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 inconsistence 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

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A. IMEG is the Engineer of Record for this project. ~~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.

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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 ¾ 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 ¼” 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 ¼” per foot or 2%, such pipe or piping 4” or larger in diameter shall be permitted to have a slope of not less than 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 ¼" 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