to finish grade unless otherwise specified on the plans. Refer to details.
- C. Thoroughly flush lines before installing sprinkler heads.
- D. Refer to installation details on Drawings for all sprinkler heads.

3.16 SPRINKLER AND QUICK COUPLING VALVE SWING JOINTS (RISERS)

- A. On spray and quick coupling valve flexible swing joints, apply two wraps of Teflon tape around threaded outlet connection (to sprinkler or quick coupling valve). Threaded connections shall be watertight. Do not over tighten.

3.17 VALVE BOXES

- A. Install valve boxes plumb and flush with finish grade, so that a reel type mover may pass over without interference. Box shall be supported on continuous brick foundation per detail. Valve box archway shall not rest on piping – provide a minimum of one-inch (1") clearance around any piping.
- B. Provide filter fabric cover over all below grade openings to prevent debris from contaminating the drain rock.
- C. If construction debris washes into the automatic valve or quick coupling valve boxes prior to project completion, remove existing gravel and replace with new gravel.

3.18 BACKFILLING

- A. Backfill:
 - 1. After system is operating and the required tests and review have been made, backfill excavations and trenches with the specified backfill.
 - 2. Backfill when PVC pipe is not in an expanded condition due to heat or pressure. Cooling the pipe can be accomplished by operating the system a short time or by backfilling in the early part of the morning.
- B. Compaction:

1. Trenches shall be thoroughly water-settled. No sluicing will be permitted. Trenches shall be backfilled uniform flush with the surrounding grade, raked and rolled with a roller weighing minimum 90 lbs. per linear foot.
2. Trenches or tunnels under roads or paved areas shall be backfilled and tamped with a mechanical tamper in successive 6" lifts.
3. Backfill for all trenches, regardless of the type of pipe covered, shall be compacted to minimum 95% density under pavements, 85% under planted and lawn areas.
4. Dress all areas to surrounding finish grades.

3.19 RESTORATION AND CLEANUP

- A. All roots, rocks and debris shall be removed from site.
- B. Sweep and wash all walks, pavement and steps.

3.20 PERFORMANCE TESTS

- A. Notification: Submit verbal request for reviews to Owner's Representative at least 48 hours prior to anticipated review.
- B. All Performance Tests shall be accomplished prior to installation of any landscape material. Exceptions to this shall be Trees and landscape boulders with approval of Owner's Representative.
- C. Prior to request for preliminary review and Coverage Check, accomplish the following:
 1. Complete all work including balancing, adjusting the system (pressure-reducing valves, flow-adjustment keys, nozzles, etc.) to provide optimum coverage without fogging.
 2. Adjust sprinkler heads to finish grade as specified.
 3. Clean out all sediment from valve boxes so that drain rock is exposed below bottom of valve, and all wiring (including spare wires) is visible.
 4. Complete the Operations and Maintenance Manual for review by Owner's Representative.
 5. Present Owner's Representative with a preliminary Record Drawing (on paper with pencil) showing location of all changes to Irrigation Plan to facilitate Review and Coverage tests.
 6. Obtain all miscellaneous keys, spare parts and tools required under this contract for review by Owner's Representative and delivery to Owner.

- D. Preliminary Review: Owner's Representative shall review Irrigation system for accuracy of layout to Plan and finish height of sprinkler heads in relation to finish grade and clearance of sprinkler heads from curbs, walks, walls and buildings. In addition all other aspects of finish presentation shall be reviewed prior to placement of landscape material.
- E. Coverage Check: Remove all valve box covers and operate each zone of the system at direction of Owner's Representative. Owner's Representative shall mark with flagging any sprinkler heads not spaced correctly. Large areas not receiving proper coverage shall be identified through similar means. Corrections to layout shall be made accordingly and/or by recommendation of Owner's Representative.

3.21 FINAL INSPECTION

- A. Prior to final inspection of work, Contractor shall have completed all punch list items and shall submit signed and approved sprinkler/plumbing/health/electrical permits as applicable to the work.
- B. At the time of, and as part of, the Final Inspection, conduct a training and orientation session for the Owner covering the operation, adjustment and maintenance of the irrigation system. The Record Drawings and Operations and Maintenance Manual shall be reviewed and all features explained. Notify the Owner in writing two (2) weeks prior to the training and orientation session. The date and time of the session shall be subject to approval of the Owner.
- C. Operations Test: Test is acceptable if system operates through at least one (1) complete cycle in a satisfactory manner, with uniform coverage of areas to be irrigated, and automatic controls functioning properly.
- D. Provide Owner's Representative with complete Mylar Record Drawing for review and approval. Upon approval Contractor shall supply copy of Record Drawing to be attached to Controller cabinet (inside if possible)
- E. Acceptance of work establishes beginning of one (1) year warranty period for irrigation system.

END OF SECTION

**SECTION 329000
PLANTING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

Note: Prior to bidding the work of this Section, Contractors shall visit the site to generally familiarize themselves with existing conditions, soils, slope, access, and other readily apparent site conditions.

1.2 DESCRIPTION OF WORK

- A. Work includes all materials, equipment and labor necessary for: decompaction, placing topsoil, finish grading, rock and gravel placement, planting of trees, shrubs and ground covers; seeding, invasive plant removal, protection, maintenance, guarantee and replacement; extended maintenance and related items necessary to complete the work indicated on the drawings and/or specified.

1.3 QUALITY ASSURANCE

- A. Plant Material: All plant material, Washington Grade No. 1 as per State of Washington Department of Agriculture Order Numbers 1229, 1230 and 1322. Quality, size and condition as determined by standards set forth in the aforementioned Standards and the American Association of Nurserymen Standard ANSI 260.1- 1973. Plant names shall conform to latest edition of "Standardized Plant Names" as adopted by American Joint Committee of Horticulture Nomenclature.
 - 1. Fertilizer: Conform to Washington State Department of Agriculture Laws and Federal Specification O-F- 241D pertaining to commercial fertilizers.
 - 2. Soil: Conform to USDA soil textural class.
 - 3. Seed: Conform to Washington State Department of Agriculture Rules for Seed Certification.
 - 4. Compost: Compost to be certified in accordance with U.S. Compost Council Seal of Testing Assurance (STA) program.

1.4 SUBMITTALS

- A. All Plant Materials: All plant material shall be ordered immediately following the award of contract. Contractor responsible for ensuring that plants of specified sizes and quantities

will, in fact, be as specified at the time of planting. Provide the Owner's Representative with copies of purchase orders for all plants delivered to the site.

1.5 PROTECTION OF EXISTING CONDITIONS

- A. Protect work, adjacent property, public, and be responsible for any damage or injury arising from this contract due to actions or neglect.

1.6 SCHEDULING

- A. Upon commencing work, the General Contractor shall examine the site and protect all trees, shrubs and other areas designated to remain in a manner substantial enough to resist the forces of construction equipment that will be on site.
- B. Confine work to areas designated. Do not disturb existing vegetation outside of project limit lines. Protect all trees within project limits not designated to be removed. Repair or replace vegetation damaged as a result of Contractor's operation to satisfaction of Owner's Representative at Contractor's expense.

- 1. Contractor shall install temporary fencing at dripline of trees to remain prior to grading.

- C. Contractor shall be cognizant of all utility lines and underground obstructions. He shall familiarize himself with all utility, irrigation, mechanical, and electrical plans so that his digging/drilling operations do not damage lines. Repair or replacement by original installer shall be made at Contractor's expense for all existing buildings, equipment, underground utilities, irrigation equipment, paving, surfacing, stairs, and/or forms damaged as a result of Contractor's operations in a manner satisfactory to the Owner's Representative before final payment is made.
- D. Protect plants, roots, balls and tips at all times from injury in handling, from sun or drying winds from beginning of digging operations, during transportation and on site until final planting.
- E. Provide all necessary safeguards, as approved and/or required by the Owner's Representative, for the protection of all planted areas until provisional inspection/acceptance is accomplished, or for such time as it requires to ensure vigorous establishment of the plant material.

1.6 FIELD QUALITY CONTROL AND REVIEW

- A. Notification: The Contractor shall give 48 hours' notice to the Owner's Representative when an inspection is desired.
- B. Inspections:

1. Plant Material: Owner's Representative will review and approve all plant material at the site prior to installation. Remove unsatisfactory material from site immediately.
2. Plant Locations: Owner's Representative will review, adjust, and approve plant locations prior to installation.

1.7 SUBSTANTIAL COMPLETION

- A. All plant material to be installed prior to project date of substantial completion.
- B. All lawns to be seeded prior to project date of substantial completion.

1.8 SUBSTANTIAL COMPLETION REVIEW (Punch List)

- A. Upon completion of all planting, seeding, and all other work (if any) required under the contract, the Contractor shall request a provisional inspection. No partial approvals will be given. Included in this requirement is that all lawn areas are fully established, being full and vigorous with no bare spots whatsoever. A minimum of two mowings shall have taken place prior to request for substantial completion review. Final review and acceptance of the work shall establish the beginning of the guarantee period.

1.9 FINAL REVIEW

- A. The Contractor shall request a final inspection upon satisfactory completion of all work required under this contract, including all punch list items.

1.10 GUARANTEE REPLACEMENT

- A. Plant Material: Guarantee in a healthy, thriving condition all trees, shrubs and groundcovers for two years from date of substantial completion. Plant containers and root balls shall be free of all weeds. Any plants requiring replacement or missing must be installed prior to final acceptance and start of guarantee period. During the guarantee period, all dead diseased, dying, broken or disappeared plant materials from any cause except those noted below shall be replaced immediately by the Contractor at no additional expense to the Owner's Representative. Use specified plants and plant as specified; guarantee until active, healthy growth is evident.

The Owner's Representative shall determine if a tree or shrub is dead based on the following;

A tree shall be considered dying or dead when the main leader has died back, or a minimum of 25 percent of the crown has died or been damaged. A shrub or groundcover shall be considered dying or dead when a minimum of 25 percent of the plant has died or been damaged.

- B. Seeded Areas: Guarantee a uniform stand of grass with no bare spots whatsoever in seeded areas at time of substantial completion review (Punch List). Reseed with the seed and in the

manner originally specified any area which fails to vigorously establish a uniform stand for any reason whatsoever. Fill to finish grade with approved topsoil and seed as specified all seeded areas with evidence of settlement or erosion. Repeat all such reseeding until final acceptance at Contractor's expense.

- C. Contractor's Responsibility: During guarantee period, Contractor shall not be responsible for replacing plants destroyed or damaged by vandalism or accidents caused by vehicles other than the Contractor's, or Acts of God, or severe cold as substantiated by 25-year low temperature records (exceeding 25 year low), provided that Contractor has exercised due care to protect work. Should replacement fall due during non-planting season, contractor may request Owner's Representative's permission to defer planting until proper season. If permission is granted, immediately remove and dispose of dead plants, including all roots. Holes shall be backfilled properly with planting mix and finish graded until the proper planting season. Plants used for replacement shall be of same kind and size originally planted and planted as originally specified.

PART 2 - PRODUCTS

2.1 PLANTS

- A. Quantities, species and varieties, size and condition as shown on planting plan and schedule. Plants to be Washington Grade No. 1, fresh, well foliated, in prime condition when in leaf, exhibiting normal habit of growth, having all buds intact and free of disease, injury, insects, insect eggs, larva, indication of strawberry root weevil, all seeds and weed roots.
- B. All plants shall be from stock which has been acclimated to conditions prevailing at the project and which has been consistently cultivated and grown in these conditions. No cold storage plants; all grafted trees to be grafted at ground level.
- C. Ball and burlapped (B&B) stock to have a natural ball sufficient to ensure survival and healthy growth; bare root (BR) materials to have sufficient root system to ensure survival and healthy growth. Containerized stock must be free of large circling roots.
- D. Substitutions are strongly discouraged. No substitutions shall be made without the written approval of the Owner's Representative. Requests for substitutions must be made at the time that documentation of ordered plant material is provided. The substitution request must be accompanied by written proof from at least five major plant suppliers that the plant is not available.
- E. Plants must be installed no more than 30 days after delivery to site. Provide adequate water by temporary means to keep plants in top condition. Store plants in protected location away from hot sun and strong, drying wind.

2.2 FERTILIZERS AND SOIL AMENDMENTS

- A. General: Approved brands conforming to applicable State fertilizer laws. Uniform in composition, dry, free- flowing, delivered to the site in original unopened containers, each bearing the manufacturer's guaranteed analysis. All fertilizers must be EPA approved. Fertilizer needs to be based on results of soil test.

- B. Trees, Shrubs and Ground Cover:
 - 1. Formula 4.2.2 "Transplanter" as manufactured by Pacific Agro Co., with Hercules Nitroform and W.R. Grace's "Magamp" and trace elements. Apply at rate of:
 - a. Trees: 8 oz.
 - b. Shrubs: 4 oz.
 - c. Ground Cover: 2 oz.

- C. Agriform Tablets: Planting tablets, 21-gram size, as manufactured by Agriform International Chemicals, Inc., 20-10-5 analysis. Apply at the rate of:
 - 1. Trees: 4 tablets
 - 2. Shrubs: 2 tablets
 - 3. Ground Cover: 1 tablet

- D. Seeded Lawn Areas:
 - 1. Installation Fertilizer (Fertilizer 'A'):
 - a. Total available Nitrogen: 16% by weight (of which 50% is derived from controlled release sources including Nutralene.)
 - b. Total available phosphorous: 16% by weight.
 - c. Total available potassium: 16% by weight.

- E. Maintenance Fertilizer:
 - 1. Initial Fertilizer (Fertilizer 'B'):
 - a. Total available Nitrogen: 21% by weight (of which 50% is derived from controlled release sources.)
 - b. Total available Phosphorous: 12% by weight.
 - c. Total available Potassium: 12% by weight.

 - 2. Follow-up Fertilizer (Fertilizer 'C'):
 - a. Nitrogen: 19% by weight.
 - b. Phosphorous: 4% by weight.
 - c. Potassium: 16% by weight.

- F. Dolomitic Limestone at minimum rate of 50 lbs. per 1,000 square foot. Gypsum to counteract salinity as recommended in report.
 - G. Other amendments as recommended in report; adjust the basic quantities of the following micronutrients as recommended in the report: iron, manganese, molybdenum, copper, zinc and boron.
 - H. See also Fertilizer Requirements under Section 3.08 Maintenance.
- 2.4 STAKES AND GUYS
- A. Material as per detail on plans, submit source for approval.
- 2.5 SELECTIVE HERBICIDE
- A. Where directed in the field, treat planting beds with a selective pre-emergent herbicide and remove all foreign weeds prior to acceptance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clear and grub any areas shown beyond civil clearing limits as needed to install landscape work.
- B. Clearing limits and subgrade shall be reviewed by Owner's Representative and approved by the Owner's Representative's representative prior to topsoil placement and finish grading.

3.2 DECOMPACTION/OVEREXCAVATION

- A. Wherever landscape is proposed over compacted areas that were previously paved, buildings, construction traffic areas, Contractor staging areas or areas otherwise detrimental to plant establishment, the Contractor shall completely remove all remnants of paving, crushed rock, quarry spalls, contaminants or other non-native material as directed by the Owner's Representative. Loosen the soil in these areas to a minimum depth of 12" below subgrade using mechanical means.

3.3 INVASIVE REMOVAL

- A. Remove all invasive plant species throughout entire site. Species include but are not limited to English Ivy, Himalayan Blackberry, English Holly, and Cherry Laurel.
- B. Remove ivy from ground and tree trunks. Avoid damaging trees or existing native understory to remain.
- C. Remove or kill entire plant and root structure of all invasive trees and shrubs.

- D. Continue removal throughout extended maintenance period.

3.4 PERFORMANCE

- A. Planting and Plant Relocation Time: Plant trees, shrubs, groundcover and lawn during periods which are normal for such work, as determined by season, weather conditions, and accepted practice. At the option and on the full responsibility of the subcontractor, planting operations may be conducted under unseasonable conditions without additional compensation.
- B. Plant Locations: After placement of topsoil, stake tree locations and position shrubs above ground as per drawings for approval of Owner's Representative. Make field adjustments to avoid obstructions to planting. Owner's Representative reserves the right to field adjust plant locations prior to planting.
- C. Planting Trees: Excavate tree pits 6" deeper and twice the diameter of the root ball. Excavated soil shall be removed from the site. Thoroughly scarify bottom of pits by shovel cutting to a depth of 12". Sides of pits shall also be shovel cut to help root penetration. Establish a firm mound to position the top of the root ball flush with finish grade of mulch layer.
- D. Place tree in upright position in center of pit, release root covering or spread roots. If wire cages are present, remove completely and dispose from site. Roots of trees shall be so placed as to have a natural spread and distribution and planting mix shall be carefully, thoroughly packed and puddled around them. Take care not to injure root system while backfilling and compacting. After water settles, fill again with planting mix and water compact to a grade of not more than 1/2" higher than the original ball. In seeded areas, finish grade smooth with surrounding area. Provide 3' diameter, 3" depth mulched circle around all trees in seeded areas.
 - 1. Fertilize trees at the soils test recommended rate applied uniformly around circumference of root spread under a cover of 2" of planting mix. Apply Agriform tablets and soil polymers per manufacturer's recommendations. Stake and guy trees immediately after planting as detailed. All supports, and trees shall stand vertical.
- E. Planting Shrubs and Ground Covers: After topsoil placement and approval of finish grade, excavate planting pockets at locations shown on drawings and as directed to a diameter of twice the root spread and to a depth that will ensure a 3-inch cushion of compacted planting mix below the root ball. Dispose of excavated soil on site as directed.
 - 1. Set plants upright in center of hole flush with finish grade, release root covering or spread roots. The roots of the plant shall be placed as to have a natural spread and distribution. Backfill with planting mix and provide slight depression as watering saucer. Care shall be taken not to injure the root system while backfilling and compacting the planting mix.
 - 2. Fertilize at the specified rate applied uniformly around the circumference of the roof spread under a cover of 2" of planting mix. Apply Agriform tablets and soil polymers per

- manufacturer's recommendations. Plant ground cover plants at spacing indicated in straight, evenly spaced rows.
- F. Pit plant trees and shrubs in areas outside of clearing limits as shown on plans. Avoid disturbance to existing native vegetation to remain. Mulch all exposed soil to minimum 3" depth.
 - G. Seed Bed Preparations: Apply Installation Fertilizer 'A' and dolomite limestone at the soils test recommended rate. Add other fertilizers as recommended in soils report. Rake to incorporate. Finish surfaces by raking smooth and even; lightly compact with roller. Level out surface undulations and irregularities to tolerances specified in Section 02200 and compact again as necessary.
 - H. Lawn Seeding: After approval of finish grade, seed at the rate specified. Seed all areas using hydro-seeder and hydro-mulch at rate specified under Hydro-mulch Section.
 - I. Timing: Seed only from March 15th to August 20th, or as approved by Owner's Representative. All seeding must be complete prior to project substantial completion date.
 - J. Protection: Protect against harm from wind, storm water and trespassing. Treat and reseed damaged portions as required. Reseed as many times as necessary to achieve Guaranteed Replacement. Post signage indicating new seeding as necessary to prevent trespassing. Provide temporary orange construction fencing around seeded areas, until grass has become fully established as needed to prevent damage. Owner's Representative or Owner's Representative representative to determine when fencing can be removed.
 - K. Reseeding: In areas which were seeded after October 15th, reseed and re-fertilize all areas where coverage is weak or sparse, as directed in the spring of the following year, and repair any settlement and/or erosion channels.
 - L. Ongoing Maintenance: Contractor shall continue to maintain turf areas and weed the entire site until 60 days from Final Completion. See additional requirements under Section 3.08, 60-day Maintenance Period.
 - M. Mulching: Immediately after completion of all planting, mulch all new planted areas to a minimum compacted depth of 3". Refer to site details for proper relationship of finished grade to adjacent paved areas, 1/2" below curbs/walks unless indicated otherwise. Mulch around existing trees and any areas of exposed soil outside of clearing limits.
 - N. Pruning, Repair and Weeding: Upon completion of the work under this contract, all existing and new trees and shrubs shall be pruned as directed by Owner's Representative to control size, remove dead or damaged branching or to correct overall form.
 - 1. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant. All cuts shall be made flush, leaving no stubs. On all cuts over 3/4" in diameter and bruises or scars on the bark, the injured cambium shall be traced back to living tissue and

removed. Wounds shall be smoothed and shaped so as not to retain water, and the treated area shall be coated with approved tree wound compound.

3.5 60-DAY MAINTENANCE PERIOD

- A. It shall be the Contractor's responsibility to continuously and vigorously maintain all the landscaped and seeded areas of this contract from time of installation until Substantial Completion of landscaped and seeded areas. Contractor shall also continue to maintain and weed all planting beds and seeded areas for 60 days after Final Completion. Sweep pavement clean and remove dead plants as directed by the Owner's Representative, who shall record plants removed.
- B. All plants shall be watered by thorough sprinkling as needed to keep the ground moist, the plants healthy, and to prevent wilting, including watering in areas not fully covered by an automatic irrigation system. Care shall be exercised to prevent soil erosion.
- C. Seeded Areas:
 - 1. Maintain by watering, weekly mowing (remove all clippings) continuous weeding, reseeding, fertilizing, herbicide treatment, rolling and top dressing, and other necessary operations to establish and maintain an even, dark green, deep rooted, thick and vigorous stand of grass. Temporarily water any areas that are not irrigated, until establishment.
 - 2. Replace any seeded/sodded areas which fail to show vigorous growth. Fill and seed all areas which settle, as specified. At the end of the maintenance period and prior to acceptance, the seeded/sodded areas shall be a flourishing, dense, vigorous, uniform, deeply rooted thick stand of specified grass with no bare spots and no weeds whatsoever.
 - 3. There shall be no foot or vehicle traffic on the seeded/sodded area whatsoever. Install a temporary 6' height chain link fence around all lawn areas until fully established. Maintain barriers around seeded areas until established, then remove from site.
 - 4. Edging: Mechanically edge all lawn borders once per month.
- D. Trees:
 - 1. Maintain in a vigorous, thriving condition by watering, pruning, cultivating, fertilizing, spraying, and other necessary operations. Spraying shall be done only as required and as approved by the Owner's Representative. Plants will not be accepted until active growth is evident. All tree supports, guys, tree wrap, etc., shall be kept intact and adjusted as required and effect in maintaining firm support throughout the guarantee period.
- E. Clean-up:

1. A general clean-up shall be made immediately after and as part of all work done in the area. The clean-up shall include the entire area under this contract. Adjacent areas shall be cleaned to the extent that the work done under the contract may scatter litter. Such clean-up shall include pick-up and removal from the contract area of all clippings, trimmings, leaves, and all other litter and debris originating from any source whatsoever. Remove flag labels from all plant material.

F. 60-Day Maintenance Walkthrough

1. Schedule an inspection at the completion of the 60-day Maintenance to review plant beds and confirm that they are weed free.

3.6 ONE YEAR WARRANTEE PERIOD FOR PLANTS

The warrantee of all plant materials furnished and planted under this Contract shall be for one full year from the completion date of the 60-day maintenance period. Although not responsible for maintenance of the plant material during the warrantee period, the Contractor should, for his own interest, assure himself that minimum care is being given to the plant materials, as he is liable for their health during the warrantee period. At the end of the warrantee period, the Owner's Representative will make another inspection to determine the condition of the plants. All plants not in a healthy growing condition, as determined by the Owner's Representative, will be noted and as soon as seasonal conditions permit, shall be removed from the site and replaced with plants of the same species and size as originally specified. Such replacement shall be made in the same manner as specified for the original plantings, and at no extra cost to the Owner. The Contractor is not responsible for vandalism. Remove all trees stakes and temporary irrigation at the end of the one-warrantee period.

END OF SECTION

SECTION 32 9113.16

MULCHING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This section includes furnishing and installing mulch throughout all landscape beds.

1.2 SUBMITTALS

- A. One gallon zip-lock bag sample, as requested.
- B. Specified Technical Data from Supplier

PART 2 - PRODUCTS

2.1 MULCH

- A. Mulch:
 - 1. Mulch shall be "Fine Dark Bark" available from Pacific Topsoil
 - 2. The mulch shall be processed to reduce weed seed, pathogens, and deleterious material,"rootable plants" and shall not contain paint, petroleum products, herbicides, fungicides, or other chemical residues that would be detrimental to plant life. Other deleterious material, plastic, glass, metal, or rocks shall not exceed 0.1 percent by weight or volume. Contractor is informed that evidence of "rootable plants" such as equisetum will be caused for Owner's Representative to direct Contractor to completely remove and replace all mulch at no cost to Owner.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Review all topsoil subgrades to verify all landscape beds are 3 and an half inches below pavement edges and top of walls.

3.2 MULCH INSTALLATION

- A. If plants installed before mulch application, Contractor shall take precautions and measures to protect all installed trees, shrubs and groundcovers from the spreading of mulch. Damaged plants will be replaced by Contractor at no cost to Owner.

- B. Install mulch to foot compacted depth of three inches in all landscape beds. Mulch depths shall be a uniform, roller compacted depth and shall be graded to produce a smooth landscape surface.
- C. Contractor shall compact mulch with lawn roller filled with water. Apply mulch as necessary to achieve a full two inch depth.

3.3 MAINTENANCE

- A. Contractor shall be responsible to weed and maintain mulched landscape beds to free of weeds to and to assure a full two inches of mulch depth up to and at the time of Final Acceptance.

END OF SECTION

SECTION 32 9119.13

TOPSOIL PLACEMENT AND GRADING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish and Install Imported Topsoil.

1.2 REFERENCES

- A. ASTM D 1557: Method for Laboratory Compaction Characteristics of Soil using Modified Effort.
- B. WSDOT *Standard Specifications*.

1.3 DEFINITIONS

- A. Percent Compaction: The required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material determined by ASTM D1557 test procedure.
- B. Soil Subgrade: The soil surface on which topsoil is placed.
- C. Finished Grades: The final grade elevations indicated on the Drawings.
- D. Aesthetic Acceptance of Grades: Acceptance by the Owner in writing of the Aesthetic Correctness of the contours as observed by Owner. Aesthetic Acceptance does not address whether an area drains properly, whether the areas are at the correct elevation, or whether it has been compacted properly.
- E. Acceptance: Wherever the terms "acceptance" or "accepted" are used herein, they mean acceptance of the Owner in writing.
- F. Drawings: Contract Drawings, sections, and profiles showing finished surface grades.
- G. Elements with Fixed Elevations: Paths, paving, concrete pads, headers, footings, foundations, walls, and other structures with fixed-spot elevations.

1.4 SUBMITTALS

- A. Submit product data and 1-gallon zip- lock bag sample of Imported Topsoil.
- B. Submit 1-gallon sample of each type of soil amendment.

1.5 SITE CONDITIONS

A. Environmental Protection:

1. Soil Moisture Content: Do not work soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air or that clods will not break readily.

PART 2 - PRODUCTS

2.01 MATERIALS

A. IMPORTED TOPSOIL

Provide at 8" depth at landscape areas and 4" depth at hydroseeded areas.

Imported Topsoil shall consist of a uniform mixture of organic compost (20% by volume), Sandy Loam (40% by volume) and sand (40% by volume). Maximum clay content should be less than 5%.

Sand Gradation

Sieve size	Percent Passing
3/8"	100
1/4"	99-100
US No. 4	98-100
US No. 8	92-100
US No. 16	82-100
US No. 30	50-80
US No. 50	10-30
US No. 100	0-5
200 wet sieve	0-2

Compost shall Fine Compost in compliance with WSDOTSS 9-14.4(8).

Sandy Loam shall comply with USDA Soil Texture Triangle and shall comply with the following gradation:

Clay	1-5%	
Silt	35-45%	
Sand		50-60%

Imported Topsoil pH shall be between 5.5 to 7.5 (to be determined by a certified soil testing lab).

Imported Topsoil mixture shall be uniform and free of any contaminants (i.e. weed seed, foreign debris, root-able plant parts, etc.). Soils should also be free of any pesticide residues (to be determined by a certified soil testing lab). Contractor is informed that any evidence of root-able plant parts such as equisetum will result in the complete removal and

replacement of all Imported Topsoil. Soil mix shall be stored/covered accordingly to prevent wetting or saturation.

Imported Topsoil is to be used in all landscape planter beds with the exception of the raised planter beds and above garage and vault structures.

- B. Grading Equipment: Appropriate size and flexibility to achieve the sculptural forms, profiles, straight slopes, and slope rounding indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Subgrade:

1. Verification: Verify that the subgrades have been graded to within one tenth of a foot (minus the topsoil depth) of the grades shown on the Drawings.
2. Aesthetic Acceptance: Verify that Owner has given the subgrade aesthetic acceptance. Do not place topsoil or rototill subgrade until Consultant has accepted subgrade for aesthetic correctness.
3. Notification of Discrepancies: Notify the Owner in writing of any discrepancies.

3.2 SURVEY REQUIREMENTS

- A. Lines and Levels: Establish lines and levels, locate and lay out by instrumentation and similar appropriate means for all planting area finish grades.
- B. General Staking: Provide a sufficient quantity of grade stakes as required to provide minimum depth layer of topsoil.

3.3 PREPARATION

A. Protection of Existing Conditions:

1. General: Use every possible precaution to prevent damage to existing conditions to remain such as structures, utilities, irrigation systems, plant materials and paving on or adjacent to the site of the Work.

B. Surface Preparation:

1. Inspection: Inspect subgrade soil for stones over one inch in diameter, sticks, oils, chemicals, plaster, concrete, and other deleterious materials.
2. Removal: Perform all Work when necessary to remove the deleterious materials before and after subgrade preparation.

3.4 PREPARING SUBGRADE

- A. Prepare subgrade to avoid excessive compaction. If Owner determines that excessive compaction has occurred, it shall be corrected as follows:

1. Scarify with a rototiller to a depth of 4 inches minimum in one direction.

Note: This Work shall occur subsequent to Irrigation Work and immediately before Topsoil Placement.

3.5 TOPSOIL PLACEMENT

- A. Imported Topsoil at Landscape Areas

1. Place Imported Topsoil evenly over indicated compacted subgrade in landscape areas to the depths shown on Drawings.

3.6 FINISH GRADING OPERATIONS

- A. General: Grade with uniform slope between points where elevations are given or between such points and existing grades, unless indicated otherwise.

- B. Soil Surface Tolerances

1. Allowances: Make proper allowances for settlement, spoils from plant pits, etc.

- C. Surface Drainage:

1. Slope finish grades to drain surface water away from buildings, walks, paving, and other structures unless otherwise indicated.
2. Slope finish grades to drain surface water to catch basins, area drains or swales as shown on the Drawings.

- D. Depressions and Loose Material: Fill and compact depressions, and remove all loose material to finish surface true to line and grade, presenting a smooth, compacted, and unyielding surface.

- E. Roller Compact with sod roller filled with water. Add Imported Topsoil as necessary to achieve finish grades.

- F. Excessive Compaction: Rip areas that have become compacted more than 85 percent compaction to a 12-inch depth. Roto-till and blade smooth prior to planting and irrigation.

- G. Imported Topsoil shall be installed three and half inches (3-1/2") lower than all adjacent pavement surfaces and top of walls. Grade a 12" wide @ 2%-4% transition from pavements. Transitions shall be graded uniform and smooth with no surface irregularities.

- H. Remove all visible evidence of wood debris and stones from all finish grades and dispose off-site.

3.7 PROTECTION

- A. Contractor is informed that physical and visual damage to any constructed improvement, including equipment wheel/track marks may result in the removal and replacement of damaged improvement, at the sole discretion of the Owner. Contractor shall schedule work and deploy measures to protect all constructed improvements.
- B. Erosion: Correct erosion and siltation damage at no cost to the Owner.
- C. Settlement Repair: Correct settlement within the Warranty period at no cost to the Owner.
- D. Drainage: Keep surface of topsoil in such condition that it will drain readily and effectively.
- E. Materials, Tools, and Equipment: In handling materials and operating tools and equipment, protect the topsoil from damage by laying down planks, plywood, or other accepted protective materials where required.
- F. Vehicular Traffic: Do not allow vehicles to travel in a single track. If ruts are formed, blade the topsoil smooth.
- G. Storage of Materials: Do not store or stockpile materials on topsoil.
- H. Dust Control: Use water trucks or temporary irrigation and take all precautions needed to prevent a dust nuisance to adjacent public or private properties.

3.08 CLEANUP & REMOVAL

- A. Daily: Keep all areas of Work clean, neat, and orderly at all times.
- B. Absolutely no stockpiling of any topsoil on pavement surfaces shall be permitted at any time during construction.
- C. Final: Clean up and remove all excess Imported Topsoil deleterious materials and debris from the entire Work area prior to Final Completion.

END OF SECTION

- A. City of Port Angeles permit fees, abandonment fees, bonds, and inspections are to be obtained, paid for and scheduled by the Contractor.

1.05 DIMENSIONS AND LAYOUTS

- A. See Section 311000 Site Clearing.

1.06 CONTRACTOR REQUIREMENTS

- A. The contractor shall meet all requirements of the City of Port Angeles Water Department.
- B. The Contractor is responsible for coordinating any water system shutdowns with City of Port Angeles, Peninsula Housing Authority, and Port Angeles Fire Department.
- C. The contractor is responsible for coordinating the phasing of the installation of the water system and fire hydrants with the Port Angeles Fire Department and City of Port Angeles Water Department. At all times the contractor shall provide adequate fire coverage per the Port Angeles Fire Department requirements.

1.07 WARRANTIES

- A. The Contractor shall warranty that the water system extension and all parts shall remain in proper working condition, order, and repair for a period of two (2) years from the date of final acceptance of the ex-tension by the Owner. The Contractor shall repair or replace at its own expense, any work or material that proves defective during the warranty period. When corrections of defects occurring within the warranty period are made, the Contractor shall further warrant the corrected work for (2) years after acceptance of the corrected work by the Owner.

1.08 SUBMITTALS

- A. Provide product data sheets for approval prior to construction.

PART 2 PRODUCTS

2.01 CONTRACTOR SHALL MEET ALL REQUIREMENTS OF THE CITY OF PORT ANGELES WATER DEPARTMENT

2.02 DUCTILE IRON PIPE

- A. Ductile iron pipe shall be new, Class 52, cement lined, conforming to AWWA C-150.
- B. Ductile iron pipe shall be push-on joint or mechanical joint unless otherwise specified on the plans.

1. Pipe with push on joints shall be furnished with a single rubber ring gasket. All gaskets, including MJ shall be lubricated to affect the seal. Pipe with mechanical joints shall be furnished with a mechanical joint of the stuffing box type, including rubber gasket, cast-iron gland, and tee-head bolts and nuts to effect the seal.
- C. All joints shall conform to AWWA C-111.
 1. Flanged joints shall conform to ANSI Standard B16.1.
- D. Internally locked joints shall be in accordance with ANSI A21.11 and equal to US Pipe "TR Flex" or Griffin "Snap Lok."
- E. Bell and socket joints shall be in accordance with ANSI A21.10 and equal to US Pipe "Usiflex."
- F. Standard Thickness cement mortar lining shall be in accordance with ANSI Standard A21.4 (AWWA C-104).

2.03 DUCTILE IRON FITTINGS

- A. Ductile iron fittings shall be short body for pressure rating of 150 psi, unless otherwise noted. Metal thickness and manufacturing process shall conform to applicable portions of ANSI Standard A21.10, A21.11, A21.53, B16.2, B16.4.
- B. Standard Cement mortar lining in accordance with ANSI Standard A21.4 (AWWA C104).
- C. Rubber gaskets for push-on joint (Tyton) or mechanical joint (MJ) shall be in accordance with USA Standard A21.11 (AWWA C-111).
- D. Where restrained joints are required, fittings may be manufactured with US Pipe TR Flex, Griffin "Snap-Lok" or Pacific States Restrained Joints, in addition Mega-Lugs may be used.

2.04 FIRE HYDRANTS

- A. Fire hydrants shall conform to AWWA Standard Specification C502 and be the following:
 1. Mueller Model Century 200 with two 2 1/2-inch (National Standard Thread) side ports and one 4-inch (National Standard Thread) steamer nozzle with 4-inch Storz Adaptor.
- B. Fire hydrants shall be equipped with one 4" (inch) Stortz attached with a 1/8-inch stainless steel cable.

- C. Fire hydrants shall be installed in accordance with the City of Port Angeles Standard Details. Pumper connection to face roadway or as directed by Port Angeles Fire Department. Fire hydrant extension to be used if required.
- D. The hydrants shall be painted according to City of Port Angeles Standards, caps to be painted based on available flow through each hydrant.

2.05 COPPER PIPE

- A. Copper tubing shall be Type K. Fittings of the same material as pipe.

2.06 LOCATING WIRE

- A. All water mains and side services installed shall have 14-gauge solid insulated copper wire placed in the trench over the water main and the ends brought up into the valve boxes. Said locating wire shall also be placed over the water service line (new lines only). All connections or splicing shall be made with Split Bolt Wire Connectors.

2.07 BEDDING AND BACKFILL MATERIAL

- A. Bedding and backfill material shall conform to Section 310000 Earthwork.

2.08 GATE VALVES – ALL RESILIENT WEDGE

- A. Gate valves 10" and larger.
- B. Gate valves 8" and smaller.
- C. All 2" valves shall be ball valves approved by Port Angeles.

2.09 BUTTERFLY VALVES

- A. Butterfly valves.
- B. Valve shafts.
- C. Butterfly valves to be installed underground shall have sealed mechanical operators and 2" standard square operating nuts
- D. Complete manufacturer's specifications for the valves proposed for use shall be submitted to Port Angeles for approval.
- E. No valves shall be used which have not been approved by Port Angeles.

2.10 VALVE BOXES

- A. Valve boxes shall be cast iron with adjustable sections such as heavy-duty Port Angeles Standard or equal APWA Standard #67 as in 1981 APWA Standard Specifications or equal, 18' top section and regular 24" base section or base section as required.

2.11 CONCRETE MARKER POSTS

- A. A concrete valve marker post shall be 4" minimum square section and a minimum length of 42", with beveled edges and containing at least one (1) 3/8" diameter bar of reinforcing steel.

2.12 FIRE HYDRANT GUARD POSTS

- A. Concrete fire hydrant guard posts shall be made of precast reinforced concrete, nine (6) inches in diameter, six (6) feet long.

2.13 SERVICE SADDLES

- A. Service saddles.

2.14 TAPS AND CUT-INS

- A. All taps and cut ins into existing mains shall be made by the City. Contractor shall coordinate with the City of Port Angeles to provide connection and shall pay fees associated with connection.

2.15 DOUBLE DETECTOR CHECK VALVE

- A. Double Detector Check Valve shall be on the approved Washington State DOH list of approved devices and shall conform to City of Port Angeles Standards and Specifications.

2.16 BUILDING CONNECTIONS

- A. Service connections shall be per City of Port Angeles Standards and WSDOT/APWA Section 9-30.6.

2.17 TRACER TAPE

- A. Utility pipe tracer tape shall be detectable below ground surface, color coded, with utility name printed on tape. Conductive warning tape required over all water pipe. Tape shall be manufacturer's standard permanent, bright-colored, continuous printed plastic tape, aluminum backed, intended for direct-burial service. Tape shall be not less than 6" wide x 4 mils thick.

Piping

Color

Wording

- | | | |
|---------------------|------|--------------------------|
| 1. Domestic Water | Blue | Caution Domestic Water |
| 2. Fire Water | Blue | Caution Fire Water |
| 3. Irrigation Water | Blue | Caution Irrigation Water |

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that trench is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATIONS

- A. General.
 - 1. All installations shall conform to the WSDOT APWA Standards.
 - 2. All trenching shall conform to the Washington Administrative Code (WAC) 296-155 requirements for Excavation, Trenching and Shoring.
 - 3. Standard Specification Section 7-10, unless otherwise specified by the City of Port Angeles.
 - 4. Pipe will have bedding unless otherwise noted.
 - 5. Join pipe sections in such a manner as not to damage the lining or coating. Any damage to the lining or coating shall be repaired by the Contractor and at the Contractor's expense.
- B. Install pipe, fittings, and appurtenances in accordance with WSDOT APWA Standards and in accordance with manufacturer's instructions.
- C. Install tracer tape per manufacturer's direction above all water lines.

3.03 CONNECTIONS TO EXISTING SYSTEMS

- A. Connections to existing mains shall be by the City of Port Angeles. The contractor shall coordinate.

- B. Contractor shall extend piping to floor flange within building for new services and shall connect 5 feet beyond exterior building face for existing buildings. Contractor shall coordinate all connections with building plumbing Contractor.

3.04 FIRE HYDRANT INSTALLATION

- A. Fire hydrant installations shall be in accordance with City of Port Angeles requirements.

3.05 TESTING AND DISINFECTION

- A. Pressure test pipe in accordance with City of Port Angeles Standards and Section 7-09.3(23) of WSDOT-APWA.
- B. The contractor is responsible for all cost associated with the water line testing and inspection.
- C. Disinfection of Water lines shall be in accordance with the City of Port Angeles Specifications. After disinfection, dispose of all contaminated water per City of Port Angeles Standards.

END OF SECTION

SECTION 333000

SANITARY SEWER UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work includes but is not limited to following.
 - 1. Furnishing and installing sanitary sewer piping, and cleanouts.
 - 2. Coordination and connections to existing and new side sewers.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including and Supplementary Conditions and Division 01 Specification Sections, apply to this section. Coordinate related work specified in other parts of the Project Manual, including but not limited to the following:
 - 1. Section 310000 - Maintenance of Earthwork.

1.03 REFERENCES

- A. Washington State DOE Washington State Department of Ecology Criteria for Sewage Works Design.
- B. City of Port Angeles Engineering Design Standards, Current Edition.
- C. WSDOT/APWA 2022 Standard Specifications for Road, Bridge, and Municipal Construction.
- D. Standard Details City of Port Angeles Standard Details

1.04 PERMITS

- A. General: All permits, fees and inspections are to be obtained or scheduled by the Contractor at his expense.

1.05 DIMENSIONS AND LAYOUTS

- A. See Section 311000 Site Clearing.
- B. The Contractor is responsible for preserving all benchmarks and stakes and the replacement of any that are displaced or missing.

- C. The Contractor is responsible for review of all records relative to the existing underground utilities. The Contractor is responsible for avoiding damages to these facilities and shall restore all utilities at its own expense. The Contractor is to notify the Owner's Representative immediately of underground utilities encountered, which are not shown on the Engineer's record.

1.06 SUBMITTALS

- A. Provide data sheets for all proposed materials.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE

- A. PVC pipe shall conform to Section 9-05.12 of WSDOT-APWA with rubber gasket joints. Connections to manholes shall be by an AC or GPK manhole adapter.

2.02 DUCTILE IRON PIPE

- A. Ductile Iron pipe shall conform to ANSI A 21.51 or AWWA C151 and shall be Cement mortar lined, push on joint or mechanical joint. The ductile iron shall be Class 52, unless otherwise approved.

2.03 CLEANOUTS

- A. Clean-outs shall conform to Contract Documents.

2.04 SANITARY SEWER MANHOLES

- A. Sanitary Sewer Manholes per City of Port Angeles Standard Details. Ring and cover shall be bolt locking.

2.05 TRACER TAPE

- A. Utility pipe tracer tape shall be detectable below ground surface, color coded, with utility name printed on tape. Conductive warning tape required over all sewer pipe. Tape shall be manufacturer's standard permanent, bright-colored, continuous printed plastic tape, aluminum backed, intended for direct-burial service. Tape shall be not less than 6" wide x 4 mils thick.

1. Tape Schedule:

- | | | |
|-------------------|-------|------------------------|
| a. Piping | Color | Wording |
| b. Sanitary Sewer | Green | Caution Sanitary Sewer |

PART 3 EXECUTION

3.01 TRENCHING

- A. Trenching shall be in accordance with Section 7-17.3(1) of WSDOT-APWA. Excavation shall be made to alignment, elevation, grade and slope as indicated on the drawings.
- B. Accomplish trenching utilizing equipment with slope and depth control, such as, "laser plane control system" so as to ensure accuracy in the bottom of the trench and placement of the pipe. No high points above designated invert or calculated trench bottom elevation will be permitted. No sloughing of site material or loose excavated soil will be permitted in trenches.

3.02 TRENCHES

- A. Trenches shall be in straight lines as indicated on the drawings. Where feasible, trench width at the top shall be no greater than 24". If sloughing of trench side is encountered, a cribbing form will be required to maintain trench side stability. Excavate to a depth below invert grade to allow for bedding as specified.
- B. Keep the trench free from water until pipe is laid and backfilled. Divert all surface water so as not to enter the trench. Entirely remove boulders, rocks, roots and other obstructions, or cut out to the width of the trench and to a depth of 6" below the elevation of bottom of pipe. Remove and dispose of all loose and excess excavated materials off-site at Contractor's prearranged location.

3.03 PIPE INSTALLATION

- A. Install pipe in accordance with Section 7-17.3(2) of WSDOT-APWA and the manufacturer's recommendations.
- B. Make all connections with approved fittings as recommended and furnished by the manufacturer. Make connections to existing sewer lines at locations shown on the drawings.
- C. Install tracer tape per manufacturer's direction above all sewer lines.

3.04 BEDDING AND BACKFILLING

- A. Bedding shall be installed in accordance with Section 310000 and contract drawings.
- B. Backfilling shall be in accordance with Section 310000.

3.05 CLEANING AND TESTING

- A. Cleaning and Testing shall be in accordance with WSDOT-APWA Section 7-17.3 and the City of Port Townsend Standards. The contractor is responsible for all coordination and cost associated with the cleaning and testing.
- B. Unacceptable pipe runs will be removed and replaced with new pipe their entirety and re-tested at no additional cost to the owner.

3.06 AS-BUILT PLANS

- A. The Contractor is responsible for providing accurate As-Built plans in accordance these specifications.

END OF SECTION

- C. The Contractor is responsible for review of all the Engineer's records relative to the existing under-ground utilities. The Contractor is responsible for avoiding damage to these facilities and shall restore all utilities at its own expense.
- D. The Contractor is to notify the Owner's Representative immediately of underground utilities encountered, which are not shown on the Engineer's record.

1.06 SUBMITTALS

- A. Provide data sheets for all proposed materials.

PART 2 PRODUCTS

2.01 REINFORCED CONCRETE PIPE

- A. Concrete pipe less than 12" in diameter shall be ASTM designation C-14, Class 3 with rubber gasketed joints.
- B. Concrete pipe 12" in diameter or larger shall be ASTM C-76, Class IV with rubber gasket joints.
- C. Connections to manholes and catch basins shall be by mortar joint. Portland cement joints on pipe are prohibited.

2.02 POLYVINYL CHLORIDE (PVC) PIPE

- A. PVC pipe shall conform to Section 9-5.12 of WSDOT-APWA. Pipe shall be ASTM 3034, SDR 35, with rubber gasket joints. PVC pipe may be used in areas where cover over pipe is three (3) feet or greater.
- B. Connections to catch basins or manholes shall be by an AC or GPK manhole adaptor.

2.03 DUCTILE IRON PIPE

- A. Ductile iron pipe shall conform to AWWA C151 Class 52 with push-on joints. Ductile iron pipe shall be cement mortar lined conforming to AWWA C104.

2.04 POLYETHYLENE PIPE (CPEP)

- A. Double walled smooth interior corrugated polyethylene pipe CPEP. Pipe shall meet the requirements of AASHTO M252 Type S for pipe 8 inches in diameter and less, and AASHTO M294 Type S, for pipe 12 inches in diameter and greater. Fittings and couplings for pipe 12-inches in diameter and greater shall be watertight.

2.05 CORRUGATED PVC PIPE

- A. Corrugated PVC pipe shall be IPEX Ultra Rib or approved equal double walled smooth interior corrugated PVC pipe. Corrugated PVC pipe shall conform to ASTM F794 and shall be watertight.

2.06 CLEANOUTS

- A. Cleanouts shall conform to the Contract Documents. All cleanout covers will be locking.

2.07 COUPLINGS AND JOINTS

- A. Tees on existing pipe shall be connected by core drilling and flexible connections.
- B. Pipe to pipe connections shall be made with a flexible gasketed coupling, adapter or coupling-adapter to make a watertight joint. Couplings shall be those manufactured by Romac or Caulder or approved equal.

2.08 BEDDING AND BACKFILL MATERIAL.

- A. Bedding and backfill material shall conform to Section 310000 and the drawing details.

2.09 CONCRETE CATCH BASINS

- A. Type 1 catch basins shall be constructed of pre-cast units by Associated Sand and Gravel or approved equal in accordance with the Clallam County Standard Details. Metal frame and grate shall conform to Clallam County Standard Details. All grates shall have locking bolts.
- B. Type 2- 48" and 54" catch basins shall be constructed of pre-cast units by Associated Sand and Gravel or approved equal in accordance with Clallam County Standard Details. Metal ring and cover shall conform to Clallam County Standard Details. All lids shall have locking bolts and shall be marked "DRAIN."

2.10 WATER QUALITY TREATMENT SYSTEM

2.11 DETENTION TANK

2.12 TRACER TAPE

- A. Utility pipe tracer tape shall be detectable below ground surface, color coded, with utility name printed on tape. Conductive warning tape is required over drainage pipe. Tape shall be manufacturer's standard permanent, bright-colored, continuous printed plastic tape, aluminum backed, intended for direct-burial service. Tape shall be not less than 6" wide x 4 mils thick.

1. Tape Schedule:

a. Piping	Color	Wording
1) Storm Sewer	Green	Caution Storm Sewer

PART 3 EXECUTION

3.01 TRENCHING

- A. Excavation and preparation of the trench shall be in accordance with Section 7-04.3(1) of WSDOT-APWA. All trenching shall conform to the Washington Administrative Code (WAC) 296-155 requirements for Excavation, Trenching and Shoring.
- B. Excavation shall be made to alignment, elevation, grade and slope as indicated on the drawings. Trenching shall be accomplished utilizing equipment with slope and depth control, such as "laser plane control system," so as to ensure accuracy in the bottom of the trench and placement of the pipe. No high points above designated invert or calculated trench bottom elevation will be permitted. No sloughing of site material or loose excavated soil will be permitted in trenches.
- C. Hand dig excavation within the drip line of trees. Cut no roots larger than 1 inch. At no time shall roots be pulled by equipment.

3.02 TRENCHES

- A. Trenches shall be in straight lines as indicated on the drawings. Where feasible, trench width at the top shall be no greater than 24". If sloughing of trench side is encountered, a cribbing form will be required to maintain trench side stability. Excavate to a depth below invert grade to allow for bedding as specified.
- B. Keep the trench free from water until the pipe is laid and backfilled. Divert all surface water so as not to enter the trench. Entirely remove boulders, rocks, roots and other obstructions, or cut out to the width of the trench and to a depth of 6" below the elevation of bottom of pipe. Remove and dispose of all loose and excess excavated materials off-site at Contractor's pre-arranged location.

3.03 PIPE INSTALLATION

- A. Install pipe in accordance with the Section 7-04.3(2) of WSDOT-APWA. Provide ductile iron pipe where top of storm drainpipe is less than 1'0" below finished grade under paved areas.

- B. Make all connections with approved fittings. Join pipe and fittings by flexible compression rings conforming to ASTM C443. Make connections to existing storm sewer lines at locations shown on the drawings.

3.04 BEDDING AND BACKFILLING

- A. Bedding in accordance with Section 310000 and the project drawings.
- B. Backfill trenches in accordance with Section 310000.

3.05 CLEANING AND TESTING

- A. Clean and test in conformance with Section 7-04.3(4) of WSDOT-APWA. All new lines shall be subjected to testing after installation. Tests shall be exfiltration test or air pressure test. Conduct tests in the presence of the Owner's representative or Engineer.
- B. Clean existing storm lines and catch basins following completion of new storm drain installation. Mechanically remove all sediment displaced from lines from the system, and do not flush downstream. Contractor shall take extreme care to prevent any sediment from being always discharged into the downstream system during construction.
- C. Unacceptable pipe runs will be removed and replaced with new pipe their entirety and re-tested at no additional cost to the owner.

END OF SECTION