SECTION 00 9114

ADDENDUM NUMBER 4

PARTICULARS

DATE: DECEMBER 12, 2024

PROJECT: MEDFORD WATER OPERATION CENTER

ARCHITECT'S PROJECT NUMBER: 22085

OWNER'S PROJECT NUMBER: CIPW-22-00280

OWNER: MEDFORD WATER

ARCHITECT: SODERSTROM ARCHITECTS

TO: PROSPECTIVE BIDDERS:

THIS ADDENDUM FORMS A PART OF THE CONTRACT DOCUMENTS AND MODIFIES THE ORIGINALPROCUREMENT DOCUMENTS DATED 11/7/2024, WITH AMENDMENTS AND ADDITIONS NOTED BELOW.

ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACE PROVIDED IN THE BID FORM AND BELOW. FAILURE TO DO SO MAY DISQUALIFY THE BIDDER.

CHANGES TO THE PROJECT MANUAL - INTRODUCTORY REQUIREMENTS, PROCUREMENT REQUIREMENTS AND CONTRACTING REQUIREMENTS:

SECTION 00 0102 – PROJECT INFORMATION

Revise Paragraph 1.02 Project Description, Subparagraph A, section 1 as follows:

1. Administration … campus. **Bidder for Medford Water Operation Center project will be responsible for constructing the public sidewalks and landscaping along the Aqua and Industry street frontages of the site (streets currently under construction) as described in the road construction drawings prepared by Marqueess & Associates, included with the Bid drawings.**

Section reissued in entirety

SECTION 00 0110 – TABLE OF CONTENTS

Remove SECTION 08 0671 – DOOR HARDWARE SCHEDULE
(Note: This information has been moved to the end of Section 08 7100 – Door Hardware)

Add SECTION 31 2316.26 – ROCK REMOVAL

Add SECTION 33 3123 – SANITARY SEWER FORCE MAIN PIPING

Section reissued in entirety

SECTION 01 5713 – TEMPORARY EROSION & SEDIMENT CONTROL

Revise Paragraph 2.01, subparagraph B as follows:

B. Grass Seed For Temporary Cover: ~~Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.~~ **Select grass seed species that will provide a sterile annual cover crop incapable of re-germinating after initial establishment**.

Section reissued in entirety

CHANGES TO THE PROJECT MANUAL - SPECIFICATIONS:

SECTION 07 6110 – Sheet Metal Roofing - Alternate

Revise Paragraph 3.01 Installation, sub-paragraph E, line 2 as follows:

4. Space standing seams at ~~17 inch~~**16 inch** on center.

Section reissued in entirety.

SECTION 08 0671 – DOOR HARDWARE SCHEDULE

Delete Section in entirety (this information has been moved to Section 08 7100 – Door Hardware)

SECTION 08 7100 – DOOR HARDWARE

Multiple Additions, Deletions, and Revisions throughout section, including the addition of Hardware Groups. Hardware Groups have been revised in entirety. Section reissued in entirety.

SECTION 21 2201 - Hybrid Fire Extinguishing Systems

Revise indicated instances of “Vortex” to “Vortex 500” throughout.

Section reissued in entirety.

SECTION 23 1113 - Fuel Handling System

Revise Paragraph 2.04 A as follows:

A. Design: One …. day tanks. **See fueling handling equipment schedule on the drawings for additional information.**

Revise Paragraph 2.04, Subparagraph B, line 3 as follows:

3. Fuel circulation pump bronze ~~8~~ **5** GPM with pressure relief 115/230V 1PH 50/60Hz.

Section reissued in entirety.

SECTION 27 0000 – Communications Basic Requirements

Delete Paragraph 1.05.B.2 in its entirety.

Section reissued in entirety.

SECTION 27 4116 – Integrated Audio-Video Systems and Equipment

Delete Paragraph 1.05.G.2 in its entirety.

Delete Paragraph 1.05.G.3 in its entirety.

SECTION 31 0000 – Site Clearing

Revise Paragraph 3.03, subparagraph A as follows:

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, ~~playing fields, lawns,~~ and planting beds, **and seeded areas.**

Delete Paragraph 3.03, subparagraph C, line 1

Delete Paragraph 3.03, subparagraphs D and E and associated lines.

Revise Paragraph 3.03 subparagraph F as follows:

F. Vegetation Removed: ~~Do not burn, bury, landfill, or leave on site, except as indicated.~~ **Must remain on site and be consolidated and buried under rough seeded areas at the southwest region of the site.**

Delete Paragraph 3.03 subparagraph F, lines 1, 2, and 3

Revise Paragraph 3.04, subparagraph A as follows:

A. Remove debris, junk, and trash from site**, excluding any soil materials.**

Section reissued in entirety.

SECTION 31 2200 – Grading

Revise Paragraph 3.01, subparagraphs A and B as follows:

A. Stockpile topsoil to be re-used on site; ~~remove remainder from site~~. **No topsoil to be removed from site.**

B. Stockpile subsoil to be re-used on site; ~~remove remainder from site~~. **No subsoil to be removed from site.**

Revise Paragraph 3.06 subparagraph A as follows:

~~A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.~~ **No soils may be removed from site. All areas used for stockpiled topsoil and subsoil must be graded to prevent standing water.**

Section reissued in entirety.

SECTION 31 2316 – Excavation

Add Paragraph 1.02, subparagraph G as follows:

G. Section 31 2316.26 – Rock Removal: Removal of rock during excavation.

Add Paragraph 1.06 – Definitions and sub paragraphs as follows:

1.06 DEFINITIONS

A. Common Excavation: Removal of all materials not classified as rock excavation as specified in Section 31 2316.26 – ROCK REMOVAL.

Delete Paragraph 3.04, subparagraph I

Revise Paragraph 3.04, subparagraph K as follows:

Remove excess excavated material removed **more than three (3) feet below existing grade from site.**

Section reissued in entirety.

SECTION 31 2316.13 – Trenching

Add Paragraph 1.04, subparagraph B as follows:

B. Soils: As defined in Section 31 2323 – FILL.

Revise Paragraph 3.03, subparagraph G as follows:

G. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. **See Section 31 2316.26 for removal of larger material.**

Add Paragraph 3.03, subparagraph M as follows:

M. No soils may be removed from site. See Section 31 2200 – Grading for additional information.

Revise Paragraph 3.09, subparagraph B as follows:

B. Remove…surface water. **No soils removed in the course of trenching activities may be removed from site.**

Section reissued in entirety.

SECTION 31 2316.26 – Rock Removal

Add Section in entirety

SECTION 31 2323 – Fill

Revise Paragraph 2.01 – Fill Materials as follows:

A. All ~~materials~~ **structural and granular fill** shall be in accordance with Project Geotechnical Report.

B. Topsoil per Section 32 9113 – Soil Preparation.

C. Imported Earth Fill: Approved earth fill materials, free of subsoil clay lumps, brush, weeds, roots, rock larger than 1-1/2 inches in any dimension, and other material harmful to plant growth.

D. On-site Excavated Fill: All excavated material encountered within three (3) feet of existing surface elevation, including:

1. Brush, weeds, and organic material.

2. Root balls and stumps.

3. Clay lumps and rock 4 inches and smaller.

Revise Paragraph 2.02, subparagraph A as follows:

A. Geotextile Fabric: Non-biodegradable

1. Non-woven: ~~GEOTEX 801~~ **MIRIFI 180N** or approved equal with laps per manufacturers specification.

2. Woven: ~~GEOTEX 200ST~~ **ACF WSF200** or approved equal with laps per manufacturers specification.

3. Filter: ~~GEOTEX 801~~ **MIRIFI 140N** or approved equal.

5. ~~Waterproof Membrane~~ **Vapor barrier**: 10mil thick by StegoWrap or approved equal installed per manufacturers specification.

4. Storm Facility Liner: FIRESTONE 45mil EPDM or approved equal with laps and cover seams per manufacturer specification.

Section reissued in entirety.

SECTION 32 1123 – Aggregate Base Course

Revise Paragraph 2.01, subparagraph B as follows:

B. Geotextile Fabric: ~~Non-biodegradable~~ **Per Section 31 2323 – Fill.**

~~1. Woven: GEOTEX 200ST or approved equal with laps per manufacturers specification.~~

Section reissued in entirety.

SECTION 32 1313 – Concrete Paving

Revise Paragraph 2.01, subparagraph C as follows:

C. Concrete ~~Driveway~~ **Vehicular Pavement and Valley Gutters**: 4,000 psi 28 day concrete, 6 inches thick, ~~# 4 continuous rebar at 16" on center each way~~ **reinforcement per plan**, buff color Portland cement, wood float broom finish.

Revise Paragraph 2.01, subparagraph D as follows:

D. Concrete Retaining Walls: 4,000 psi 28 day concrete, thickness a**nd reinforcement** per plan, buff color Portland cement, smooth rubbed finish.

Add Paragraph 3.06, subparagraph E as follows:

E. Retaining walls shall be at a minimum 80% design strength and 7 days cure prior to any backfill placement.

Revise Paragraph 3.07 Joints as follows:

3.07 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Place 3/8 inch wide expansion joints at ~~20 foot intervals~~ **9 times typical scored panel size maximum (example: 5 foot panels require an expansion joint every 45 feet)** and to separate paving from vertical surfaces, other components and in pattern indicated.

1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
2. Secure to resist movement by wet concrete.

C. Provide scored **contraction** joints **at 3 times typical scored panel size maximum (example: 5 foot panels require a contraction joint every 15 feet)**.

1. Sawn joints shall be green sawn a minimum of 1/8 inch wide, 1/3 the depth of the pavement within 12 hours of concrete placement.

2. Troweled joints shall be a minimum of 1/8 inch wide, 1/3 the depth of the pavement, with 1/4 inch radii.

~~D. Install joints as specified on the plan set.~~

D. Provide scored dummy joints at a length roughly equivalent to sidewalk width, 10 foot maximum (example: 5 foot wide sidewalk requires a dummy joint approximately every 5 feet).

1. Dummy joints shall be equally spaced between expansion joints.

E. No horizontal joints are permitted on site retaining walls.

F. Install joints as otherwise specified on the plan set.

Section reissued in entirety.

SECTION 32 1713 – Parking Bumpers

Delete Paragraph 1.01, subparagraph B

Delete Paragraph 2.01, subparagraph B

Section reissued in entirety.

SECTION 32 1723.13 – Painted Pavement Markings

Add Paragraph 1.03, subparagraph D as follows:

D. ASTM E303-93 (2013) – Pendulum Test Method for Dynamic Slip Resistance.

Revise Paragraph 2.01, subparagraph A as follows:

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.

1. Roadway markings: White.
2. Parking lot **striping**: ~~Yellow~~ **White**.
3. ~~Handicapped Symbols~~ **Accessible parking 'wheelchair' symbols**: Blue **and white**.

4. Symbols and text: White.

5. Fire lane striping: red with white text.

6. No parking and hazard zones: Yellow with white text (as applicable).

Delete Paragraph 2.01, subparagraph B

Section reissued in entirety.

SECTION 32 1726 – Tactile Warning Surfaces

Delete Paragraph 2.01, subparagraph B

Delete Paragraph 2.02, subparagraph B

Delete Paragraph 3.04 – Installation Cast In Place, Cast Iron Plates
Section reissued in entirety.

SECTION 32 3300 – Site Furnishings

Delete Paragraph 2.01, subparagraph B “Skateboard Deterrents” in its entirety
Section reissued in entirety.

SECTION 32 8424 – Irrigation

Multiple Additions, Deletions, and Revisions throughout section. Section reissued in entirety.

SECTION 32 9113 – Soil Preparation

Revise Paragraph 2.01, subparagraph B as follows:
B. On-Site or Imported Earth Fill: ~~Approved excavated earth fill materials, free of subsoil clay lumps, brush, weeds, roots, stones larger than 1-1/2 inches in any dimension and other material harmful to plant growth.~~ **See Section 31 2323 – Fill.**

Revise Paragraph 3.02, subparagraph A, line 1 as follows:
1. Remove all gravel, aggregate base rock material, asphalt, concrete, roots of any dead tree or tree to be removed, and all construction debris from planting beds to a minimum depth of ~~18”~~ **22 inches** below ~~finish grade~~ **top of prepared topsoil,** and a minimum depth of 12” inches below ~~finish grade~~ **top of prepared topsoil** for areas to be seeded

Delete Paragraph 3.04, subparagraph A, line 2
Section reissued in entirety.

SECTION 32 9200 – Hydroseeding

Revise Paragraph 2.01, subparagraph A and line 1 as follows:
A. **Maintenance** Fertilizer and Accessories:
1. **Maintenance** Fertilizer: Best Turf Gold 22-5-6, or approved equal.

Revise Paragraph 3.01, subparagraph A, line 3 as follows:
3. Start of Hydroseeding Work indicates acceptance of subgrade and ~~surface~~ **finish grade** conditions.
Section reissued in entirety.

SECTION 32 9300 – Planting

Revise Paragraph 3.02, subparagraph E, line 1 as follows:

1. Set top of root ball 1-1/2 inches above ~~finished grade~~ **top of prepared topsoil.**

Revise Paragraph 3.02, subparagraph G, lines 3, 4 and 7 as follows:
3. When hole is filled to within 4" of ~~finish grade~~ **top of prepared topsoil**, fill with water and let stand until water is absorbed by soil.
4. Backfill with prepared ~~soil mix~~ **topsoil** and compact to eliminate voids.
7. Plant Hydration System: For trees not provided with automatic irrigation (see ~~plan~~ **Drawings**), install 36” Tree Diaper per manufacturer’s direction. Minimum four stakes per tree diaper.

Revise Paragraph 3.02, subparagraph J, lines 1 as follows:

1. Apply ~~4"~~ **3-inch thick** layer of bark mulch over planting beds within two days after planting.

Add Paragraph 3.02, subparagraph J, lines 2 as follows:

2. Keep mulch 2 inches away from tree trunk.

Section reissued in entirety.

SECTION 33 1416 – Site Water Utility Distribution Piping

Multiple Additions, Deletions, and Revisions throughout section. Section reissued in entirety.

CHANGES TO DRAWINGS:

DRAWING C0.01

1. Remove Sheet Notes for Erosion Control, Site Demolition, Site Preparation, Utility Installation, Concrete Construction, and Pavement Marking

DRAWING C3.10

1. Revise SW Facility #1 information

DRAWING C3.70

1. Revise SW Facility #4 information

DRAWING C4.00

1. Revise sewer along north side of building, including adding additional facilities and elevation call-outs

DRAWING C5.10

1. Remove Concrete Construction sheet notes
2. Detail 12 – revise fabric underneath pavement

DRAWING C5.11

1. Detail 25 – DCS Table of Elevations – Revise elevations throughout table

DRAWING C5.12

1. Detail 26 – Add note for Indicator Valve

DRAWING L1.01

1. Added keynote #17 to reference crushed gravel border per Detail #3 on Sheet L4.00

DRAWING L1.02

1. Added keynote #17 to reference crushed gravel border per Detail #3 on Sheet L4.00
2. Changed edge restraint line on crushed gravel border
3. Removed keynote #14 for uncovered bicycle parking
4. Changed location of bicycle rack, paving and control joint in clouded areas

DRAWING L2.05

1. Changed irrigation head, drip stub up and inline drip tubing extent locations inside clouded areas

DRAWING L3.00

1. Changed planting locations inside clouded areas

DRAWING L3.05

1. Changed planting locations and quantities inside clouded areas

DRAWING L4.00

1. Added detail for crushed gravel border with building to Detail #3
2. Remove skateboard deterrent from seat wall on Detail #2
3. Modified text language on Details #4 and #5

DRAWING L4.01

1. Modified Detail #2 to show vertical main line routing to achieve main line depth
2. Modified Detail #3 to show vertical lateral line routing to achieve lateral line depth
3. Modified Detail #4 to show prepared topsoil depth, finish grade correction for mulch and seeded areas, removed 4” dimension between head and concrete paving.
4. Modified Detail #6 to show vertical main line routing to achieve main line depth
5. Modified Detail #7 to show vertical lateral line routing to achieve lateral line depth
6. Modified text language for finish grade and top of prepared topsoil on Details #9, #10, #13 and #15

DRAWING A.A0.01

1. Revised Wall Type Legend to match the one shown on floor plan sheets

DRAWING A.A0.11

1. Added detail 13 for curb at Locker Room/Mudroom/Laundry area walls

DRAWING A.A2.11

1. Add curbs at all Locker Room/Mudroom/Laundry area walls.
2. Add Keynotes 03-0007, 03-0008

DRAWING A.A3.12

1. Revise details 1 to show building mounted signage
2. Add Detail 6 to show building mounted signage

DRAWING A.A4.01

1. Detail 5 – adjusted door opening in elevation
2. Detail 6 – remove blank detail callout
3. Detail 9 – revise detail callout

DRAWING A.A5.01

1. Revise Detail 11 to identify correct wood type.

DRAWING A.A5.04

1. Revise Detail 4 – Tackboard size and type
2. Revise Detail 7 – change keynote to indicate tackboard

DRAWING A.A5.05

1. Revise Detail 3 – tackboard type
2. Revise Detail 11 to remove tackboard
3. Revise Detail 13 – tackboard type

DRAWING A.A5.06

1. Revise Detail 5 to add multiple detail call outs
2. Revise detail 6 to add detail call out.
3. Revise Detail 22 to add multiple detail call outs

DRAWING A.A5.07

1. Revise Detail 4, 5 and 8 to add detail callouts

DRAWING A.A5.08

1. Revise elevations 2 and 3 with additional detail cuts, information, etc
2. Revise Detail 5 to add detail cuts

DRAWING A.A5.09

1. Revise Detail 3 to add detail callouts

DRAWING A.A6.01

1. Revise Sheet Note 6 to indicate roof deck is painted

DRAWING A.A6.11

1. Revise Sheet Note 6 to indicate roof deck is painted
2. Add Keynote 16-0006 to Training 103 for coordination of ceiling mounted items

DRAWING A.A6.12

1. Revise Sheet Note 6 to indicate roof deck is painted

DRAWING A.A8.01

1. Revise all hardware groups

DRAWING A.A8.11

1. Details 2, 3, 9, 10, and 11 - Added note to fill jamb/head with insulation
2. Detail 2 - Added note fill HM door head with spray foam

DRAWING A.A9.01

1. Changed Rooms 147-161 to have concrete curb or tile base, as applicable;
2. Delete Finish Note 10
3. Add Finish note 18
4. Correct base at Rooms 108, 118, 125
5. Correct ceiling at Room 123
6. Add finishes to Room 128
7. Correct MTL reference at Room 167
8. Remove CAB reference at Room 173

DRAWING A.A9.02

1. Revise WD-1 to show that it is for Wood Base
2. Revise MTL-3
3. Correct color name for T-4
4. Revise T-5

DRAWING A.A9.11

1. Revise Details 15 and 16

DRAWING A.A9.31

1. Added new detail 22 for locker base

DRAWING A.A9.32

1. Revised Detail 3 to show SS-1

DRAWING A.EQ2.11

1. Update quantities of Items #22, 25, 26
2. Update connection requirements for Items #25-28
3. Add Items #29 & 30 to Equipment Schedule
4. Remove Projector screen from Crew 169
5. Tag TV in Crew 169

DRAWING A.EQ2.12

1. Tag equipment in Rooms 124, 134, 137, and 103

DRAWING A.S2.01

1. Added keynote 23 for diagonal bracing at third points of WF beams at GL-9 & 11 and associated detail callout for bracing.

DRAWING A.S2.02

1. Added keynote 23 for diagonal bracing at third points of WF beams at GL-9 & 11 and associated detail callout for bracing.

DRAWING A.S4.11

1. Added detail I & J and updated schedule to reference new details
2. Detail B: Added column cap

DRAWING A.S7.01

1. Detail 6 Specified typical web stiffener plate 3/8” thickness for beam to beam conn.
2. Detail 9: Added detail
3. Detail 14: Modified girder truss support to be knife plate w/ bearing seat in lieu of angle style bearing seat. Added note to spec bolts size/grade.

DRAWING A.S7.02

1. Added detail #2
2. Detail 5: Flipped structural fascia
3. Detail 6: Flipped structural fascia, added weld callout
4. Detail 7: Added section view to detail to help show HSS to angle conn.
5. Detail 9: Modified detail to bolt drag angle to web stiffener in lieu of welded plate connection.
6. Deleted detail 12.
7. Detail 14: Added angle bearing seat to HSS and associated connection notes.
8. Detail 15: Flipped structural fascia

DRAWING A.E0.02

1. Revised fixtures C4, C8, and C8I

DRAWING A.E3.11

1. Add power connection to locker receptacles in Men’s Lockers 155 and Women’s Lockers 149.

DRAWING A.E3.12

1. Add power connection to TV in Conf. 137.

DRAWING A.E6.02

1. Revise panel schedule 2PD showing power connection to locker receptacles.

DRAWING A.T0.01

1. Add responsibility matrix to cover sheet for Technology

DRAWING A.T2.12

1. Revise location of data outlet at video wall in entryway

DRAWING D.A3.11

1. Added detail 9 for Guardrail profile

DRAWING F.G1.01

1. Removed F.A1.01 from sheet list

DRAWING F.A2.01

1. Detail 1 - Added roof slope
2. Detail 4 - Added minimum clear dimensions

DRAWING F.P0.02

1. Revise Fuel Dispenser (D-1/D-2) MFR and model numbers.
2. Revise Fuel polishing models (FPS-1/FPS-2)

DRAWING F.P3.00

1. Revise location of FPS-1.

DRAWING F.P3.01

1. Delete FOS/FOR piping from FPS-1 to AST-1 in both views #1/#2.

DRAWING F.P6.01

1. Revise detail 5 sheet reference to F.P3.01.

DRAWING S.A3.11

1. Details 1 and 2 - Add min clear height and eave heights

DRAWING S.P2.00

1. Revise vent pipe size to 4”

DRAWING S.P2.01

1. Revise vent pipe size to 4”

DRAWING S.P2.02

1. Revise vent pipe size to 4”

DRAWING V.G1.01

1. Add Sheet V.A8.01 to sheet list (Note – this sheet was previously included in the drawing set, but was inadvertently left off the sheet list)

DRAWING V.A2.01

1. Detail 2 - Added T/slab call-out to mezzanine
2. Add cardreaders to match T drawings,
3. Add Keynote 16-0001
4. Details 1 - Added dimensions to outside face of girt

DRAWING V.A4.01

1. Revised height of FRP at Details 3 and 4.

DRAWING V.A8.01

1. Revised Finish Schedule
2. Revise all hardware groups

DRAWING V.A8.21

1. Details 2, 3, and 4 - Added note to fill jamb/head with insulation
2. Detail 2 - Added note fill HM door head with spray foam

DRAWING V.EQ2.11

1. Revised Vehicle Lift to be OFCI
2. Added power to equipment;
3. Added Note 1 to Equip Sched

CORRECTIONS

1. In ADD #2, Sheet V.A0.01 was included with the addendum but not listed in the narrative. Q55 in ADD #3 attempted to address this, but mis-identified the sheet in question. Sheet V.A0.01 includes revisions to R1 to eliminate thermal blocking per Q4 of ADD #2. No additional changes to this sheet have been made.
2. In the ADD #3 “Changes to Drawings,” Drawing V.2.01 was listed. This should have been V.A2.01. Additional changes have been made to this sheet as part of this Addendum, and they are detailed above.

BIDDER QUESTIONS

Q1: Please provide cut sheets for owner furnished contractor installed items

Answer: Technology/Technology support item cutsheets have been included with this Addendum. Other items (shop equipment, kitchen appliances, etc) are either existing or have not yet been selected.

Q2: On A.EQ2.11, in the equipment schedule are: a) Item 28, six 50” flatscreen televisions but only three are detailed in the equipment plan, b) Item 25, six 85” flatscreen televisions but only two are detailed in the equipment plan, c) Item 11 is not detailed in the equipment plan. Please indicate the locations of the above items not included in the equipment plan

Answer: a) Screens are stacked in two rows of three - see 7/A.A5.01; b) see revised A.EQ2.11 and A.EQ2.12; c) Hood located in Break room above range. See revised A.EQ2.12

Q3: On V.EQ.2.11, Item 06 is identified as a Plasma Welder. Plasma Arc Welding is an high tech manufacturing process often requiring robotics and not generally found in a vehicle shop. Please confirm the welding systems being owner furnished, contractor installed.

Answer: Welding system is Owner Furnished, Owner installed, See Revised V.EQ2.11

Q4: Are compressed gas/air cylinder racks required, and will they be CFCI, OFCI, or OFOI?

Answer: No, not required

Q5: Will the GC be responsible for receiving and offloading the OFCI gensets?

Answer: Yes

Q6: Please define if the vehicle lift is owner furnished contractor installed, owner furnished owner installed, or contractor furnished contractor installed (reference Equipment Schedule on V.EQ2.11)

Answer: OFCI, see Revised V.EQ2.11

Q7: Bay 1 of the Vehicle Building is controlling the girt sizing for the building. Is a soldier column allowed in Bay 1 to allow for 8” girts to be used?

Answer: If this can be done without impacting required opening sizes and locations, this is acceptable

Q8: V.A8.21, Detail 1 HM Door Jamb. Please clarify if spray foam and insulation fill are required at door jambs. Detail 2 of the head and related details for the overhead doors do not include any similar requirements.

Answer: See revised details 2-4 on VA8.21 and revised details on A.A8.11 indicating where insulation is required

Q9: V.A8.01: Please provide a completed Finish Schedule.

Answer: See Revised V.A8.01

Q10: Please identify tackboards in the following rooms as TB-1 or TB-2: 141 IT Manager Rm, 121 Conference Rm (N wall), 137 Conference (N wall), 169 Crew Ready, 163 Scada/Instruments

Answer: Refer to finish schedule

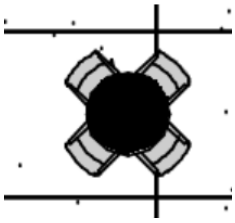
Q11: Please provide Specification for 10 7500 Flagpoles.

Answer: This was issued with ADD #3

Q12: A.A8.01, Door and Frame Schedule, item 148: Please complete the door schedule information for this opening (elevation view A.A5.01, 2, shows this as a storefront door).

Answer: This was issued with ADD #3

Q13: On Addendum 1, A.A1.01, Architectural Site Plan, please identify and provide all pertinent information for the following symbol.



Answer: That symbol represents a picnic table, and is to be Owner Furnished/Owner Installed. No utilities, connections, etc. are required.

Q14: Please confirm out-to-out of steel dimensions for Vehicle Building to be 70’-wide x 160’-long x 17’-8” eave height.

Answer: See revised V.A2.01 for dimensions to outside face of girts. Eave height will be dependent on size of roof girts - t/steel shown.

Q15: Does this project have any interior clearance requirements (e.g. vertical or horizontal to primary framing) at Vehicle, Storage, or Decant buildings?

Answer: 14 ft clear minimum for vehicle clearances at doors. Structure to be tall enough to accommodate OH doors

Q16: Specification Section 32 3300 calls out Tapco skateboard stoppers, which they no longer manufacture. Is there another manufacturer preferred for this?

Answer: These have been deleted from the project scope

Q17: Room signage panel a 11/A.A5.01 is labeled as WD-1, panels on A.A5.02/A.A5.04 are labeled as WD-2 - please clarify.

Answer: Room signage panel to be WD-2. 11/A.A5.01 revised

Q18: Please provide details for decorative graphic DP-1. Section 09-7800 is not included in specifications book.

Answer: Decorative graphics removed from project scope

Q19: Corner guards are labeled as CR-1/2/3 on A.A9.01 but appear to be labeled as CG-1/2/3 on the Interior Finish Summary on page A.A9.02. Please clarify.

Answer: This was updated on A.A9.02 to be CR in ADD 3

Q20: WD-1 is listed as a base product on the Room Finish Schedule but is shown on the Interior Finish Summary on A.A9.02 as a wood beam with vertical grain, please advise.

Answer: This has been updated to reflect a Wood Base instead of a beam

Q21: There is a blank symbol at 9/A.A4.01— please clarify.

Answer: Detail callout has been revised. See revised Sheet A.A4.01

Q22: There is a blank symbol at 6/A.A4.01— please clarify.

Answer: Detail callout has been removed. See revised Sheet A.A4.01

Q23: 6-28/A.A4.02 details are missing wall finishes labels — please advise.

Answer: Refer to Room Finish Schedule on A.A9.01 for wall finishes.

Q24: Regarding the Photovoltaic scope, please confirm that PV Systems are to be located on the Storage and Vehicle Buildings only. Also, please confirm a size (in KW) of the system required?

Answer: Correct, Storage and Vehicle only. See Bid Form for size of system

Q25: Bid Item 3 on the Bid Form reads, “Solar Panels – 1.5% of Construction Cost”. Is it the intent that we are simply to list the value of the Solar Panel System Bid for the project regardless of the percentage of the overall construction cost? For example, what if the solar panel costs are less than 1.5% of Construction Cost? What if they’re more?

Answer: Bid Form has been revised to indicate a 150 kW system. This change was issued with ADD #1, although a more recent Bid Form was issued with ADD #3.

Q26: It is likely that hard rock excavation will be encountered during some of the excavation needs on the project. Would you consider adding a rock excavation unit price to the bid form such as you did for the different import items?

Answer: This will be handled in the field as it occurs. See also Section 31 2316.26 – Rock Removal.

Q27: Please confirm that ALL components of the louvered screening fence will require field painting (frame C louvers), and that ALL components will come factory primed.

Answer: This system should be fully factory finished per Section 08 9200.

Q28: At Vehicle Building, will the exposed structural columns, beams, and x-bracing require painting? If so, we are assuming this steel will come factory primed, correct?

Answer: Shop primed only

Q29: Vehicle Bldg - Will the exposed steel decking in the OTS ceilings require painting?

Answer: Shop primed only

Q30: Vehicle Bldg - Will the exposed HVAC ducting require painting?

Answer: No

Q31: Vehicle Bldg - Will exposed sprinkler piping require painting?

Answer: No

Q32: Vehicle Bldg - Will the steel mezzanine ladder require painting? Will it come factory primed?

Answer: Shop primed only

Q33: Vehicle Bldg - Will the mezzanine guardrail require painting? Will it come factory primed?

Answer: Shop primed only

Q34: Will the Storage Building structural steel columns, beams, and x-bracing require painting?

Answer: Shop primed only, or Galvanized

Q35: Will the Decant Building structural steel columns, beams, and x-bracing require painting?

Answer: Shop primed only, or Galvanized

Q36: Will the guardrail shown on 05-011, sheet D.A3.11 require painting? Will it come factory primed?

Answer: Guardrail to be galvanized. See new detail 9/D.A3.11

Q37: Will the vertical concrete walls and concrete pilasters require the application of a water repellent?

Answer: No, a water repellent is not required

Q38: Will the Fuel Island structural steel columns and beam require painting?

Answer: Shop primed only, or Galvanized

Q39: Note 3 on A.A6.01 indicates that ALL components of the OTS ceilings are scheduled for painting, however, Note 6 on the same plan sheet indicates that the corrugated metal decking is to remain unpainted. Please clarify.

Answer: Corrugated steel will require painting and will come factory primed. See revised Sheet Note 6

Q40: If the corrugated steel decking requires painting, will it come factory primed?

Answer: Corrugated steel will require painting and will come factory primed. See revised Sheet Note 6

Q41: Will exposed sprinkler piping at the Admin Building require painting?

Answer: Yes

Q42: Will the interior stair structure require painting (treads, risers, stringers, columns, underside)?

Answer: Yes, with the exception of the underside/support structure that is not exposed to view.

Q43: Please confirm a factory finish on all wood doors.

Answer: Yes, all wood doors to be factory finished

Q44: Will the solid wood windowsills require a painted or stained finish?

Answer: Stained finish

Q45: Will the wood baseboard (WD-1) require site staining, or will it come factory finished?

Answer: Site staining - GC can shop stain at their option

Q46: Please confirm factory finish on ALL suspended wood ceiling components.

Answer: All suspended wood ceiling components should be factory finished.

Q47: Please confirm all Admin Building exposed structural steel columns, beams, joists, and girders will come factory primed and receive field painting.

Answer: Confirmed.

Q48: Will the plywood walls in Shop 207 (Vehicle Building) require painting?

Answer: Yes, see Revised V.A8.01

Q49: Please provide height for gypsum board wall in Vehicle Building - Fire Riser 205, plywood walls in Bead Blast 206, Shop 207.

Answer: Walls to be full height to underside of mezzanine. See revised V.A8.01 for additional information regarding plywood.

Q50: Since the tower is only 1,000’ from the runway, has there been any communication with the FAA about proximity to the airport as far as tower height and if it will be allowed.

Answer: Yes, a permit has been submitted for FAA review and approval

Q51: For the Fuel Station, what eave or clear height is required? What Roof Slope?

Answer: See revised F.A2.01

Q52: For the Storage Building, what eave height or clear height is required?

Answer: See Revised S.A3.11

Q53: Is Behlen's standard SSPC-Paint 15 primer for primary framing acceptable in lieu of the SSPCPaint 20 zinc-rich primer specified?

Answer: No, due to the exterior conditions this system is not adequate

Q54: Ref. 07 6110: What module size (12", 16", or 24") is required for the Taylor Metal MS150 standing seam roof panel? 07 6110 section 3.04.E. states 17" module but that is not a standard offering.

Answer: 16" module. See Revised 07 6110

Q55: Ref. 07 7200 section 2.02: Are ice flags required for the standing seam roof alternate?

Answer: Yes

Q56: Ref. 07 7200 section 2.02: How many ice flags are required per 40" IMP roof panel?

Answer: Spacing/system design is the responsibility of the snow guard/ice flag manufacturer, but anticipate needing 2 flags per 40" IMP panel.

Q57: Does Decant, Storage, Vehicle, or Fuel buildings require any field-painting of metal building structural components?

Answer: Only if touch-ups to shop primer are required.

Q58: Details 2-7/A.A5.03 are marked as Typical location - please provide clarification/room number.

Answer: These represent a typical interior office. See Room Finish Schedule for specifics

Q59: Detail 7/A.A5.04 is marked as both TB-2 (tackboard) and 12-0003 (markerboard), please clarify.

Answer: 7/A5.05 Keynotes revised to tackboard

Q60: 6/A.A5.01 indicates that the counter is SS-1 a Corian surface, 3/A.A9.32 indicate that it is concrete. Please clarify.

Answer: A3/A.A9.32 revised to SS-1

Q61: FRP details are missing on elevations 6-9 on A.A4.02, please clarify.

Answer: Updated sheet with this information was issued with ADD #1.

Q62: Details 3/A.A5.05 and 11/A.A5.05 are marked as 12-0004 (tackboard) but are not designated as TB-1 or TB-2, please clarify.

Answer: 3/A.A5.05 Revised tackboard to TB-2, 11/A.5.05 Tackboard removed in lieu of projector, 13/A5.05 Revised tackboard to TB-1

Q63: Specification Section 27 60 52 Antenna Tower 1.2G References the Design Standard TIA-222-1. Oregon Code recognizes TIA-222-H and does not require "I" yet. Are we required to use TIA-222-1?

Answer: The tower is expected to be permitted after Oct 1, 2025, when TIA-222-I is expected to be in effect.

Q64: Please confirm, both OFCI genset belly tanks will be manufactured to accept all required extra backup fueling (2-2” FOS & FOR pipe connections) and second control (assuming separate level control is required) belly tank connections.

Answer: These have not been purchased yet so there are not shop drawings for coordination. This is a requirement that will need to be checked during shop drawing review.

Q65: Please provide expanded sequence of operation (Reference F.P3.0, Emergency Generator Fuel Supply Table) for backup fueling of both genset base tanks.

Answer: Updated sequence of operation has been added to F.P3.01

Q66: Please confirm, Drawing F.P3.0 Emergency Generator Fuel Supply Table, note #4 should send return Diesel fuel to AST-2, not AST-1 as currently indicated.

Answer: See updated addendum #2 plans for updated sequence of operations

Q67: Specification 26 3100, page 8 “Basis of Design” states mid paragraph, “while staying under the physical size and weight requirements listed”. No BOD weights or requirements can be found, please provide.

Answer: There are no specific weight or physical size requirements. Any proposed system needs to have similar or lower physical size and weight compared to the BOD.

Q68: Spec section 26 0573 asks for Arc Flash Risk Assessment to be included in the work scope. This is usually by owner and performed by the Electrical Engineer of record. Please confirm the owner would like this performed by the electrical trades.

Answer: This work needs to be performed by a specialist subcontractor as per the specifications.

Q69: Please confirm that only MEPF trades are required to provide coordination documents in 3D modeling software such as Revit, AutoDesk, NavisWorks, AutoDesk A360 or similar modeling software to ensure fit & finish is coordinated and trade conflicts are avoided.

Answer: It is strongly recommended that as many trades as possible provide 3D coordination documents. MEPTF trades are required to create and use a 3D model for coordination.

Q70: We are not finding a local contractor that can meet the employ at least one full time BICSI certified RCDD nor the requirements in 27 0000, 1.05, G, paragraphs 2 and 3. Our local, highly competent contractors fulfil these by having people with these qualifications review and/or sign off and certify the work and have been doing so for quite some time with excellent results for customers all over southern Oregon. Not much different than having a supervising electrician sign off on permits for a company that does not have a supervisor electrician. All their work passes industry standard testing and certification using calibrated test equipment. Can these requirements be modified so our local contractors can do the work? Please Advise.

Answer: This requirement has been removed. See revise Section 27 0000.

Q71: Please confirm the following accessories for the UPS:

a) Do you need 40kVA N+1?
b) Environmental Requirements, E. Energy Saver?
c) Uninterruptible Power Supply
    1) K. Output Power distribution Panels - line and match with UPS. Are the specs in this section exactly what you want? If so, we need to customize the IDC or your EC can provide the panels externally instead.
    2) L. Remote Emergency Power Off (REPO) Station?
    3) M. Remote Monitor Panel (RMP)?
    4) N. Supervisor Contact Module (SCM)? This is not an available feature on the 93PM UPS.
    5) O. Relay Interface Module (RIM)?
    6) P. External Battery Disconnect? This option would not be line and match and external to the UPS.

Answer:

a) 40kVA N+1 - Yes ;
b) Energy Saver - No ;
c) Uninterruptible Power Supply
    1) Output Power distribution Panels - The output distribution panel is external to the UPS. Refer to the single line diagram for more information. ;
    2) Remote Emergency Power Off (REPO) Station - Not required;
    3) Remote Monitor Panel (RMP) - Yes, this is required Contractor to provide the ethernet equipped PXGMS option card. A modem and an RS232 port are not required.;
    4) Supervisor Contact Module (SCM) - Not required ;
    5) Relay Interface Module (RIM) - Yes, this is required;
    6) External Battery Disconnect - Not required

Q72: Please Confirm that generators are OFCI. Is Owner purchasing the ATS as well?

Answer: The generators are OFCI. There is no ATS on this project.

Q73: V.P2.01, Enlarged Plmb – RR203 & Mudroom 201: What does the graphic on the floor at the west wall of the mudroom represent? Is this item OFCI, CFCI, OFOI?

Answer: That graphic is floor grate for the catch basin/ trench drain

Q74: Specs call out Dimensional Letter Signage mounted to the exterior as indicated in the drawings. No exterior elevations are shown with or include letter signage on the buildings.

Answer: See 1 and 6/A.A3.12

Q75: Spec 23 1113, 2.04, calls for a diesel fuel polisher but not a gasoline fuel polisher. The equipment schedule (F.P0.02) and the above ground storage tank plan (enlarged) (F.P3.00) both show diesel and gasoline fuel polishers. Please provide a specification for the gasoline fuel polisher if one is required.

Answer: See revised Specification 23 1113

Q76: Will the EVO tank monitor be the controller for the day tank pump set and float switches?

Answer: Yes, the day tanks are monitored by the EVO fuel monitoring control panel (FMCP-1). The float switches provided in the day tank shall control the fuel oil return pumps at the day tanks as per the sequence of operation.

Q77: 08 0671 Door Hardware Schedule: Please provide spec or basis of design for hardware items with the description “Coordinate with Owner” so bidders will be bidding the same materials.

Answer: A new hardware schedule has been issued - see 08 7100

Q78: Please provide part numbers and sizes for the electrical vaults required by PPL for this project.

Answer: A completed design has not been received from PPL yet.

Q79: Please provide the PPL power plan for this project.

Answer: A completed design has not been received from PPL yet.

Q80: Vehicle Building: what is the maximum allowable vertical deflection at frame Line 2 where stud wall attaches to bottom flange of the rigid frame rafter?

Answer: L/240

Q81: Vehicle Building: what is the maximum allowable horizontal drift for the rigid frame at Line 2 where the stud partition attaches?

Answer: H/180

Q82: Vehicle Building: At Line 2, may we use an interior column to help limit vertical deflection (to meet serviceability requirements of the transverse stud partition at this frame line) in a more economical way?

Answer: If this can be done without impacting required opening sizes and locations, this is acceptable

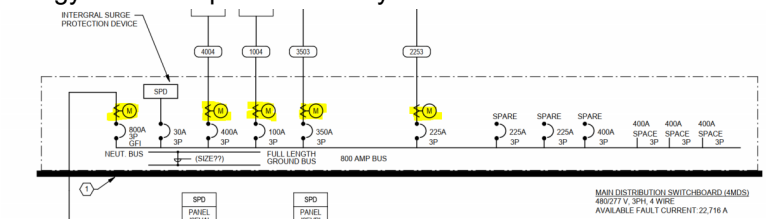
Q83: Section 1.04.B.2.a of the Addendum 2 requires that the studies be reviewed and approved by a "preparing engineer." Does a preparing engineer refer to a Professional Engineer? If so, can this engineer be licensed in a state other than Oregon?

Answer: No. The preparing engineer signing the drawing must be a Professional Engineer licensed in the State of Oregon.

Q84: Is it correct to state that the system to be studied corresponds exclusively to the equipment contained in document A.E5.01 “Single Line Diagrams – Electrical,”?

Answer: No. In addition to loading and equipment ratings specified in the drawings and specifications, shop drawing information for all electrical protection equipment must be incorporated into the study in addition to exact feeder lengths measured on-site. Refer to Section 26 05 73 for more information.

Q85: Please confirm whether the symbols highlighted in yellow in the following figure represent energy meters or protective relays.



Answer: Those represent energy meters.

Q86: With respect to the item 2.01.B (One-Line Diagrams; Page 84 on the PDF) of the Addendum 2' Section 26 0573, Part 2 (Products), would you please confirm whether the one-line diagrams generated by the electrical simulation software meets the requirements? Or, whether the consultant is expected to create additional one-line diagrams, such as using AutoCAD software?

Answer: One-line diagrams generated within the electrical simulation software meets this requirement.

Q87: Our understanding is that the customer will be responsible for obtaining the required data from the utility company. Siemens PTI does not plan to directly contact the local utility. Could you please verify whether this is accurate?

Answer: The electrical contractor is responsible for obtaining the required data from PPL and providing it to the Electrical Distribution Studies Preparing Engineer.

Q88: Regarding item 2.05 (Arc Flash Labels) of the Addendum 2' Section 26 0573, Part 2 (Products), we'd like to clarify that the selection of the arc-flash rated PPE is not within Siemens PTI's scope of work due to the following reasons: Per the guidance in Section 130.5 of the NFPA 70E®, it is the responsibility of the facility owner to select the arc-flash PPE based on the results of the arc-flash incident energy analysis and the owner's risk assessment analysis. NFPA 70E Annex H provides guidance for the selection of PPE based on the calculated arc-flash incident energy.

Answer: The intent of the arc flash labels is not to specifically select PPE equipment. Below is an example of acceptable Arc Flash Information Labels.

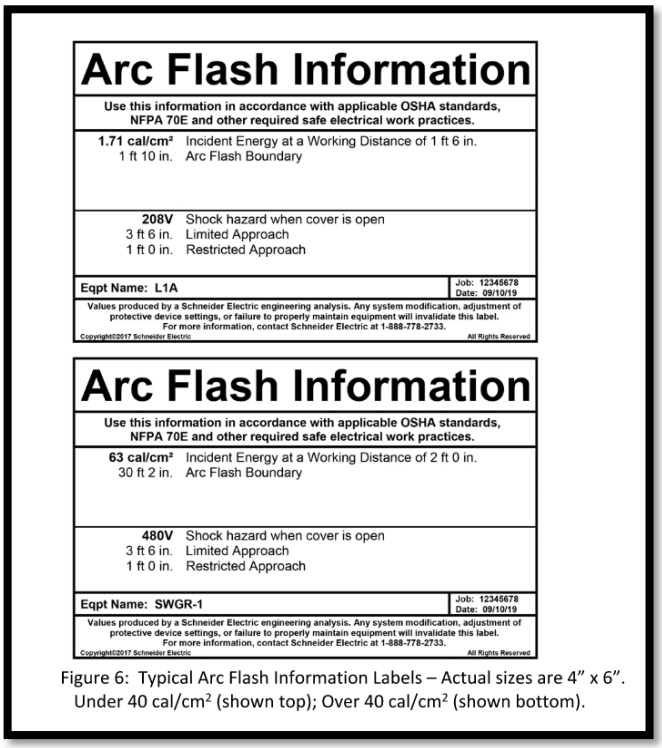


Figure 6: Typical Arc Flash Information Labels – Actual sizes are 4" x 6". Under 40 cal/cm² (shown top); Over 40 cal/cm² (shown bottom).

Q89: Given the broad scope of evaluating voltage variations in electronic equipment, would you please clarify whether all models of the electronic equipment the customer wishes to assess will be supplied in a format that is compatible with the EMTP software (preferably in PSCAD software format).

Answer: Evaluate transient voltage levels at low voltage buses. This will require creating a simulation model to represent the microgrid. The electrical contractor will be responsible to obtaining specific equipment electrical information required to adequately model the system and supply it to the Engineering Distribution Study Engineer during the shop drawing phase of the project.

Q90: Would you please clarify the context in which the term "power factor" was used in Addendum 2 pertaining to transient overvoltage events? For e.g., does this pertain to switching of capacitors leading to transient overvoltages?

Answer: Revise 3.02.C.5. to read as follows: Evaluation must consider solutions to power factor and/or harmonic concerns identified by the transient analysis study.

Q91: Per the drawings for storage building, the trench drain shown has a 4" drain serving only that fixture, also is shown to have a 2" vent serving the trench drain. My understanding of the plumbing code is that the main drain line of a building, or in this case what is serving the trench drain, requires a minimum of a 4" vent serving that fixture. Whatever size the main drain is in area of inches, is to be equaled in vent area of inches.

Answer: We have revised the vent piping to 4”

Q92: Per the specifications section 22000 identifying the building drain line materials, only allows for no/hub cast iron with extra heavy duty no/hub bands. At a minimum I would recommend solid wall Sch 40 PVC under the slab and then could be transitioned to cast iron above the slab. If the building is not designated a "non-combustible" construction building, I would recommend allowing PVC into the specifications for waste and venting. This would help reduce the cost of the plumbing scope.

Answer: Admin building has a plenum return air system; hence PVC is not allowed per code. Client has requested below grade sanitary system to be cast iron.

Q93: F.P6.01, Detail 5, the GENERAL NOTES say "1. See P7.03 for fuel oil system controls." We cannot locate P7.03 in any of the plan sets. Is this available?

Answer: Sheet reference should be F.P3.01 as part of Addendum #2.

Q94: The Equipment Schedule and drawing calls for two fuel polishers, one for the diesel tank and one for the Unleaded Gasoline tank. Section 23, 2.04 only stipulates that a fuel polisher is needed on the diesel tank. Does there need to be a fuel polisher for the Unleaded Gasoline tank? If so, will you accept a manual fuel polisher for the Unleaded Gasoline tank? Fuel Tec, who is specified in the Equipment Schedule, does not make an automatic fuel polisher for gasoline.

Answer: Basis of design has been updated – see Specifications.

Q95: Are the Fuel Oil Return pumps to be controlled by the EVO Tank Monitor or by some other method?

Answer: Yes, the day tanks are monitored by the EVO fuel monitoring control panel (FMCP-1). The float switches provided in the day tank shall control the fuel oil return pumps at the day tanks as per the sequence of operation provided.

Q96: The drawing shows the diesel turbine providing a supply line to the Generator Sets. Will the FOS functionality be controlled by the EVO?

Answer: The design intent is for the diesel tank to supply the two (2) new generators

Q97: The drawings show the piping run from the Diesel Tank to the Fuel Island splitting off to also supply the GenSets. Does the scope intend for the Fuel Contractor to join the piping to an existing run to the GenSets? If so, at what connection point is the piping run terminated?

Answer: The design intent is for the diesel tank to supply the two (2) new generators

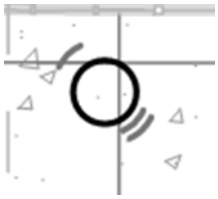
Q98: The drawings show the Return Pumps and the FOR line returning the fuel to the FOS line. Is that the intent?

Answer: No. The drawings have been updated to provide a separate FOS and FOR.

Q99: What is the expected GPM for the Day Tank return pumps?

Answer: The fuel oil return pumps should flow approximately 25 gpm.

Q100: On C2.20, at the Admin Building, at the intersection of gridlines J.5 and 12.3, please identify and provide all pertinent information for the following symbol:



Answer: That appears to be a graphical error where one of the picnic table symbols is partially showing. This symbol can be ignored. See Q13

Q101: Please clarify what is needed. Is barbed wire required? Is the fence installed all galvanized or black powder coated and vinyl fabric? - Sheet A.A1.04 shows conflicting info compared to Specs 32 3113

Answer: Barbed wire is required. Fence to be black powdered coated with vinyl coated fabric. See revised A.A1.04

Q102: Detail #13 on Plans A.A1.04 – Specifies Bottom Rail Security with ½" diameter hook and concrete footing. Is this applicable?

Answer: Include this feature in pricing

Q103: Plans on A.A1.04 Calls for 7 Gauge Coil Top Wire, Spec Sheet Section 32 3113 calls for 1 5/8" Top Rail. Please clarify

Answer: Follow specifications. See revised A.A1.04

Q104: Specs Call for 2 3/8" Terminal Posts and 1 7/8" Line Posts. Please clarify

Answer: It is understood that these are typically different sizes. Provide post sizes as necessary to support fence of size/height and meet design strength requirements

Q105: Is the height of the interior fence the same height as the exterior fence or different?

Answer: All fence is the same height.

Q106: Plans A.A1.04 calls for a Slide Gate and Bollard with Chain Link for the employee area exit gate. The plans show no room for a slide gate. I suggest installing a Double Swing Gate.

Answer: No gate at this location - only bollards with chain between them. See Revised A.A1.01

Q107: Gravel access road to mechanical enclosure Per Plans A.A1.01 calls for Double Swing Gate with Panic Hardware. Since it's for vehicles, I suggest standard hardware.

Answer: This has been revised to be standard gate hardware. See Revised A.A1.01

Q108: Plans A.A1.01 call for 1 sliding gate to cover entering and exiting traffic. Please clarify

Answer: Correct, single sliding gate at all drives due to space constraints.

Q109: Specs 32 3113, Section A, Note 5. Please clarify the controls required

Answer: Owner would like multiple options for staff to open gates

Q110: Please clarify the options for exiting automatic gates (i.e. free exit loop and detector)

Answer: See Revised Section 32 3113 - a in-ground sensor should be provided

Q111: Sheet A.A1.01 calls for 8' High Steel Fence at perimeter of site. The Fencing Specifications call for Chain Link with Barb Wire. Please clarify height of fence and type (or style) of fence.

Answer: Fence to be 8 ft high black powdered coated with vinyl coated fabric.. See revised A.A1.01

Q112: Is the Sliding Gate at the West entrance to Fleet Vehicle lot to be motorized? Sheet A.E1.02 does not indicate power to be provided to this gate. Please advise.

Answer: All sliding gates to be motorized. See Revised A.A1.01

Q113: Sheet A.E1.02 does not indicate power to be provided to Sliding Gate at Industry Drive Entrance. Is this gate to be motorized? I presume it is based on the access control requirements at this location. Please advise.

Answer: All sliding gates to be motorized. See Revised A.A1.01

Q114: Sheet A.E1.02 includes a Division of Responsibility Matrix, which calls for Contractor to be responsible for incoming service (primary) conduit. Sheet C4.00 indicates new primary service line crossing Aqua Way and Industry Way. Is this scope of work to be completed as part of this project scope or will it be completed as part of the roadway construction?

Answer: The portion of the primary conduit identified in drawing C4.00 is part of this project.

Q115: Sheet C4.00 indicates buried Fiber Optic lines crossing Aqua Way and Industry Way, then extending off the plan sheet. Is this scope of work to be completed as part of this project scope or will it be completed as part of the roadway construction?

Answer: Fiber and power conduits will be stubbed to the property line. All fiber/power work within the Industry and Aqua ROW limits is outside of this project scope.

Q116: Are the drive approaches from Aqua and Industry included in the scope of this project, or are they to be installed in the previously awarded Road Extension Project?

Answer: All curb & gutter, accessible ramps, sidewalks, and driveway approaches extending to the tangent point on MWC property are covered by the roadway project and are outside of this project scope.

Q117: Does this project scope include any landscaping between the separated sidewalks and the curbs installed in the previously awarded Road Extension Project.

Answer: Public sidewalks and frontage landscaping are the responsibility of this project. See the first page of drawings prepared by Marquess & Associates included with the original bid package. See also revised Section 00 0102.

Q118: Page C4.10, detail #2 shows point of connection to an existing 8” dia. water stub at station 3+00.4 off Industry Drive. Can you confirm that this water main will be installed and stubbed as shown, prior to construction?

Answer: Yes, the line will be stubbed to the property line as part of the roadway project.

Q119: Page C4.11, detail #2 shows point of connection to an existing 8” dia. water stub at station 0+63.5 off Aqua Way. Can you confirm that this water main will be installed and stubbed as shown, prior to construction?

Answer: Yes, the line will be stubbed to the property line as part of the roadway project.

Q120: Page C4.00 shows an existing 6” dia. sanitary line coming into the site off Industry Drive. Page CP3 suggests that it will be installed and capped. Can you confirm that this sanitary line will be installed as shown, prior to construction?

Answer: Yes, the line will be stubbed to the property line as part of the roadway project.

Q121: Pages C4.00 & C6.14 show power and fiber optic lines crossing Aqua Way and Industry Drive. Neither the electrical site plan nor the technology plans show these lines. Are these conduits within the scope of the Operation Center project, and can you provide any further details for this scope of work?

Answer: Fiber and power conduits will be stubbed to the property line. All fiber/power work within the Industry and Aqua ROW limits is outside of this project scope. Fiber to be pulled by provider.

Q122: Page C4.00 shows power and fiber optic lines that are cut off at the Northeast corner of the intersection of Industry Drive and Aqua Way. Where are these lines going and who is to install them?

Answer: Fiber and power conduits will be stubbed to the property line. All fiber/power work within the Industry and Aqua ROW limits is outside of this project scope. Fiber to be pulled by provider.

Q123: Please explain the following finish codes that are on the Room Finish Schedule at A.A9.01 but not on the Interior Finish Summary at A.A9.02: GL-1, P-X, C-CONC, RESIN-1, GYP, CAB- 1, PRF-1, MR-1, ACT-2, MTL-4.

Answer: See Revised A.A9.01

Q124: Please provide countertop details for 3, 4, 6, 8, 10/A.A5.07.

Answer: See revised Sheet.

Q125/Answer: Several questions were received about the specifics of hardware groups. Since hardware groups have been revised in entirety, it is believed that the revisions cover or negate the questions. See revised Door Schedules on A.A8.01 and V.A8.01 and revised Section 08 7100.

APPROVAL OF ADDITIONAL PRODUCTS/SYSTEMS:

ALL CONTRACT DOCUMENT SPECIFICATION REQUIREMENTS APPLY IN TOTAL TO ALL ADDITIONAL MANUFACTURERS AND PRODUCTS LISTED BELOW

DRAWING V.M0.02

Greenheck is approved as a manufacturer. See also Section 23 72 23-Packaged Air-to-Air Energy Recovery Ventilators from Addendum 1.

Bidders are reminded that all questions related to the Bid Documents or the project must be submitted in writing in accordance with Section 22 of the Information for Bidders. Received questions will only be answered by Addenda. After the stated December 4, 2024 deadline, no individual questions will be answered and bidders will be responsible for making their own interpretation of the bid documents.

ACKNOWLEDGEMENT: All Bidders shall acknowledge receipt and acceptance of this Addendum on the Bid Form. Bids submitted without acknowledgment may be considered informal.

BOARD OF WATER COMMISSIONERS

CITY OF MEDFORD, OREGON

By: _____

Brad Taylor, General Manager

Receipt acknowledged and conditions agreed to this _____ day of _____, 2024.

Bidder: _____

By: _____

(Signature)

_____

(Print Name)

END OF SECTION

SECTION 00 0102 - PROJECT INFORMATION

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Project Name: Medford Water Operation Center, located at:

1. 4677 Industry Drive.
2. Medford, Oregon 97501.

B. Architect's Project Number: 22085.

C. Owner's Project Number: CIPW-22-00280 .

D. The Owner, hereinafter referred to as Owner: Medford Water.

1.02 PROJECT DESCRIPTION

A. Summary Project Description: Construction to include, but limited to, the following buildings and associated site improvements on 10 acre open lot.

1. Administration and Operations building of approximately 36,000 square foot one-story construction consisting of steel structure with cold-formed metal bearing walls, curtain wall and storefront glazing, and insulated metal wall and roof panels, to include associated site work for larger operational campus. Bidder for Medford Water Operation Center project will be responsible for constructing the public sidewalks and landscaping along the Aqua and Industry street frontages of the site (streets currently under construction) as described in the road construction drawings prepared by Marquess & Associates, included with the Bid drawings.
2. Decant building of approximately 6,000 square foot one-story construction consisting of pre-engineered metal building structure on concrete slab-on-grade with *standing seam* metal roof panels.
3. Storage building of approximately 12,000 square foot one-story construction consisting of pre-engineered metal building system on concrete slab-on-grade with *standing seam metal roof panels* and no exterior walls.
4. Vehicle Building and Maintenance Shop of approximately 14,000 square foot one-story construction of pre-engineered metal building system on concrete slab-on-grade with insulated metal wall and roof panels.
5. Fuel Island with associated tanks and fueling stations, including a small pre-engineered metal building of approximately 1,300 square foot which functions as a canopy at the fueling loction.
6. Approximately 60 foot tall communications tower and foundation.

B. *All buildings to be designed to Risk Category IV structural design requirements.*

1.03 PROJECT CONSULTANTS

A. The Architect, hereinafter referred to as Architect: Soderstrom Architects, Ltd.

1. Address: 1331 NW Lovejoy Street, Ste 775.
2. City, State, Zip: Portland, Oregon 97209.
3. Phone: (503) 228-5617.

B. Architect's Structural Engineer: ZCS Engineering & Architecture.

1. Address: 45 Hawthorne Street.
2. City, State, Zip: Medford, Oregon 97504.
3. Phone: (541) 500-8588.

C. Architect's Civil Engineer: ZCS Engineering & Architecture.

1. Address: 45 Hawthorne Street.
2. City, State, Zip: Medford, Oregon 97504.
3. Phone: (541) 500-8588.

D. Architect's Mechanical, Plumbing, and Electrical Engineer: Interface Engineering.

1. Address: 100 SW Main Street, Ste 1600.
2. City, State, Zip: Portland, Oregon 97204.
3. Phone: (503) 382-2266.

E. Architect's Landscape Architect: ZCS Engineering & Architecture.

1. Address: 45 Hawthorne Street.
2. City, State, Zip: Medford, Oregon 97504.
3. Phone: (541) 500-8588.

F. Owner's Communication Tower Engineer: Jacobs Engineering

1. Address: 1100 NE Circle Blvd
2. City, State, Zip: Corvallis, OR 97330
3. Phone: (541) 752-4271

1.04 PROCUREMENT DOCUMENTS

A. Availability of Documents: Complete sets of procurement documents may be obtained:

1. From the Owner online at separate link provided in invitation to Bidders.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 00 0110

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END OF SECTION

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SECTION 01 5713 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Compensation of the owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 31 2200 - Grading: Temporary and permanent grade changes for erosion control.

C. Section 32 1123 - Aggregate Base Courses: Temporary and permanent roadways.

1.03 PERFORMANCE REQUIREMENTS

A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.

B. Also comply with all more stringent requirements of State of Oregon Erosion and Sedimentation Control Manual.

C. Best Management Practices Standard: FHWA FLP-94-005.

D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

1. The owner will obtain permits and pay for securities required by authority having jurisdiction.
2. The owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.

1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 2 years.

G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.

1. Control movement of sediment and soil from temporary stockpiles of soil.
2. Prevent development of ruts due to equipment and vehicular traffic.
3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to the owner

H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
   1. Prevent windblown soil from leaving the project site.
   2. Prevent tracking of mud onto public roads outside site.
   3. Prevent mud and sediment from flowing onto sidewalks and pavements.
   4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to the owner.

I. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to the owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

J. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to the owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

K. Open Water: Prevent standing water that could become stagnant.

L. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

D. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
   1. Wood waste, chips, or bark.
   2. Erosion control matting or netting.
   3. Polyethylene film, where specifically indicated only.

B. Grass Seed For Temporary Cover: ~~Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.~~ **Select grass seed species that will provide a sterile annual cover crop incapable of re-germinating after initial establishment.**

C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
   2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491/D4491M.
   3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
   4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
   5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
   6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533.
   7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
   8. Manufacturers:
      a. BP Amoco, Amoco Fabrics and Fibers: www.geotextile.com
      b. TenCate: www.tencate.com
      c. North American Green: www.nagreen.com
      d. Propex Geosynthetics: www.geotextile.com

D. Silt Fence Posts: One of the following, minimum 5 feet long:
   1. Hardwood, 2 by 2 inches in cross section.

E. Gravel: See Section 32 1123 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Construction Entrances: Traffic-bearing aggregate surface.
   1. Width: As required; 20 feet, minimum.
   2. Length: 50 feet, minimum.
   3. Provide at each construction entrance from public right-of-way.
   4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Linear Sediment Barriers: Made of silt fences.
   1. Provide linear sediment barriers:
      a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
      b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
      c. Along the toe of cut slopes and fill slopes.

d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart.
e. Across the entrances to culverts that receive runoff from disturbed areas.

2. Space sediment barriers with the following maximum slope length upslope from barrier:
a. Slope of Less Than 2 Percent: 100 feet..
b. Slope Between 2 and 5 Percent: 75 feet.
c. Slope Between 5 and 10 Percent: 50 feet.
d. Slope Between 10 and 20 Percent: 25 feet.
e. Slope Over 20 Percent: 15 feet.

D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
2. Straw bale row blocking entire inlet face area; anchor into pavement.

E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

G. Soil Stockpiles: Protect using one of the following measures:
1. Cover with polyethylene film, secured by placing soil on outer edges.
2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.

I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Traffic-Bearing Aggregate Surface:
1. Excavate minimum of 6 inches.
2. Place geotextile fabric full width and length, with minimum 24 inch overlap at joints.
3. Place and compact at least 8 inches of 2 inch diameter drain rock.

B. Silt Fences:
1. Store and handle fabric in accordance with ASTM D4873.
2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
5. Install with top of fabric at nominal height and embedment as specified.
6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
7. Fasten fabric to wood posts using one of the following:

a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gauge, 0.083 inch shank diameter.
b. Five staples per post with at least 17 gauge, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.

8. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

C. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
5. Incorporate fertilizer into soil before seeding.
6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed one-third of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Clean out temporary sediment control structures weekly and relocate soil on site.

E. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 07 6110 - SHEET METAL ROOFING - ALTERNATE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet metal roofing, associated flashings, and underlayment.

B. Secondary framing.

C. Insulation.

D. Counterflashings.

E. Integral fascias.

F. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Section 07 7200 - Roof Accessories: Manufactured accessories.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.

E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

G. CDA A4050 - Copper in Architecture - Handbook; current edition.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on metal types, finishes, characteristics.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

D. AIS Certificate: Certify that products comply with American Iron and Steel (AIS) provision for the Consolidated Appropriations Act of 2017 (Section 746 Division A of Title VII), and subsequent statutes, mandating domestic preference.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise noted.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of similar type and scale project experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a 2 -year period after Date of Substantial Completion. Defective work includes failure of watertightness or seals.

C. Provide 20 -year manufacturer warranty for finishes. Warranty shall include degradation of metal finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Roofing Manufacturers:

1. Taylor Metal Products; MS150: www.taylormetal.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SHEET MATERIALS

A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; 24-gauge, 0.0239-inch minimum base metal thickness, shop precoated with polyvinylidene fluoride (PVDF) coating; color as selected.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, thickness to match roofing sheet, and at least 2 inch wide, interlockable with sheet.

C. Fabricate starter strips, interlockable with sheet.

D. Form pieces in longest practical lengths.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

2.04 FINISHES

A. Polyvinylidene Fluoride (PVDF) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.

B. Color: As selected by Architect from manufacturer's premium metallic colors.

C. Primer Coat: On coated sheets, finish concealed side of sheet with primer compatible with finish system as recommended by finish system manufacturer.

2.05 SECONDARY FRAMING

A. *Support for Roofing and Continuous Insulation: Continuous thermal Z-girts.*
   1. *Fiberglass reinforced plastic (FRP) girts that provide roofing attachment support for standing seam roof.*
   2. *Depth: As required for thickness of insulation.*
   3. *Length: 96 inches for girts.*
   4. *Spacing: as recommended by girt manufacturer and roof attachment requirements, perpendicular to roof slope.*
   5. *Fasteners: As recommended by clip manufacturer.*
   6. *Products:*
      a. *Advanced Architectural Products, LLC; GreenGirt CMH Roof System*
      b. *Substitutions: See Section 01 6000 - Product Requirements*

B. Connectors: Factory-made formed steel sheet, ASTM A653/A653M SS Grade 50, with G60/Z180 hot-dipped galvanized coating and factory-punched holes.

2.06 ACCESSORIES

A. Fasteners: Stainless steel, with soft neoprene washers.

B. Underlayment: Self-adhering butyl-rubber sheet complying with ASTM D1970/D1970M; strippable release film.
   1. Top Sheet: Woven polypropylene top surface.
   2. Sheet Thickness: 30 mil, minimum.
   3. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
   4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
   5. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96/E96M, Procedure A (desiccant method).
   6. Functional Temperature Range: Minus 45 degrees F to 300 degrees F.
   7. Ultraviolet (UV) Resistance and Weatherability: Approved in writing by manufacturer for exposure to weather for minimum of six months.
   8. Products:
      a. Protecto Wrap Company; Jiffy Seal Butyl Ice and Water Guard HT: www.protectowrap.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Polyisocyanurate (ISO) Board Insulation: Complies with ASTM C1289, Type II, Class 1 - Faced with glass-reinforced felt on both surfaces of core foam.
   1. Grade and Compressive Strength: Grade 2, 20 psi, minimum.
   2. Board Thickness: Two layers, staggered joints, overall thickness as required achieve R-value indicated on drawings.
   3. Product: Carlisle InsulBase.
      a. Carlisle InsulBase.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Deck Sheating: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch thick.
   1. Products:
      a. GP Dens-Deck Prime, distributed by Carlisle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Vapor Retarder: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.

F. Concealed Sealants: Non-curing butyl sealant or butyl tape.

G. Exposed Sealants: ASTM C920 elastomeric sealant, with minimum movement capability as recommended by manufacturer for sealed substrates; color to match adjacent material.

H. Insulation Adhesive: Type as recommended by insulation manufacturer.

I. Eave Protection Sheet: Rubberized asphalt bonded to sheet polyethylene, 40 mil, 0.040 inch total thickness, with strippable treated release paper.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to eaves.

B. Verify deck is dry and free of snow or ice.

C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

3.02 METAL DECK PREPARATION

A. Install deck sheathing on metal deck:

1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
3. Mechanically fasten sheathing to roof deck, in accordance with Factory Mutual recommendations and roofing manufacturer's instructions.

3.03 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

C. Prior to secondary framing installation, apply vapor retarder to deck sheathing with adhesive in accordance with manufacturer's instructions.

1. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

D. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

3.04 INSTALLATION

A. Secondary Framing:

1. Install secondary framing (subgirts) perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane, and spaced at intervals as recommended by sheet metal roofing manufacturer.

B. Insulation:

1. Attachment of Insulation: Between secondary framing members, embed each layer of insulation in adhesive in full contact, in accordance with insulation manufacturers' instructions.
2. Do not install wet, damaged, or warped insulation boards.
3. Lay subsequent layers of insulation with joints staggered minimum 12 inch from joints of preceding layer.

4. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
5. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
6. Do not apply more insulation than can be completely waterproofed in the same day.

C. Eave Protection:

1. Apply eave protection sheet in accordance with manufacturer's instructions.
2. Extend eave protection sheet up roof slope at least 4 feet beyond exterior wall line of building.

D. Roofing:

1. Apply underlayment over entire roof area, as follows:
   a. Apply single layer of self-adhered membrane, laid perpendicular to slope; weather lap edges.
2. Apply slip sheet in one layer, laid loose.
3. Cleat and seam sheet metal roofing joints.
4. Use butyl tape to seal concealed joints between metal roofing surfaces.
5. Provide formed metal pans for protrusions through roof; fill pans watertight with roof cement.

E. Standing Seam Roofing:

1. Comply with SMACNA (ASMM) details.
2. Space standing seams at ~~[17] inch~~16 inch on center.
3. Lay sheets with long dimension perpendicular to eaves. Apply pans beginning at eaves.
4. Lock cleats into seams and flatten.
5. Stagger transverse joints of roofing sheets.
6. At eaves and gable ends, terminate roofing by hooking over edge strip.
7. Finish standing seams 1-1/2 inch high on flat surfaces
8. Bend up one side edge 1-1/2 inches and other edge 1-3/4 inches.
9. Make first fold 1/4-inch wide single fold and second fold 1/2 inch wide, providing locked portion of standing seam, five plies in thickness.
10. Fold lower ends of seams at eaves over at 45 degree angle.
11. Terminate standing seams at ridge and hips by turning down with tapered fold.
12. Install snow guards upslope from eaves as indicated on drawings.

F. Built-In Gutters and Downspouts: See Section 07 6200.

1. Comply with SMACNA (ASMM) details.
2. At roof edges, extend gutter lining under metal roofing at least 6 inches, and terminate in 3/4-inch folded edge secured by cleats. Hook lower end of roofing into lock strip to form 3/4-inch wide loose-lock seam.

G. Flashing:

1. Comply with SMACNA (ASMM) details.
2. Secure flashings in place using concealed fasteners.
3. Cleat and seam each joint.
4. Apply roof cement compound between metal flashings and felt flashings.
5. Fit flashings tight in place, and make corners square, surfaces true and straight in planes, and lines accurate to profiles.
6. Seal metal joints watertight.

3.05 PROTECTION

A. Do not permit traffic over unprotected roof surface.

END OF SECTION

SECTION 08 7100 - DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood, aluminum, and hollow metal doors.

B. Electrically operated and controlled hardware.

C. Lock cylinders for doors that hardware is specified in other sections.

D. Thresholds.

E. Weatherstripping and gasketing.

F. Gate locks.

G. Preliminary schedule of door hardware sets for swinging and other door types as indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Section 06 4100 - Architectural Wood Casework: Cabinet hardware.

B. Section 07 9200 - Joint Sealants: Sealants for setting exterior door thresholds.

C. ~~Section 08 0671 - Door Hardware Schedule: Schedule of door hardware sets.~~

D. Section 08 1113 - Hollow Metal Doors and Frames.

E. Section 08 1416 - Flush Wood Doors.

F. Section 08 3613 - Sectional Doors: Door hardware, except cylinders.

G. Section 08 4313 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.

H. Section 08 7113 - Power Door Operators.

I. Division 26 - Electrical: Power supply to electric hardware devices.

J. Division 28:

1. Access Control: Electronic access control devices.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

C. BHMA A156.1 - Standard for Butts and Hinges; 2021.

D. BHMA A156.2 - Bored and Preassembled Locks and Latches; 2022.

E. BHMA A156.3 - Exit Devices; 2020.

F. BHMA A156.4 - Door Closers and Pivots; 2024.

G. BHMA A156.5 - Cylinders and Input Devices for Locks; 2020.

H. BHMA A156.6 - Standard for Architectural Door Trim; 2021.

I. BHMA A156.7 - Template Hinge Dimensions; 2016.

J. BHMA A156.8 - Door Controls - Overhead Stops and Holders; 2021.

K. BHMA A156.13 - Mortise Locks & Latches Series 1000; 2022.

L. BHMA A156.16 - Standard for Auxiliary Hardware; 2023.

M. BHMA A156.18 - Standard for Materials and Finishes; 2020.

N. BHMA A156.21 - Thresholds; 2019.

O. BHMA A156.22 - Standard for Gasketing; 2021.
P. BHMA A156.26 - Standard for Continuous Hinges; 2021.
Q. BHMA A156.31 - Electric Strikes and Frame Mounted Actuators; 2024.
R. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
S. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
T. DHI (H&S) - Sequence and Format for the Hardware Schedule; 2019.
U. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
V. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
W. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
X. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
Y. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
Z. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.
AA. UL (DIR) - Online Certifications Directory; Current Edition.
BB. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
C. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.
B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, marked templates, material descriptions, finishes, and dimensions and profiles of individual components.
C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
    1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
    2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
    3. List groups and suffixes in proper sequence.
    4. Provide complete description for each door listed.

5. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
6. Include account of abbreviations and symbols used in schedule.

D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:

1. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.

E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1. Submit final typed finish hardware schedule that includes any corrections and changes to the submittal schedule.

F. ~~Keying: All final cylinder cores, keys, and keying furnished and performed by Owner.~~

G. Specimen warranty.

H. Templates: After hardware schedule has been approved, provide templates for door and frame preparation.

I. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional provisions.
2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

A. Single Source: Where several manufacturers are specified for one type of hardware, use only products of one manufacturer.

B. Installer’s Qualifications:

1. Locally recognized installer of commercial hardware products and an employer of workers trained and approved by product manufacturers and who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

C. Supplier’s Qualifications:

1. Hardware supplier shall have and maintain a factory direct status with all manufacturer’s specified or approved.
2. ~~Supplier shall employ an Architectural Hardware Consultant (AHC) who will coordinate and produce required submittals and who is available during the course of the project for meetings with the Architect and Owner.~~

1.07 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1. Deliver in unopened containers.

B. Delivery of Keys: Deliver to Owner in person, or by registered mail.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer's Warranty: Provide warranty against defects in material and workmanship for period indicated. Complete forms in Owner's name and register with manufacturer.
   1. Closers: 30 years, minimum.
   2. Exit Devices: 10 years, minimum.
   3. Locksets and Cylinders: 10 years, minimum.
   4. Other Hardware: Two years, minimum.
C. Upon notification of defects within warranty period, make necessary repairs and replacements at Owner's convenience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Only manufacturers listed in Door Hardware Schedule or Section 08 7100 are considered acceptable, unless noted otherwise.

B. Obtain each type of door hardware as indicated from a single manufacturer and single supplier.

C. Manufacturer's Abbreviations: Coordinate with manufacturers listed in Section 08 7100.

1. GLY - Glynn Johnson.
2. IVE - Ives.
3. KNX - Knox Company.
4. LCN - LCN.
5. McK - McKinney.
6. NGP - National Guard Products.
7. PEM - Pemko.
8. ROC - Rockwood.
9. SCH - Schlage.
10. STA - Stanley Hinges.
11. TRI - Trimco.
12. VON - Von Duprin.

2.02

~~2.01~~2.03 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR) or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
   4. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
      a. Air Leakage Rate: Tested in accordance with UL 1784, with air leakage rate not to exceed 3.0 cfm/sf of door opening at 0.10 inch of water for both ambient and elevated temperature tests.
   5. Auxiliary Hardware: BHMA A156.16.
   6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
   7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.

8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.

E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. See Door Hardware Schedule.

F. Fasteners:

1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
   a. Aluminum fasteners are not permitted.
   b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
   a. Self-drilling (Tek) type screws are not permitted.
   b. Through-bolting type are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Fire-Rated Applications: Comply with NFPA 80.
   a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
   b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
6. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

~~2.02~~2.04 HINGES

A. Manufacturers:

1. Ives, an Allegion brand: www.allegion.com/us/#sle.
2. McKinney; an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. ~~Hager Companies: www.hagerco.com/#sle.~~
4. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Hinges: Comply with BHMA A156.1, Grade 1.

1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
   a. Provide hinge width required to clear surrounding trim.
2. Continuous Hinges: Comply with BHMA A156.26.
3. Provide hinges on every swinging door.
4. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   a. Provide hinges with flush barrels, non-magetic stainless steel pins, flat button tips, and square corners. Pack hinges with appropriate type screws required by door and frame construction.
5. Provide ball-bearing hinges at each door with closer.
6. Provide non-removable pins on exterior outswinging doors with set screw concealed in barrel.

7. Provide non-removable pins on interior outswinging doors at locations as indicated, non-rising loose pins.
8. Provide power transfer hinges where electrified hardware is mounted in door leaf.
9. Provide following quantity of butt hinges for each door:
    a. Doors up to 60 inches High: Two hinges.
    b. Doors From 60 inches High up to 95 inches High: Three hinges.
    c. Doors at 96 inches High: Four hinges.
    d. Doors 97 inches High up to 120 inches High: Five hinges.

~~2.03~~2.05 PIVOTS

A. Manufacturers:
    1. Rixson; an Assa Abloy Group company: www.assaabloydss.com/#sle.
    2. ~~DORMA USA, Inc: www.dorma.com/#sle.~~
    3. Ives, an Allegion brand: www.allegion.com/us/#sle.
    4. Substitutions: See Section 01 6000 - Product Requirements.
B. Center-Hung and Offset Pivots: Comply with BHMA A156.4.
C. Door Weight: Medium; standard openings with up to 650 lbs door weight.

~~2.04~~2.06 FLUSH BOLTS

A. Manufacturers:
    1. Ives, an Allegion brand: www.allegion.com/us/#sle.
    2. Trimco: www.trimcohardware.com/#sle.
    3. Substitutions: See Section 01 6000 - Product Requirements.
B. Flush Bolts: Comply with BHMA A156.16, Grade 1.
    1. Flush Bolt Throw: 3/4 inch, minimum.
    2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
        a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
    3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
    4. Automatic Flush Bolts: Automatically latch upon closing of door; automatic retraction of bolts when active leaf is opened; located on inactive leaf of pair of doors.

~~2.05~~2.07 EXIT DEVICES

A. Manufacturers:
    1. Von Duprin, an Allegion brand: www.allegion.com/us/#sle.
    2. Substitutions: Not permitted.
B. Exit Devices: Comply with BHMA A156.3, Grade 1.
    1. Provide exit devices properly sized for door width and height.
    2. Provide strike as recommended by manufacturer for application indicated.
    3. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

~~2.06~~2.08 ELECTRIC STRIKES

A. Electric Strikes: Comply with BHMA A156.31, Grade 1.
    1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
    2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
    3. Provide field selectable Fail Safe/Fail Secure modes.
    4. Provide transformer and rectifier as necessary for complete installation.

5. Connect electric strikes into fire alarm where non-rated doors are scheduled to release with fire or sprinkler alarm condition.

~~2.07~~2.09 LOCK CYLINDERS

A. Manufacturers:

1. Schlage, an Allegion brand: www.allegion.com/us.
2. Substitutions: Not permitted.

B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.

1. Provide full size interchangeable core (FSIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
2. Provide cylinders from same manufacturer as locking device.
3. Provide cams and/or tailpieces as required for locking devices.
4. Within specific Door Sections, when provisions for lock cylinder are being referenced to this Section, provide specified lock cylinder and keyed to building keying system, unless otherwise indicated.

~~2.08~~2.10 CYLINDRICAL LOCKS

A. Manufacturers:

1. ~~Corbin Russwin or Sargent; an Assa Abloy Group company: www.assaabloydss.com/#sle.~~
2. Schlage, an Allegion brand: www.allegion.com/us/#sle.
3. Substitutions: Not permitted.

B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.

1. Bored Hole: 2-1/8 inch diameter.
2. Latchbolt Throw: 1/2 inch, minimum.
3. Backset: 2-3/4 inch unless otherwise indicated.
4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
   a. Finish: To match lock or latch.
   b. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
   c. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
   d. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.

~~2.09~~2.11 MORTISE LOCKS

A. Manufacturers:

1. ~~Corbin Russwin or Sargent; an Assa Abloy Group company: www.assaabloydss.com/#sle.~~
2. Schlage, an Allegion brand: www.allegion.com/us/#sle.
3. Substitutions: ~~See Section01 6000-Product Requirements~~Not permitted.

B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.

1. Latchbolt Throw: 3/4 inch, minimum.
2. Deadbolt Throw: 1 inch, minimum.
3. Backset: 2-3/4 inch unless otherwise indicated.
4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
   a. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.

b. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
c. Finish: To match lock or latch.

~~2.10~~2.12 DOOR PULLS AND PUSH PLATES

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Forms+Surfaces: www.forms-surfaces.com/#sle.
3. ~~Hager Companies: www.hagerco.com/#sle.~~
4. ~~Hiawatha, Inc, division of Activar Construction Products Group, Inc: www.activarcpg.com/hiawatha/#sle.~~
5. ~~Pamex, Inc: www.pamexinc.com/#sle.~~
6. Trimco: www.trimcohardware.com/#sle.
7. Ives, an Allegion brand: www.allegion.com/us.
8. Substitutions: See Section 01 6000 - Product Requirements.

B. Door Pulls and Push Plates: Comply with BHMA A156.6.
1. Pull Type: Offset, unless otherwise indicated.
2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
a. Edges: Beveled, unless otherwise indicated.
3. Material: Aluminum, unless otherwise indicated.

~~2.11~~2.13 DOOR PULLS AND PUSH BARS

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; NeoMax series locking and dummy pulls : www.assaabloydss.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Door Pulls and Push Bars: Comply with BHMA A156.6.
1. Bar Type: Bar set, unless otherwise indicated, with locking capacity.
2. Material: Aluminum, unless otherwise indicated.

~~2.12~~2.14 COORDINATORS

A. Manufacturers:
1. ~~Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.~~
2. ~~DORMA USA, Inc: www.dorma.com/#sle.~~
3. Ives, an Allegion brand: www.allegion.com/us/#sle.
4. ~~Pamex, Inc: www.pamexinc.com/#sle.~~
5. Trimco: www.trimcohardware.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

B. Coordinators: Provide on doors having closers and self-latching or automatic flush bolts to ensure that inactive door leaf closes before active door leaf.
1. Type: Bar, unless otherwise indicated.
2. Material: Aluminum, unless otherwise indicated.
3. Ensure that coordination of other door hardware affected by placement of coordinators and carry bar is applied properly for completely operable installation.

~~2.13~~2.15 CLOSERS

A. Manufacturers; Surface Mounted:
1. LCN, an Allegion brand: www.allegion.com/us/#sle.
2. Substitutions: Not permitted.

B. Manufacturers; Low Energy for ADA Applications:

1. LCN, an Allegion brand: www.allegion.com/us.
2. Substitutions: Not permitted.

C. Closers: Comply with BHMA A156.4, Grade 1.

1. Type: As indicated in door hardware sets.
   a. Closers may not be thru bolted through door unless required for the fire rating.
2. Size to properly close door automatically, smoothly, and tightly against door frame under operating conditions; manufacturer's published recommended sizes are minimum.
   a. Take special precaution to compensate for auxiliary hardware, oversized doors, stack action in shafts, and differential pressures caused by air conditioning system.
3. Provide door closer on each exterior door.
4. Provide door closer on each fire-rated and smoke-rated door.
5. Verify head condition prior to furnishing door closers; make required modifications or changes due to conditions at no cost to Owner.
6. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.
7. At corridor entry doors, mount closer on room side of door.
8. At outswinging exterior doors, mount closer on interior side of door.

~~2.14~~2.16 OVERHEAD STOPS AND HOLDERS

A. Manufacturers:

1. Rixson; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Glynn-Johnson, an Allegion brand: www.allegion.com/us/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.

~~2.15~~2.17 POWER DOOR OPERATORS

A. See Section 08 7113.

~~2.16~~2.18 KICK PLATES

A. Manufacturers:

1. Ives, an Allegion brand: www.allegion.com/us/#sle.
2. Trimco: www.trimcohardware.com/#sle.
3. Tice Industries.
4. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.

1. Size: 10 inch high by 2 inch less door width (LDW) on push side of door.

~~2.17~~2.19 FLOOR STOPS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Trimco: www.trimcohardware.com/#sle.
3. Ives, an Allegion brand: www.allegion.com/us.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.

1. Type: Heavy-duty, with bumper floor stop.
2. Material: Steel housing with rubber insert.

2.182.20 WALL STOPS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Trimco: www.trimcohardware.com/#sle.
3. Ives, an Allegion brand: www.allegion.com/us.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.

1. Type: Bumper, convex, wall stop.
2. Material: Brass housing with rubber insert.

2.192.21 ASTRAGALS

A. Manufacturers:

1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. National Guard Products, Inc: www.ngpinc.com/#sle.
3. ~~Von Duprin, an Allegion brand: www.allegion.com/us/#sle.~~
4. Zero International, Inc: www.zerointernational.com/#sle.
5. Substitutions: Not permitted.

B. Astragals: Comply with BHMA A156.22.

1. Type: Meeting and overlapping type, and with sealing gasket.
2. Material: Steel or aluminum, see hardware groups.
3. Provide non-corroding fasteners at exterior locations.

2.202.22 THRESHOLDS

A. Manufacturers:

1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. National Guard Products, Inc: www.ngpinc.com/#sle.
3. Zero International, Inc: www.zerointernational.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Thresholds: Comply with BHMA A156.21.

1. Provide threshold at each exterior door, unless otherwise indicated.
2. Type: Latching at exterior doors, raised at acoustic doors. ADA compliant at all doors.
3. Material: Aluminum.
4. Threshold Surface: Fluted horizontal grooves across full width.
5. Field cut threshold to profile of frame and width of door sill for tight fit.
6. Provide non-corroding fasteners at exterior locations.

2.212.23 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:

1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. National Guard Products, Inc: www.ngpinc.com/#sle.
3. Zero International, Inc: www.zerointernational.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Weatherstripping and Gasketing: Comply with BHMA A156.22.

1. Head and Jamb Type: Self-adhesive.
2. Door Sweep Type: Door shoe with drip cap; or mortise or concealed automatic, encased in retainer.
3. Material: Aluminum, with brush weatherstripping or bio-based polymer extrusion.

4. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, as well as doors between fully conditioned and partially conditioned spaces, unless otherwise indicated.
5. Provide door bottom sweep on each exterior door, unless otherwise indicated.
6. Provide sound-rated gasketing and automatic door bottom on doors indicated as "Sound-Rated", "Acoustical", or with "Sound Transmission Class (STC) rating"; fabricate as continuous gasketing, do not cut or notch gasketing material.

C. Automatic Door Bottom: Comply with BHMA A156.22

1. Fully mortised into door
2. Comply with ASTM E90

~~2.22~~2.24 LATCH PROTECTOR

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Ives, an Allegion brand: www.allegion.com/us.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Latch Protector: Provide on door to protect latch from being tampered with while in locked position.

1. Type: Standard latch protector.
2. Material: Stainless steel.

~~2.23~~2.25 SILENCERS

A. Manufacturers:

1. Ives, an Allegion brand: www.allegion.com/us/#sle.
2. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.

1. Single Door: Provide three on strike jamb of frame.
2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
3. Material: Rubber, gray color.

~~2.24~~2.26 KEYS AND KEYING

A. Locksets and Cylinders: Owner to provide a construction key system, with 10 construction keys. All cylinder housings shall be ~~SF~~FSIC type.

B. Installation of Cylinders: Owner will install all final cylinder cores.

~~2.25~~2.27 FIRE DEPARTMENT LOCK BOX

A. See Section 10 4116 - Emergency Key Cabinets.

~~2.26~~2.28 EXIT MOTION SENSOR

A. Exit Motion Sensor: Interior passive infrared detection device to initiate door release of exit door magnetic lock.

1. Power: 12 VDC.
2. Provide adjustable detector face to allow for precise pattern configurations, and easy pattern adjustment.
3. Provide relay that operates before transistor to prevent false alarms.
4. Operating Temperature: 32 to 110 degrees F.

2.272.29 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
   1. Primary Finish: 630; satin stainless steel, with stainless steel 300 series base material (former US equivalent US32D); BHMA A156.18.
   2. Secondary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
      a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
   3. Unless otherwise specified, match finish of each item of hardware with finish selected for lock sets and latches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

C. Install hardware for smoke and draft control doors in accordance with NFPA 105.

D. Use templates provided by hardware item manufacturer.

E. Do not install surface mounted items until application of finishes to substrate are fully completed.

F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list, unless noted otherwise on drawings.
   1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
   2. For Aluminum-Framed Storefront Doors and Frames: See Section 08 4313.
   3. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
   4. Mounting heights in compliance with ADA Standards: Distance from finished floor to centerline of hardware item. As indicated on following list, unless noted otherwise on drawings.
      a. Locksets: 40-5/16 inch.
      b. Push Plates/Pull Bars: 42 inch.
      c. Deadlocks (Deadbolts): 48 inch.
      d. Exit Devices: 40-5/16 inch.

G. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
   1. See Section 07 9200 for additional requirements.

3.03 ADJUSTING

A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

PART 4 DOOR HARDWARE GROUPS

4.01 DESCRIPTION

A. Door hardware sets provided represent the design intent, they are only a guideline and should not be considered a detailed or complete hardware schedule.

1. Provide door hardware item(s) as required for similar purposes, even when item is not listed for a door in Door Hardware Schedule.

2. Necessary items that are not included in a Hardware Set should be added and have the appropriate additional hardware as required for proper application and functionality.

3. Door hardware supplier is responsible for providing proper size and hand of door for products required in accordance with Door Hardware Schedule and as indicated on drawings.

B. Quantities listed are for each Pair (PR) of doors, or for each Single (SGL) door, as indicated in hardware sets.

C. Organize listing of door hardware components within each hardware set in compliance with 10-Part scheduling sequence indicated in DHI (H&S), unless otherwise indicated

4.02 HARDWARE GROUPS

HARDWARE GROUP NO. 01

101

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
2	EA		818T				
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			630	IVE
2	EA	POWER TRANSFER	EPT10 CON			689	VON
1	EA	KEYED REMOV. MULLION	KR4954 STAB			689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-EO-CON 24 VDC			626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL-OP-388-CON 24 VDC			626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX X K510-730 36-083			626	SCH
2	EA	FSIC CORE	23-030 NUM			626	SCH
2	EA	LONG DOOR PULL	9264F 36" O			630-316	IVE
1	EA	OH STOP	100S			630	GLY
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	SURF. AUTO OPERATOR	4642 WMS 120 VAC			689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	EA	MULLION SEAL	8780NBK PSA			BK	ZER
1	SET	WEATHER STRIPPING	PROVIDED BY DOOR/FRAME MANUFACTURER				
2	EA	DOOR SWEEP	8197AA			AA	ZER
1	EA	THERMAL BREAK THRESHOLD	766x5AFG			AL	PEM
2	EA	WIRE HARNESS	CON-26P (FROM EPT TO ELECTRIFIED HARDWARE- VERIFY LENGTH BEFORE ORDERING)				SCH
2	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)				SCH
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC				VON
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

POWER SUPPLY AND AUTO OPERATOR REQUIRE 120VAC. CARD READER AND ACTUATOR AT EXTERIOR MOUNTED ON BOLLARD (BOLLARD PROVIDED BY OTHER SECTION OF WORK). ACTUATOR BUTTONS ARE ALSO REQUIRED IN THE VESTIBULE. A 6" TOP RAIL IS REQUIRED FOR THE DOOR CLOSER, OR A DROP PLATE MUST BE FURNISHED.

HARDWARE GROUP NO. 02

125B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	EA	DUMMY PUSH BAR	350			626	VON
1	EA	LONG DOOR PULL	9264F 36" O			630-316	IVE
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER				

HARDWARE GROUP NO. 03

173A 174A

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			630	IVE
1	EA	POWER TRANSFER	EPT10 CON		✓	689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-98-L-M996-M51-FSE-CON		✓	626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	RAIN DRIP	142AA			AA	ZER
1	EA	GASKETING	188SBK PSA			BK	ZER
1	EA	DOOR SWEEP	8197AA			AA	ZER
1	EA	THERMAL BREAK THRESHOLD	766x5AFG			AL	PEM
1	EA	WIRE HARNESS	CON-44P (FROM EPT TO ELECTRIC HARDWARE- VERIFY PROPER LENGTH)		✓		SCH
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 03.1

V201A V207A V208B V208G V208J

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			630	IVE
1	EA	POWER TRANSFER	EPT10 CON		✓	689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-98-L-M996-M51-FSE-CON		✓	626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	RAIN DRIP	142AA			AA	ZER
1	EA	GASKETING	188SBK PSA			BK	ZER
1	EA	DOOR SWEEP	8197AA			AA	ZER
1	EA	THERMAL BREAK THRESHOLD	766x5AFG			AL	PEM
1	EA	WIRE HARNESS	CON-44P (FROM EPT TO ELECTRIC HARDWARE- VERIFY PROPER LENGTH)		✓		SCH
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 03.2

V204

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	LD-98-L-NL-M51		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	8197AA		AA	ZER
1	EA	THERMAL BREAK THRESHOLD	766x5AFG		AL	PEM

HARDWARE GROUP NO. 03.3

V205 V209

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080T M51A		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	LOCK GUARD	LG10		630	IVE
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	8197AA		AA	ZER
1	EA	THERMAL BREAK THRESHOLD	766x5AFG		AL	PEM

HARDWARE GROUP NO. 04

102

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
2	EA		818T				
8	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
2	EA	DUMMY PUSH BAR	350			626	VON
2	EA	LONG DOOR PULL	9264F 36" O			630-316	IVE
1	EA	OH STOP	100S			630	GLY
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	SURF. AUTO OPERATOR	4642 WMS 120 VAC		✓	689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	SET	WEATHER STRIPPING	PROVIDED BY DOOR/FRAME MANUFACTURER				

AUTO OPERATOR REQUIRES 120VAC. A 6" TOP RAIL IS REQUIRED FOR THE DOOR CLOSER, OR A DROP PLATE MUST BE FURNISHED.

HARDWARE GROUP NO. 05

103A

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			652	IVE
1	EA	KEYED REMOV. MULLION	KR4954 STAB			689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-EO-CON 24 VDC			626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL-OP-388-CON 24 VDC			626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX X K510-730 36-083			626	SCH
2	EA	FSIC CORE	23-030 NUM			626	SCH
2	EA	LONG DOOR PULL	9264F 36" O			630-316	IVE
2	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30 SRT			689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	SET	WEATHER STRIPPING	PROVIDED BY DOOR/FRAME MANUFACTURER				
2	EA	WIRE HARNESS	CON-26P (FROM EPT TO ELECTRIFIED HARDWARE- VERIFY LENGTH BEFORE ORDERING)				SCH
2	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)				SCH
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC				VON
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

POWER SUPPLY REQUIRES 120VAC. A 6" TOP RAIL IS REQUIRED FOR THE DOOR CLOSERS, OR DROP PLATES MUST BE FURNISHED.

HARDWARE GROUP NO. 06

113 127

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			652	IVE
1	EA	PANIC HARDWARE	LD-98-L-M51			626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC		✓	630	VON
1	EA	SURFACE CLOSER	4040XP EDA MC			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	EA	WALL STOP	WS406/407CVX			630	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER				
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 06.1

111

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE CON		✓	630	VON
1	EA	SURFACE CLOSER	4040XP REG MC			689	LCN
1	EA	WALL STOP	WS406/407CVX			630	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER				
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

A 5" DOOR STILE IS REQUIRED FOR THE LOCKSET. A 6" TOP RAIL IS REQUIRED FOR THE DOOR CLOSER, OR A DROP PLATE MUST BE FURNISHED.

HARDWARE GROUP NO. 07

125A 134B 146B 154

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			630	IVE
1	EA	POWER TRANSFER	EPT10 CON		✓	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL-OP-388-CON 24 VDC		✓	626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	LONG DOOR PULL	9264F 36" O			630-316	IVE
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	SET	WEATHER STRIPPING	PROVIDED BY DOOR/FRAME MANUFACTURER				
1	EA	DOOR SWEEP	8197AA			AA	ZER
1	EA	THERMAL BREAK THRESHOLD	766x5AFG			AL	PEM
1	EA	WIRE HARNESS	CON-26P (FROM EPT TO ELECTRIFIED HARDWARE- VERIFY LENGTH BEFORE ORDERING)		✓		SCH
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC		✓		VON
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

POWER SUPPLY REQUIRES 120VAC.

HARDWARE GROUP NO. 08

200

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	PANIC HARDWARE	LD-98-L-NL-M51		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE GROUP NO. 08.1

201A 201B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			652	IVE
1	EA	PANIC HARDWARE	LD-98-L-NL-M51			626	VON
1	EA	RIM CYLINDER	20-057 ICX			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
3	EA	SILENCER	SR64			GRY	IVE

HARDWARE GROUP NO. 09

106A

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON		✓	630	VON
1	EA	SURFACE CLOSER	4040XP REG MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CVX			630	IVE
3	EA	SILENCER	SR64			GRY	IVE
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 09.1

112A 112B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE CON		✓	630	VON
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT			689	LCN
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER				
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

A 6" TOP RAIL IS REQUIRED FOR THE DOOR CLOSER, OR A DROP PLATE MUST BE FURNISHED.

HARDWARE GROUP NO. 09.2

143

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE CON		✓	630	VON
1	EA	SURFACE CLOSER	4040XP REG MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CVX			630	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER				
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 10

138 141 164 165 170A 170B
171

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	ROLLER LATCH	RL32		626	IVE
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	SET	VERTICAL LOCKING DOOR PULL- BACK TO BACK	LP3401-DBU-ADA-54"		629	ROC
1	EA	FLOOR STOP	FS436		626	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER			

DO NOT INSTALL DOOR PULLS LOWER THAN 34" AFF. THE BOTTOM 34" OF THE DOOR FACE MUST NOT HAVE ANY PROJECTING HARDWARE, PER CODE.

HARDWARE GROUP NO. 11

137

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	ROLLER LATCH	RL32		626	IVE
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	SET	VERTICAL LOCKING DOOR PULL- BACK TO BACK	LP3401-DBU-ADA-54"		629	ROC
1	EA	FLOOR STOP	FS436		626	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER			

DO NOT INSTALL DOOR PULLS LOWER THAN 34" AFF. THE BOTTOM 34" OF THE DOOR FACE MUST NOT HAVE ANY PROJECTING HARDWARE, PER CODE.

HARDWARE GROUP NO. 12

121 124 134A 146A 162

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	ROLLER LATCH	RL32		626	IVE
1	SET	VERTICAL PULL- BACK TO BACK	RM3401-60" 5HD		629	ROC
1	EA	FLOOR STOP	FS436		626	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER			

DO NOT INSTALL DOOR PULLS LOWER THAN 34" AFF. THE BOTTOM 34" OF THE DOOR FACE MUST NOT HAVE ANY PROJECTING HARDWARE, PER CODE.

HARDWARE GROUP NO. 12.1

168 169

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	ROLLER LATCH	RL32		626	IVE
1	SET	VERTICAL PULL- BACK TO BACK	RM3401-60" 5HD		629	ROC
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436		626	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER			

DO NOT INSTALL DOOR PULLS LOWER THAN 34" AFF. THE BOTTOM 34" OF THE DOOR FACE MUST NOT HAVE ANY PROJECTING HARDWARE, PER CODE.

HARDWARE GROUP NO. 13

107

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	L9080T M51A		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE GROUP NO. 13.1

135A

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	L9080T M51A		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488SBK PSA (FOR SOUND)		BK	ZER

HARDWARE GROUP NO. 13.2

136A

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	L9080T M51A		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR66		GRY	IVE

HARDWARE GROUP NO. 13.3

136B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	L9080T M51A		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR66		GRY	IVE

HARDWARE GROUP NO. 14

109 110 129 130 131 132

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PRIVACY W/OCCUP. INDIC.	L9456T M51A L583-363 OS-OCC		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	SURFACE CLOSER	4040XP REG MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488SBK PSA (FOR SOUND)		BK	ZER

HARDWARE GROUP NO. 14.1

150 158 V203

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PRIVACY W/OCCUP. INDIC.	L9456T M51A L583-363 OS-OCC		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	SURFACE CLOSER	4040XP REG MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488SBK PSA (FOR SOUND)		BK	ZER

HARDWARE GROUP NO. 14.2

151 156 157

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	PRIVACY W/OCCUP. INDIC.	L9456T M51A L583-363 OS-OCC		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA (FOR SOUND)		BK	ZER

HARDWARE GROUP NO. 15

147A 147B 160A 160B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	SET	VERTICAL PULL- BACK TO BACK	RM3401-60" 5HD			629	ROC
1	EA	SURFACE CLOSER	4040XP EDA MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	FLOOR STOP	FS436			626	IVE
3	EA	SILENCER	SR66			GRY	IVE

DO NOT INSTALL DOOR PULLS LOWER THAN 34" AFF. THE BOTTOM 34" OF THE DOOR FACE MUST NOT HAVE ANY PROJECTING HARDWARE, PER CODE.

HARDWARE GROUP NO. 16

142

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON		✓	630	VON
1	EA	SURFACE CLOSER	4040XP EDA MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CVX			630	IVE
3	EA	SILENCER	SR64			GRY	IVE
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 16.1

163

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE CON		✓	630	VON
1	EA	OH STOP	90S			630	GLY
1	EA	SURFACE CLOSER	4040XP REG MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	SET	SILENCER/SEALS	BY DOOR FRAME MANUFACTURER				
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 17

135B

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
7	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			652	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW4		✓	652	IVE
1	EA	CONST LATCHING BOLT	FB51P 24"			630	IVE
1	EA	DUST PROOF STRIKE	DP2			626	IVE
1	EA	EU MORTISE LOCK	L9092TEU M51A RX CON 12/24 VDC		✓	626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	COORDINATOR	COR X FL			628	IVE
2	EA	MOUNTING BRACKET	MB			689	IVE
2	EA	CLOSER W/ STOP ARM	4040XP SCUSH MC			689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW B-CS			630	IVE
1	EA	GASKETING	488SBK PSA (HEAD, JAMBS & ASTRAGAL-FOR SOUND)			BK	ZER
1	EA	FLAT ASTRAGAL	44STST			STST	ZER
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

HARDWARE GROUP NO. 18

114 115 116 123

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	ROLLER LATCH	RL32		626	IVE
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	SET	VERTICAL LOCKING DOOR PULL- BACK TO BACK	LP3401-DBU-ADA-54"		629	ROC
1	EA	FLOOR STOP	FS436		626	IVE
1	SET	SOUND GASKETING	870AA-S		AA	ZER
1	EA	SEMI-MORTISE AUTO DR BTM	362AA		AA	ZER
1	EA	THRESHOLD	64A-224		A	ZER

DOOR FRAME MUST BE A CASED-OPEN TYPE WITH NO STOPS. THE SOUND SEAL PERFORMS AS THE PERIMETER STOP. DO NOT INSTALL DOOR PULLS LOWER THAN 34" AFF. THE BOTTOM 34" OF THE DOOR FACE MUST NOT HAVE ANY PROJECTING HARDWARE, PER CODE.

HARDWARE GROUP NO. 19

105

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	L9080T M51A		626	SCH
1	EA	FSIC CORE	23-030 NUM		626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE CON	✓	630	VON
1	EA	SURFACE CLOSER	4040XP EDA MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436		626	IVE
1	SET	SOUND GASKETING	870AA-S		AA	ZER
1	EA	SEMI-MORTISE AUTO DR BTM	362AA		AA	ZER
1	EA	THRESHOLD	64A-224		A	ZER
1	EA	MOUNTING BRACKET	870SPB			ZER
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)	✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28			

MOUNT SOUND SEALS, BRACKET AND THEN THE DOOR CLOSER.

HARDWARE GROUP NO. 19.1

106B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP			652	IVE
1	EA	STOREROOM LOCK	L9080T M51A			626	SCH
1	EA	FSIC CORE	23-030 NUM			626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE CON		✓	630	VON
1	EA	SURFACE CLOSER	4040XP EDA MC			689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP	WS406/407CVX			630	IVE
1	SET	SOUND GASKETING	870AA-S			AA	ZER
1	EA	SEMI-MORTISE AUTO DR BTM	362AA			AA	ZER
1	EA	THRESHOLD	64A-224			A	ZER
1	EA	MOUNTING BRACKET	870SPB				ZER
1	EA	WIRE HARNESS	CON-6W (FROM EPT OR STRIKE TO POWER)		✓		SCH
1	EA	ACCESS CONTROL	PROVIDED BY DIV 28				

MOUNT SOUND SEALS, BRACKET AND THEN THE DOOR CLOSER.

HARDWARE GROUP NO. 20

152 153

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PASSAGE LATCH	L9010T M51A		626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE GROUP NO. 20.1

167 V201B V202 V207C V207D

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PASSAGE LATCH	L9010T M51A		626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436		626	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE GROUP NO. 21

159

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PANIC HARDWARE	LD-98-L-BE-M51		626	VON
1	EA	SURFACE CLOSER	4040XP EDA MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE GROUP NO. 21.1

201C

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PANIC HARDWARE	LD-98-L-BE-M51		626	VON
1	EA	SURFACE CLOSER	4040XP EDA MC		689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

END OF SECTION

SECTION 21 2201 - HYBRID FIRE EXTINGUISHING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Victaulic Vortex **500** Hybrid Extinguishing System

B. Coordinate with Division 28, Electronic Safety and Security, for releasing control panel, initiating devices and controls for the Vortex **500** System.

1.02 RELATED SECTIONS

A. Contents of Division 21, Fire Suppression and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Division 22, Plumbing
2. Division 23, Heating, Ventilating and Air Conditioning
3. Division 26, Electrical
4. Division 28, Electronic Safety and Security
5. Section 21 00 00, Fire Suppression Basic Requirements
6. Section 21 12 00, Fire Suppression Standpipes
7. Section 21 13 00, Fire Suppression Sprinkler Systems

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

B. Meet requirements of ASCE 7, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers, latest adopted edition.

1.04 SUBMITTALS

A. Submittals as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 21 00 00, Fire Suppression Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. General: All tubing, piping, and fittings for the complete system to be stainless steel, galvanized, or other corrosion resistant materials. Fittings that do not have wetted surfaces may be ductile iron or equivalent.

B. Victaulic Vortex **500** Extinguishing System:
   1. Victaulic.
   2. No substitutions permitted.

2.02 SYSTEM DESCRIPTION

A. Unless otherwise specified, protection to be by an engineered hybrid, high velocity, low pressure, Victaulic Vortex **500** dual fluid system capable of making water particles less than 10 microns in size.

B. System to be designed, installed and tested in accordance with Victaulic Vortex **500** performance based design intent as described in the Victaulic's Vortex **500** Design, Installation and Maintenance Manual. The Victaulic Vortex **500** System to incorporate separate pressurized streams of nitrogen and water which are combined and discharged as a hybrid inert gas fog into the fire hazard.

C. The combination of the nitrogen gas and water to be at the emitter, where the nitrogen stream to be at approximately 25 psig, and water component to be at a minimum of 30 psig.
   1. Water to be introduced into the nitrogen flow downstream of the nitrogen exit orifice to atmosphere.
   2. Provide a self-regulating flow cartridge for each emitter to ensure a specific water flow of less than one gallon per minute per emitter.
   3. Provide a strainer upstream of each flow cartridge to ensure no clogging is permitted.

D. The mixture of the two components (hybrid) to be in a shock front, allowing shear forces to atomize the water, creating the hybrid inert gas micro mist of water droplets less than 10µm in diameter, with the majority being less than 10µm in diameter.

E. Application to protect via total flooding or as a local application hazard protection.

F. System to be activated automatically upon detection of a fire and capable of being manually activated.

G. A release signal shall be provided to discharge the system and a supervisory signal is used to confirm the hybrid inert gas fog has discharged.

2.03 EXTINGUISHMENT MECHANISM AND TEST METHODOLOGY

A. The fire extinguishing system's primary extinguishing mechanism to be reduction of atmosphere to 12.5 percent to 14 percent oxygen.

B. Secondary to be by heat absorption via the fine water particles vaporization from liquid phase to vapor phase.

C. Test protocol acceptance criteria to be in accordance with that set by Victaulic Vortex 5Design, Installation and Maintenance Manual.

D. Documented approval agency testing for machined spaces up to 3500 cubic meters with scalability beyond 3500 cubic meters, is required.

E. No ozone depletion potential or Global Warming Characteristic to be accepted.

2.04 SPECIFICATION NEEDS

A. When an engineered system is required or specified, design to include the following:
   1. Engineered systems to utilize proven fire test data from a recognized international testing agency (e.g., IMO or Factory Mutual) as a minimum for the design basis of the proposed system design.
   2. The testing referenced to be based on the specific hazards, equipment packages and the associated enclosure type.
   3. The design of engineered systems must clearly demonstrate function and NFPA 750 performance based design intent based on the referenced test data considering volume and water volume density and extinguishing performance for the design when comparing to the test data.

B. The following items as detailed in the I-VORTEX Installation and Maintenance Manual systems:
   1. Victaulic Vortex **500** fire suppression system installation and verification procedure.
   2. Points of contact and discharge actuation eyewitness.
   3. Acceptance and testing procedure.
   4. I-VORTEX General Design, Installation, and Maintenance Manual.

C. Provide Victaulic Vortex customer information sheets for the hazards and provide detailed drawings to assist in the design and layout of the emitters and submitted to the Owner's stakeholders. Any further requirements for the system not covered in this specification to be relayed to the Victaulic Vortex project engineers for their consideration and requisite actions in laying out the proposal.

D. Owner's stakeholder approval is required for all fire suppression systems.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install in conformance with UL Listing, FM Approval or ICC-ES requirements and restrictions.

B. Post clear instruction signs outside the system hazard area or adjacent to an unenclosed system to ensure correct operation of the system. Additionally, post recharge and basic maintenance instructions inside the system cabinet or adjacent to the system. Signs and instructions to be provided on engraved or etched material in English.

C. Submit completed points of contact, discharge, activation, eyewitness, acceptance testing procedure.

D. Provide details of test results to Owner's stakeholders.

3.02 EMITTER REQUIREMENTS

A. The Victaulic Vortex **500** System does not require tight enclosures such as with gaseous alternatives.

B. Designs to include emitters to ensure proper coverage of the enclosure. Designs incorporating doorway manifold emitters are not allowed.

C. Locate all emitters in the protected space in accordance with the fire suppression system manufacturer's recommendation and the approved pre-engineered system design. Position emitter to ensure the hybrid inert gas fog is uninterrupted and does not directly impinge on adjacent enclosure equipment (e.g., monorails) or mounting supports.

D. Emitter covers to be fitted to all discharge emitters to prevent blockage from corrosion deposits in a marine environment. Emitter covers to be designed so as to not interfere with the normal discharge.

3.03 WATER SUPPLY REQUIREMENTS

A. Unless approved otherwise, pre-engineered fire suppression system to provide a connected reserve of fluids equal in volume to the initial discharge supply per Victaulic Vortex **500** performance based design intent and will be used for backup. The backup system for engineered systems to be equal in volume to the initial discharge supply.

B. Shutoff control valves for all fluid paths to be monitored for proper operative position.

C. A supply of water to be confirmed for refilling the water cylinders. Make provisions to simplify the task of periodically draining and refilling water cylinders as required by NFPA 750 performance based design intent. Provide filters or strainers with mesh no larger than 80 percent of the smallest orifice or fluid channel in the system or 100 micrometers, whichever is smaller. Provide a system to rapidly verify the water cylinders are full by continual monitoring of facilities to enable rapid level confirmation during periodic maintenance.

D. Design water cylinders to prevent corrosion. When requested, install tanks and cylinders on metal or fiberglass grating inside optional cabinets to raise the cylinders above the cabinet floor and avoid corrosion underneath of the cylinders and/or cabinets.

3.04 NITROGEN SUPPLY REQUIREMENTS

A. Cylinders are to be retained in position by metal bands with rubber or synthetic strips fitted to prevent corrosion of the cylinders or metal bands. Special consideration to be given to FPSO applications due to additional motion induced forces.

B. Primary nitrogen cylinder to have a pressure gauge with display and be continually monitored with a low pressure alarm transmitted to an attended location.

C. Provide DOT 150 or ASME approved cylinder tubes.

3.05 TESTING

A. A pressure test of the complete system (discharge pipe, tubing and fittings) to be carried out in accordance with the requirements of Victaulic Vortex **500** performance based design intent to ensure the system is free of leaks prior to a final discharge test.

B. A final discharge test is required on every individual system prior to any machine testing or operation to ensure piping and fittings do not come loose due to system shock, and that emitters have been positioned correctly with suitable, unobstructed spray patterns.

END OF SECTION

SECTION 23 1113 - FUEL HANDLING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:
   1. Fuel Valves
   2. Fuel Dispenser
   3. Fuel Polishing System

B. Provide complete functional integration of facility fuel handling system as described herein and in coordination with fuel management system (FMS) by Division 23.

C. Provide labor for installation of fuel management system (FMS), including but not limited to: Raceway, control wiring and programming as required for FMS to interface with fuel system controls. Provide control wiring per FMS shop drawings and in compliance with the locally adopted version of the National Electric Code and Division 26, Electrical material and installation requirements.

D. Contractor to coordinate and provide all interconnecting piping, conduits, fittings, etc., between suppliers equipment and devices for complete and operating system.

1.02 RELATED SECTIONS

A. Contents of Division 23, Fuel Handing System Basic Requirements and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:
   1. Division 26, Electrical requirements for fuel handling equipment.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 23 00 00, Fuel Handing System Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 23 00 00, Fuel Handing System Basic Requirements and Division 01, General Requirements.

B. Submit a complete, project-specific submittal package containing complete bill of materials, sequence of operations, electrical wiring diagrams, catalog data and proof of product liability insurance. Partial submittals not accepted. Drawings and product information are to be project specific. Catalog cuts or "standard drawings" not acceptable.

C. Product Data: Submit manufacturer's technical product data and installation instructions for fuel system materials and products.
   1. Provide submittals for fuel pumps, safety devices and any other products required to provide complete working system together with their listed regulatory compliance.
   2. List regulatory compliance of submitted products to applicable construction standards.
   3. Submit copies of product warranties applicable to products specified in this Section.

4. Provide submittals for electrical products required to provide complete working system together with their listed regulatory compliance. Products provided will be suitable for installation in hazardous locations as defined by NFPA 70, National Electrical Code. Provide electrical enclosures with NEMA ratings appropriate for their installed use.
5. Show in shop drawings how fuel handling system controls interface with fuel management system including but not limited to: pump control, annunciation of alarm conditions, etc. Include sequence of operation for fuel handling system as part of overall submittal.

D. Record Drawings: At project closeout, submit Record Drawings of installed fuel systems products.

E. Maintenance Data: Submit maintenance data and parts list for fuel systems materials and products. Include this data, product data, shop drawings and Record Drawings in maintenance manual.

F. Substitutions: Where items of equipment and/or materials are specifically identified by a manufacturer's name or model number, such specified items may be used in the base bid. If the contractor wishes to utilize equipment other than that specifically named in the base bid, they must submit a request in writing, together with the full description and technical data on the equipment proposed as listed in Division 01, General Requirements for substitutions. If such equipment is accepted as an alternate, bidders will be notified to allow them to include the accepted equipment. It is further understood that the substitution(s) are to include modifications or extra cost(s), regardless of the trade(s) involved, or changed necessary due to the alternate equipment. Submittal or shop drawings, if other than the base named equipment, must show detailed changes required by other trades involved. Contractor is responsible for additional costs involved. Under no circumstances is the Engineer responsible for the installation, operation, or performance of substitute materials or equipment, even though accepted; this is the sole responsibility of the contractor. In addition to specific warranty in the heating, ventilating, air conditioning, plumbing, or electrical Specifications, the manufacturers of equipment to be supplied under any substitution warrant the same against costs, including labor and material, arising out of defects in material and/or workmanship, for a period coextensive with the guarantee period provided in the Contract Documents.

G. The calculation of capacities, quantities, dimensions, and other attributes are based on the pertinent data of the Base Name Manufacturers. If submitted alternate manufacturer is accepted as an alternate, it is the contractor's responsibility to investigate in detail the products of these other manufacturers. The contractor is solely responsible for changes in design, location, dimension, function, and installation involved in selection of other than the Base Named Manufacturer. The contractor is responsible for, and bears costs for, changes including required work of other trades, or the Owner and including the Engineer's redesign or evaluation of submittal costs caused directly or indirectly by the use of equipment other than that listed on the Drawings or called for in the Specifications.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 23 00 00, Fuel Handing System Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Qualifications: Firms with a minimum of five years' experience and regularly engaged in manufacture and/or installation of fuel handling systems and products of types, materials, and sizes required.
2. Provide complete fuel handling and dispensing systems including accessories. Original Equipment Manufacturer shall have employees who manufacture, design, start up and service fuel handling systems of this nature throughout the United States. Proof of manufacturing and starting up of the specified system(s) within the last five years must be supplied. This is to assure the highest standards of product quality and system integration capabilities for the customer.
3. Contractor Qualifications
    a. Contractor must be properly licensed by the State of Oregon (DEQ) to install fuel handling systems.
    b. Hazardous Substance Certification issued by the State of Oregon.
4. Comply with the current edition of the following regulatory requirements as well as all References and Standard specified in Section 23 00 00, Fuel Handling System Basic Requirements:
    a. NFPA Compliance: Install fuel systems in accordance with:
        1) NFPA 30, Flammable and Combustible Liquids Code.
    b. UL Compliance:
        1) UL 79, Power Operated Pumps for Petroleum Product dispensing Systems.
        2) UL 842, Standard for Safety for Valves for Flammable Fluids.
        3) UL 508, Standard for Safety of Industrial Control Equipment.
    c. UFC Compliance (Oregon Administrative Rules 837, Division 40):
        1) Article 79, "Flammable and Combustible Liquids."
    d. UFC Compliance (Washington Administrative Code 51-44):
        1) Article 79, "Flammable and Combustible Liquids."
    e. IMC Compliance: Fabricate and install fuel systems in accordance with IMC, Chapter 13 "Fuel Piping and Storage."
    f. FM Global Compliance:
        1) Provide fuel system products that are listed by FM Global as acceptable.
5. Factory Testing:
    a. Prior to shipment, manufacturer tests "packaged" assemblies.
    b. Electrical components functionally tested with instruments and controls. Settings of instruments and controls verified for conformance to these Specifications. A certificate of factory testing, together with a copy of the wiring diagram to be placed in the control cabinet prior to shipment. Affix UL-508 label to the inside of the control panel.
6. Installation, Startup, Training and Service:
    a. Installation in strict accordance with manufacturer's instructions. Contractor is to provide documentation of acceptance testing of fuel tanks after installation and before the fuel tanks are backfilled.

b. The contractor provides the services of the manufacturer's technician to monitor the installation, start-up, test and calibrate the fuel handling equipment including, but not limited to, the leak detection system as well. The manufacturer's technician also provides training. The fuel handling system as a whole is functionally tested. Instrument settings verified for conformance to these Specifications.
c. Provide Four hours of factory certified service for the startup and certification of the fuel handling system and fuel management system (FMS). Provide a letter from the fuel oil handling system manufacturer and FMS manufacturer to the consulting engineer and Owner stating that the system received its factory startup and that components are in working order.
d. Training session for the fuel oil handling system to include its integration with the FMS. Provide training on same day as FMS training, unless otherwise directed by Owner.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, Fuel Handling System Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - SEE THE FUEL HANDLING EQUIPMENT SCHEDULE ON THE PLUMBING DRAWINGS FOR ADDITIONAL SPECIFICATIONS.

A. Fuel Valves: See Fuel Handing Equipment Schedule on Pluming Drawings.
B. Fuel Dispenser:
   1. Gasboy
   2. Gilbarco
   3. Or approved equivalent.
C. Fuel Polishing System:
   1. Fuel Tec
   2. Or appoved equivalent.

2.02 FUEL VALVES

A. General Requirements: Valve products provided for use with fuel-oil systems UL 842 listed. Additional valve standards and valve construction standards are listed specific to type of valve specified.
B. Fuel Safety Valves: Metal body valve with threaded connections, construct for fuel-oil, Grade No. 2 or lighter oil applications. Valve is rated for inlet pressures from 0 to 60-PSIG. Valve will limit inlet pressure on burner pumps to maximum 3-PSIG.

2.03 FUEL DISPENSERS

A. Fuel dispensers shall be listed for alternate fuels (E-15 minimum) with single or twin hoses/product dispensing (See Drawings).
B. Galvanized steel frame with a minimum 13 Ga. weather tight enclosure/jacketing, stainless steel or baked enamel painted.
C. High resolution, 1-inch back-lighted liquid crystal displays.

D. Pulse output, signal operating of remote tank mounted pumps. Intertie to fuel control system (see equipment layout drawings and specifications).

E. Components:

1. Totalizer: Battery-backed electronic totalizer and optional electromechanical totalizer. Readable from the back without opening the cabinet. Reads up to 999999.9.
2. Pressure regulator valve: To prevent product from leaking from the air elimination vent in aboveground tank suction pump installations.
3. Filters: Ten-micron filter to help ensure product purity and helps protect critical components from contamination.
4. Hose: 3/4-inch or 1-inch hardwall hose to match model.
5. Automatic Nozzles: Restrict flow when tank is full, 3/4-inch or 1-inch to match hose-dispensing flow rate.
6. Internal Hose Retractor: Helps keep hoses out of the fueling lane.
7. High Hose Retractor: Eases hose handling with enclosed spring return. Keeps hose up and out of the way to reduce wear and run-over damage.
8. Voltage and Frequency - Standard: 115VAC/60 Hz. Coordinate with Division 26, Electrical.
9. Inlet Connection - Standard and High: 1-1/2-inches NPT. Super High and Ultra High: 2-inches NPT.
10. 24-month minimum warranty.

2.04 FUEL POLISHING SYSTEM

A. Design: One diesel and one gasoline storage tank system. A fuel polishing system is not required for the generator day tanks. **See fueling handling equipment schedule on the drawings for additional information.**

1. Complete factory-assembled automatic particulate filtration, water separation and removal system to maintain the purity of No. 2 fuel oil held in extended storage. The system shall circulate the oil from the storage tank, through the system, removing water and particulate matter, then returning the clean dry fuel back to the storage tank.
2. The System shall exceed diesel engine manufacturer’s cleanliness target of ISO 18/16/13. Water removal to less than 100 PPM.
3. The system shall separate free and emulsified water from diesel fuel with a military type micro-glass coalescer/filter and hydrophobic water separator within a stainless steel top loading housing. Water absorbing filter media is not required.
4. System shall have a touch screen HMI and PLC controller that schedules system operation with alarms and sensors that automatically indicate filter conditions, presents of water in trap, and fluid leak. System includes Modbus networking kit.
5. Industrial electric control panel shall be Underwriters Laboratory 508A and CE Listed
6. System shall be installed with supply and return piping that is exclusive to the system and independent of any other piping to or from the storage tank(s). System supply piping shall extend to contact the storage tank bottom and be designed to maintain contact with the storage tank bottom to extract even small droplets of water.

B. The filtration system shall consist of but not limited to the following components:

1. Welded rain tight aluminum equipment enclosure. 36-inch by 48-inch by 14-inch.
2. Five stage filtration and water removal.
   a. First stage pre-filters three micron dual spin-on.

b. Second, third, and forth stage filter/coalescer within a stainless steel housing:
    1) Treated cellulose
    2) Micro-glass
    3) Hydrophilic cloth wrap
3. Fuel circulation pump bronze ~~8~~ **5** GPM with pressure relief 115/230V 1PH 50/60Hz.
4. Stainless steel separated water trap one gallon capacity with pressurized drain.
5. Valves: Supply and return valves shall be 1-inch ball valves, drain 1/2-inch ball valve.
6. Sensors:
    a. Vacuum sensor transmits condition of first stage filter to HMI/PLC
    b. Pressure sensor transmits condition of filter/coalesce to HMI/PLC
    c. Water sensor transmits high & low water levels in water trap
7. Electrical:
    a. Industrial Control Panel Underwriters Laboratory UL-508A and CE listed
    b. Power required: 115/230 1PH 50/60 Hz 20A
    c. Enclosure NEMA 4X
    d. Voltage: high 115/230, low 24DC
8. Controller: HMI/PLC touch screen
    a. Programmable: date, time, tank selection, run time
    b. Compatibility: MODBUS, ETHERNET, GSM/GPRS
    c. Display:
        1) Low water in trap
        2) Vacuum at primary filter (filter change instructions)
        3) Pressure at final filter (filter change instructions)
        4) High water in trap (drain separated water)
        5) System on
        6) Tank selected for filtration
        7) Day selected for filtration
        8) Run time selected for filtration
        9) Time of day
    d. Alarms:
        1) High water in trap
        2) High vacuum (service primary filter)
        3) High pressure (service final filters)
        4) Fluid in system sump
        5) No fluid flow

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Inspection: Examine areas and conditions under which fuel systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Equipment Connections: Connect fuel piping to fuel pump as indicated, and in accordance with applicable codes.

3.02 FUEL VALVES

A. Reference 3.1, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces and weld ends.

D. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

E. Do not attempt to repair defective valves; replace with new valves.

3.03 LEAK DETECTION SYSTEM FOR PIPING SUMP

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's written instructions and recommendations, applicable codes and local ordinances.

C. Provide power wiring and devices for a working system. Provide low voltage wiring and devices for a working system. Coordinate with Division 26, Electrical.

3.04 FUEL DISPENSERS

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Provide power wiring and devices for a working system. Provide low voltage wiring and devices for a working system. Coordinate with Division 26, Electrical.

3.05 FUEL POLISHING SYSTEM

A. Install per manufacturer's instructions and recommendations.

END OF SECTION

SECTION 27 0000 - COMMUNICATIONS BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work included in 27 00 00, Communications Basic Requirements applies to Division 27, Communications work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of communications systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.
2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent," substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.
6. Entrance Facility (EF): Area or location that contains entrance point (demarcation) cable and associated equipment for telecommunication services entering the building.
7. Equipment Room (ER): Area or location that contains backbone cabling associated with interbuilding cable or cable that connects buildings together in a campus environment. ERs may contain Main Cross-Connects, Intermediate Cross-Connects, Horizontal Cross-Connects, and Telecommunication Rooms.
8. Main Cross-Connect (MC): Area or location that contains telecommunications equipment for connecting backbone cable to/from Intermediate Cross-Connects and Horizontal Cross-Connects. Active telecommunications equipment will often be contained in this area to serve as the telecommunications hub or headend. Backbone cable from Local Exchange Carrier's point of demarcation will connect to building backbone cable or active telecommunications equipment at this location.
9. Main Point of Entry (MPOE): Area or location where service providers terminate and handoff to customer owned premise cabling system.
10. Main Telecommunications Room (MTR): Location that services as the main distribution point for Client/Owner telecommunications system. The MTR connects to each TR and the MPOE. MTR should not be accessible by the service providers. In most cases the MTR is a private space.

11. Intermediate Cross-Connect (IC): Area or location that contains telecommunications equipment for connecting backbone cable from the MC to backbone cable distributing to one or many Horizontal Cross-Connects. This location may contain active telecommunications equipment.
12. Horizontal Cross-Connect (HC): Area or location that contains telecommunications equipment, cable terminations and cross-connect wiring. HC is the recognized connection point between backbone and horizontal pathway facilities.
13. Telecommunications Room (TR): Area or location containing telecommunications equipment, cable terminations and cross-connect wiring. Three applications serviced by TRs are horizontal cable connections, backbone system interconnection and entrance facilities. The TR provides facilities (space, power, grounding, etc.) for housing telecommunications equipment. TR may contain a MC, IC or HC and a demarcation point or an interbuilding entrance facility.
14. Interbuilding Cable: Backbone cable associated with connecting buildings together in a multibuilding or campus environment.
15. Intrabuilding Cable: Backbone cable associated with connecting Entrance Facility, Equipment Rooms, Main Cross-Connects, Intermediate Cross-Connects, Horizontal Cross-Connects, and Telecommunication Rooms together on single floor or multi-floor building.

1.02 RELATED SECTIONS

A. Contents of Section applies to Division 27, Communications Contract Documents.

B. Related Work:

1. Additional conditions apply to this Division including, but not limited to:
    a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
    b. Drawings
    c. Addenda
    d. Owner/Architect Agreement
    e. Owner/Contractor Agreement
    f. Codes, Standards, Public Ordinances and Permits

C. Related Products/Systems within Division 28, Electronic Safety and Security.

1.03 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 27, Communications Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of Oregon:
    a. OAR - Oregon Administrative Rules
    b. 2021 OESC - Oregon Electrical Specialty Code
    c. 2022 OFC - Oregon Fire Code
    d. 2022 OMSC - Oregon Mechanical Specialty Code
    e. 2021 OPSC - Oregon Plumbing Specialty Code
    f. 2022 OSSC - Oregon Structural Specialty Code

g. 2021 OEESC - Oregon Energy Efficiency Specialty Code
h. 2011 Oregon Elevator Specialty Code

C. Reference codes, standards and guidelines include but are not limited to the latest adopted editions from:

1. ABA - Architectural Barriers Act
2. ADA - Americans with Disabilities Act
3. ANSI - American National Standards Institute
   a. ANSI/TIA-526-7-A Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
   b. ANSI/TIA-526-14-C Optical Power Loss of Installed Multimode Fiber Cable Plant
   c. ANSI/TIA-568.0-D - Generic Telecommunications Cabling for Customer Premises
   d. ANSI/TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard
   e. ANSI/TIA-568.2-D - Balanced Twisted-Pair Telecommunications Cabling and Components Standard
   f. ANSI/TIA-568.2-D-2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Addendum 2
   g. ANSI/TIA-568.3-D - Optical Fiber Cabling Components Standard. Commercial Building Telecommunications Cabling Standard
   h. ANSI/TIA-568.3-D-1 - Optical Fiber Cabling Components Standard.
   i. ANSI/TIA-568.4-D - Broadband Coaxial Cabling and Components
   j. ANSI/TIA-569-E - Commercial Building Standard for Telecommunications Pathways and Spaces
   k. ANSI/TIA-570-D - Residential Telecommunications Infrastructure Standard
   l. ANSI/TIA-598-D - Optical Fiber Cable Color Coding
   m. ANSI/TIA-598-D-1 - Optical Fiber Color Coding in Cable Addendum 1, additional Colors for Elements 3-16
   n. ANSI/TIA-598-D-2 - Optical Fiber Cable Color Coding Addendum 2, Jacket Color for OM5 Indoor Fiber Cables
   o. ANSI/TIA-606-C - Administration Standard for Commercial Telecommunications Infrastructure
   p. ANSI/TIA-J-STD-607-D - Generic Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   q. TIA-758-B Customer-Owned Outside Plant Telecommunications Infrastructure Standard
   r. ANSI/TIA-942-B - Telecommunications Infrastructure Standard for Data Centers
4. APWA - American Public Works Association
5. ASCE - American Society of Civil Engineers
6. ASHRAE - Guideline 0, the Commissioning Process
7. ASIS INTL - American Society for Industrial Security International
8. ASTM - ASTM International
9. AVIXA - Producer of InfoComm and international trade organization representing the audiovisual industry
10. BICSI - Building Industry Consulting Service International
    a. BICSI TDMM - Telecommunications Distribution Methods Manual, 14th Edition, 2020
    b. BICSI ITSIMM - Information Technology Systems Installation Methods Manual, 8th Edition, 2022

c. BICSI OSPDRM - Outside Plant Design Reference Manual, 6th Edition, 2018

11. CFR - Code of Federal Regulations
12. EPA - Environmental Protection Agency
13. ETL - Electrical Testing Laboratories
14. FCC - Federal Communications Division
15. IBC - International Building Code
16. IEC - International Electrotechnical Commission
17. IEEE - Institute of Electrical and Electronics Engineers
18. IFC - International Fire Code
19. ISO - International Organization for Standardization
20. NEC - National Electric Code
21. NEMA - National Electrical Manufacturers Association
22. OSHA - Occupational Safety and Health Administration
23. TIA - Telecommunications Industry Association
24. UL - Underwriters Laboratories Inc.

D. AIS Certificate: Certify that products comply with American Iron and Steel (AIS) provision for the Consolidated Appropriations Act of 2017 (Section 746 Division A of Title VII), and subsequent statutes, mandating domestic preference.

1.04 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures.

B. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. In addition:

1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
2. Provide product submittals and shop drawings in electronic format only. Electronic format must be posted to ftp site. For electronic format, provide one file per division containing one bookmarked PDF file with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Architect on all transmissions/submissions.
3. Product Data: Provide manufacturer's descriptive literature for products specified in Division 27, Communications Sections.
4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the specifications and Drawings.

a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
b. Provide a red rectangle around part number and description with corresponding red arrow pointing to the item/material being submitted.
    1) Submit one submittal per specification section in Division 27. As stated above, identify all items being submitted for approval prior to installation.
c. Include technical data, installation instructions, and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 27, Communications specification Sections for specific items required in product data submittal outside of these requirements.
d. See Division 27, Communications individual Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.
6. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support to meet the AHJ terms of satisfaction. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components.
7. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 27, Communications Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
8. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
9. Substitutions and Variation from Basis of Design:
    a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
    b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals." For any product marked "or approved equivalent," a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.
10. Shop Drawings:

a. Provide coordinated Shop Drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 27, Communications specification Sections for additional requirements for Shop Drawings outside of these requirements.
b. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.
c. Provide Shop Drawings indicating all elevations for proposed layouts of equipment on all walls and for each rack elevation. This is required to obtain approval prior to installations. No work will be accepted prior to the approval process. Contractor is to submit for all wall elevations and rack elevations per these specifications and as illustrated on the drawings. If a conflict exists, contractor shall bring it to the attention of the Owner and work to a satisfactory solution that meets the terms of satisfaction.
    1) Contents shall include all walls, racks where Contractor proposes to install submittal material and equipment.

11. Samples: Provide samples when requested by individual Sections.
12. Resubmission Requirements:
    a. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Changes made for the resubmittal will be indicated in a cover letter with reference to page(s) changed and will reference response to comment. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
    b. Resubmit for review until review indicates no exception taken, or "make corrections as noted."
    c. When submitting Drawings for Engineer's re-review, clearly indicate changes on Drawings and "cloud" any revisions. Submit a list describing each change.
13. Operation and Maintenance Manuals, Owner's Instructions:
    a. Submit, at one time, electronic files (native/searchable PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.
        1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
        2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: batteries, lamp lenses, speakers and filters.
        3) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Sections.
        4) Include product certificates of warranties and guarantees.

5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and subassemblies.
6) Include copy of burn-in and test reports specific to each piece of equipment.
7) Include copy of software/appliance programming.
8) Include commissioning reports.
9) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Submit copy of material used for Owner instruction. Field instruction per Section 27 00 00, Communications Basic Requirements Article titled "Demonstration."
c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

14. Record Drawings:
a. Maintain at site at least one set of drawings for recording “as-constructed” conditions. Indicate on Drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed communication items. Include items changed by field orders, supplemental instructions, and constructed conditions.
b. Record Drawings are to include equipment and connection schedules that accurately reflect "as constructed or installed" for project.
c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line Drawings created from CAD Files in version/release equal to Contract Drawings. Submit CAD Files and Drawings upon substantial completion.
d. At completion of project, show changes and deviations from the Drawings in red on one set of black-line drawings. Include written Addenda, RFIs, and change order items. Make changes to Drawings in a neat, clean, and legible manner.
e. Invert elevations and dimensioned locations for incoming utilities and site raceways below grade extending to 5-feet outside building line.
f. See Division 27, Communications individual Sections for additional items to include in Record Drawings.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

B. Whenever this Specification calls for material, workmanship, arrangement, or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

C. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., conduit) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

D. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

E. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

F. Provide products that are UL listed.

G. Contractor Qualifications:

1. Minimum of five years' experience in the design, installation, testing and maintenance of communications systems.
2. ~~Must employ at least one full time BICSI certified Registered Communications Distribution Designer (RCDD) who is involved in reviewing work performed by contractor on this project.~~
3. ~~Installation technicians must be BICSI certified for copper and fiber optic installations that are current and in good standing with BICSI. Provide roster of communications technicians and verifiable certifications for this project.~~
4. Maintain a local service facility which stocks spare devices and/or components for servicing systems.
5. Be able to provide project references for three projects, including scope of Work, project type, Owner/user contact name and telephone number.
6. The contractor selected for this project must be certified by the manufacturer of the approved products and utilize these components for completion of work.
7. Provide Manufacturer certifications for each respective technician that will be working on the project. All technicians must be manufacturer certified to install, terminate, and test horizontal and backbone cabling.

1.06 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

1.07 COORDINATION DOCUMENTS

A. Prior to construction, prepare and submit coordinated layout Drawings (composite drawings), to coordinate installation and location of ductwork, grilles, diffusers, piping, fire sprinklers, plumbing, lights, and electrical services. Composite Drawings show services on single sheet. Key Drawings to structural column identification system. Prior to completion of Drawings, coordinate proposed installation with architectural and structural requirements, and other trades (including plumbing, HVAC, fire protection, electrical, ceiling suspension, and ceiling tile systems, etc.), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

B. Prepare Drawings as follows:

1. Coordination models/drawings may be created using Revit 3D modeled elements or a 3D CAD software. The modeled elements to be graphically represented within the model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the model elements. Model elements must have the ability to be spatially coordinated with other modeled elements using either Revit, Autodesk Navisworks or Autodesk A360.
2. Drawings in CAD format. CAD format release equal to design documents. Drawings to be same sheet size and scale as Contract Drawings and indicate location, size, and elevation above finished floor of equipment and distribution systems.
3. Review and revise, as necessary, section cuts in Contract Drawings after verification of field conditions.
4. Incorporate addenda items and change orders.
5. Provide additional coordination as requested by other trades.

C. Advise Architect in event conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

D. Submit final Coordination Drawings with changes as Record Drawings at completion of Project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer, including but not limited to cable, outlets, patch panels, equipment connection cords and wall plates.

2.02 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL or ETL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.

B. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

C. Hazardous Materials:

1. Comply with local, State of Oregon, and Federal regulations relating to hazardous materials.
2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.
3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

2.03 ACCESS PANELS

A. See Division 01, General Requirements and Division 08, Openings for products and installation requirements.

B. Confirm Access Panel requirements in Division 01, General Requirements and Division 08. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. Provide flush mounting access panels for service of systems, equipment and individual components requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly.
    a. Ceiling access panels to be minimum of 24-inch by 24-inch required and approved size.
    b. Wall access panels to be minimum of 12-inch by 12-inch required and approved size.
    c. Provide screwdriver operated catch.
    d. Manufacturers and Models:
        1) Drywall: Karp KDW.
        2) Plaster: Karp DSC-214PL.
        3) Masonry: Karp DSC-214M.
        4) 2 hour rated: Karp KPF-350FR.
        5) Manufacturers: Karp, Milcor, Elmdor, Acudor, or approved equivalent.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Install equipment requiring access (i.e., amplifiers, taps, zone controllers, volume controls, and storage devices) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
    a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork divisions. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.
    b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
    c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
    a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Plenums: In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

3.02 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 27 Communications Sections.

B. Equipment Importance Factor: 1.5.

C. General:

1. Earthquake resistant designs for Communications (Division 27) equipment and distribution, i.e. cabinets and racks, ceiling assemblies, raceways, ladder racking, etc. to conform to regulations of jurisdiction having authority.

2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.
3. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for cabinets, racks, major equipment and overhead raceways. Engineer to design and provide stamped Shop Drawings cabinets, racks, major equipment and overhead raceway. Submit Shop Drawings along with equipment submittals.
4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details.
5. Provide means to prohibit excessive motion of communications equipment during earthquake.

3.03 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground conduit installation prior to backfilling.
2. Prior to ceiling cover/installation.
3. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Final Punch: Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.04 CONTINUITY OF SERVICE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. During remodeling or addition to existing structures, or addition of a structure to existing structure, while existing structure is occupied, current services to remain intact until new construction, facilities or equipment is installed.
2. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new wiring to point of connection.
3. Coordinate transfer time to new service with Owner. If required, perform transfer during off peak hours. Once changeover is started, pursue to its completion to keep interference to a minimum. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work.
4. Organize work to minimize duration of power interruption.

3.05 CUTTING AND PATCHING

A. Confirm Cutting and Patching Requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).
2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftspeople of each respective trade in conformance with appropriate Division of Work.
3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.06 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

3.07 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation.
2. Protect all equipment and conduit to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3.08 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Authorized Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

D. Training and Demonstration per Section 01 91 13, General Commissioning Requirements.

3.09 CLEANING

A. Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.10 INSTALLATION

A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Install equipment and devices in accordance with manufacturer's installation instructions, plumb and level and firmly secured to mounting surfaces. Maintain manufacturer's recommended clearances.

C. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test operation and demonstrate compliance with requirements. Replace damaged or malfunctioning equipment.

D. Provide miscellaneous supports/metals required for installation of equipment.

3.11 PAINTING

A. Confirm Painting requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. Ferrous Metal: After completion of communications work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in telecommunications rooms, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.
2. In a telecommunications room, on roof or other exposed areas, equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect. Fire rated plywood backboards to receive two coats of fire retardant paint on all six sides; color to be white.
3. See individual equipment Specifications for other painting.
4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.
5. Conduit: Clean, primer coat and paint interior conduit exposed in finished areas with two coats paint suitable for metallic surfaces. Color selected by Architect.
6. Covers: Covers such as handholes, maintenance holes, vaults, pullboxes and the like will be furnished with finishes which resist corrosion and rust. Covers are to be identified with ‘Communications.’ It is the Contractor's responsibility to proactively seek and obtain approval with Owner prior to purchasing and prior to installation for terms of satisfaction.

3.12 ACCESS PANELS

A. Confirm Access Panel requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. Coordinate locations/sizes of access panels with Architect prior to work.

3.13 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
   a. Testing Reports, as outlined in their respective Division sections
   b. Cleaning
   c. Operation and Maintenance Manuals
   d. Training of Operating Personnel
   e. Record Drawings, including cabling identifications, symbols, and locations
   f. Warranty and Guaranty Certificates, including extended manufacturer's warranties
   g. Start-up/test Documents and Commissioning Reports

3.14 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in Operation and Maintenance Manuals. All cabling test results are to be included.
2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

3.15 LETTER OF CONFORMANCE

A. Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that Communications items were installed in accordance with manufacturer's recommendations, and UL listings and approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

END OF SECTION

SECTION 27 4116 - INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Equipment Mounting Hardware
2. Video Display Mounting Hardware
3. Power Distribution
4. Audio Source Equipment
5. Audio Distribution Equipment
6. Audio Amplification
7. Loudspeakers
8. Video Distribution Equipment
9. Video Display Equipment
10. Control System Equipment
11. Control System User-Interface
12. Wire and Cable
13. Assistive Listening Equipment
14. Architectural Connectivity

1.02 RELATED SECTIONS

A. Contents of Division 27, Communications and Division 01, General Requirements apply to this Section.

B. In addition, reference Division 11, Projection Screens.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. BICSI/INFOCOMM AV Design Reference Manual.
2. ANSI/INFOCOMM 2M-2010 Standard Guide for Audiovisual Systems Design and Coordination Processes.

1.04 SUBMITTALS

A. Submittals as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Screen shots for touch panel user-interface.
2. Shop drawings showing installation instructions, block wiring diagrams, component interconnections, custom faceplate layouts with labeling, device locations and literal descriptions.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. A minimum of five years experience in the design, installation, testing and maintenance of commercial audio-video systems.
2. ~~Employ at least one full-time InfoCOMM Certified Technology Specialist (CTS) who is involved in reviewing work performed by Contractor on this project.~~
3. Maintain a local service facility which stocks spare devices and/or components for servicing systems.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Equipment Mounting Hardware:

1. Equipment Racks:
   a. Middle Atlantic
   b. Lowell Manufacturing
   c. Or approved equivalent.
2. Equipment Cabinet Accessories:
   a. Blank Rack-Panels:
      1) Middle Atlantic
      2) Lowell Manufacturing
      3) Or approved equivalent.
   b. Vent Panels:
      1) Middle Atlantic
      2) Lowell Manufacturing
      3) Or approved equivalent.
3. In-Wall Equipment Racks:
   a. Middle Atlantic.
   b. Or approved equivalent.

B. Video Display Mounting Hardware:

1. Projector Mounting Bracket:
   a. Chief Manufacturing
   b. Or approved equivalent.
2. Flat-Panel Display Mounting:
   a. Chief Manufacturing
   b. Or approved equivalent.
3. Mounting Accessories:
   a. Ceiling Plate with Adjustable Column:
      1) Chief Manufacturing
      2) Or approved equivalent.
   b. Angled Ceiling Adapter:
      1) Chief Manufacturing
      2) Or approved equivalent.
   c. Adjustable Extension Column:

1) Chief Manufacturing
2) Or approved equivalent.

d. Fixed Extension Column:
1) Chief Manufacturing
2) Or approved equivalent.

e. C-Clamp:
1) Chief Manufacturing
2) Or approved equivalent.

4. Motorized Projector Lift:
a. Draper Micro Projector Lift
b. Or approved equivalent.

C. Power Distribution:

1. Lowell Manufacturing
2. Middle Atlantic
3. Or approved equivalent.

D. Audio Source Equipment:

1. Wireless Microphone Receivers:
a. Shure
b. Sennheiser
c. Audio-Technica
d. Or approved equivalent.

2. Hand-Held Wired Microphones:
a. Shure
b. Sennheiser
c. Audio-Technica
d. Or approved equivalent.

3. Boundary Wireless Microphones:
a. Shure
b. Sennheiser
c. Audio-Technica
d. Or approved equivalent.

4. Desktop Microphones:
a. Shure
b. Sennheiser
c. Audio-Technica
d. Or approved equivalent.

E. Audio Distribution Equipment:

1. DSP Audio Matrix Mixer:
a. Biamp Systems
b. Or approved equivalent.

F. Audio Amplification:

1. QSC Audio
2. Or approved equivalent.

G. Loudspeakers:

1. Flush Ceiling-Mount Passive Loudspeaker:

a. JBL, Inc
b. Or approved equivalent.

2. Flush Wall-Mount Passive Loudspeaker:
   a. Loudspeaker:
      1) JBL, Inc
      2) Or approved equivalent.
   b. Rough-In Frame:
      1) JBL, Inc
      2) Or approved equivalent.
3. Surface-Mount Passive Loudspeaker:
   a. Loudspeaker:
      1) JBL, Inc.; Control 28T-60-WH.
      2) Or approved equivalent.
   b. Mounting Hardware:
      1) Vertical Column Orientation:
         (a) JBL, Inc
         (b) Or approved equivalent.
      2) Horizontal Splay Orientation:
         (a) JBL, Inc
         (b) Or approved equivalent.
      3) Ceiling-Mount Adapter:
         (a) JBL, Inc
         (b) Or approved equivalent.

H. Video Distribution Equipment:
   1. Digital Audio-Video Matrix Switcher:
      a. Crestron
      b. Or approved equivalent.
   2. All-In-One Presentation Switcher:
      a. Crestron
      b. Or approved equivalent.

I. Video Display Equipment:
   1. LG
   2. Samsung
   3. Sony
   4. Or approved equivalent.

J. Control System Equipment:
   1. Crestron
   2. Or approved equivalent.

K. Control System User-Interface:
   1. Crestron
   2. Or approved equivalent.

L. Wire and Cable:
   1. Crestron
   2. Belden
   3. Liberty Wire & Cable

4. West Penn Wire
5. Or approved equivalent.

M. Assistive Listening Equipment:

1. Listen Technologies; LS-04.
2. Or approved equivalent.

N. Architectural Connectivity:

1. Connectors and Jacks:
   a. Neutrik
   b. Switchcraft
   c. Liberty Wire & Cable
   d. Or approved equivalent.
2. Twisted-Pair/HDBASE-T:
   a. Transmitter:
      1) Crestron
      2) Intelex
      3) Or approved equivalent.
   b. Receiver:
      1) Crestron
      2) Or approved equivalent.

2.02 EQUIPMENT MOUNTING HARDWARE

A. Equipment Racks:

1. Type: 19-inch stand-alone equipment cabinet with vented side panels, vented locking rear door.
2. Overall Dimensions: 84-inches high, 24-inches wide, 30-inches deep.
3. Usable Dimensions: 45 rack spaces, 28-inches deep.
4. Removable, key-locked side panels.
5. Black powder-coat finish.
6. UL listed.

B. Equipment Cabinet Accessories:

1. Blank rack-panels.
2. Vent panels.

C. In-Wall Equipment Racks:

1. Type: 19-inch wide, 19-inch deep, 45-inch high TIA compliant equipment rack.
2. Designed to be installed flush in wall cavity or void with sliding rail and 90-degree pivot rotation for maintenance purposes.
3. Black powder-coat finish.

2.03 VIDEO DISPLAY MOUNTING HARDWARE

A. Projector Mounting Bracket:

1. Plus or minus 4-degree roll adjustment.
2. Plus or minus 25-degree pitch adjustment.
3. 150-pound weight capacity.

B. Flat-Panel Display Mounting:

1. 17-1/2-inch lateral shift.
2. Plus or minus 1/2-inch height adjustment.

3. Mounts on 16-inch, 20-inch, or 24-inch stud spacing.
4. Less than 2-inch depth from wall.
5. 200-pound weight capacity.

C. Mounting Accessories:

1. Devices consist of plates, columns, clamps, brackets and adapters.
2. All devices of steel construction using National Pipe Thread (NPT) and American National Standards Institute (ANSI) standards.
3. Examples of Components Required:
   a. 8-inch ceiling plate with attached adjustable 1-1/2-inch NPT (column).
   b. Angled ceiling adapter.
   c. Adjustable extension column.
   d. Fixed extension column, 1-foot length.
   e. C-Clamp.

D. Motorized Projector Lift:

1. Designed to be installed in a 2-foot-wide, 2-foot-long ceiling tile grid.
2. Up to 4-foot down travel from fully up position.
3. Include universal projector mounting bracket.
4. Include low-voltage control connection capability for integration to third-party audio-video control system.
5. Include all necessary travel cables for power and signal to projector.
6. UL listed.

2.04 POWER DISTRIBUTION

A. Rack-Mounted Power Distribution:

1. One front and eight rear NEMA 5-15R electrical outlets.
2. One 15-amp circuit.
3. Surge and spike protection.
4. 9-foot extension cable.
5. Black powder coat finish.
6. UL listed.

2.05 AUDIO SOURCE EQUIPMENT

A. Wireless Microphone Receivers:

1. UHF band operation.
2. 960 operating frequencies across 24 MHz of bandwidth.
3. Auto frequency selection.
4. Detachable 1/4-wave antennas.
5. 1/4-inch and XLR audio outputs.
6. Multifunction LCD display.
7. Provide with combination pack which includes a hand-held dynamic microphone and a body-pack with lavalier microphone.

B. Hand-Held Wired Microphones:

1. Dynamic (moving coil) type microphone.
2. 50-Hz to 16-kHz frequency response.
3. Super-cardioid polar pattern, rotationally symmetrical about microphone axis, uniform with frequency.

4. Die-cast metal casing with spherical steel mesh grille.

C. Boundary Wireless Microphones:

1. Condenser (electret bias) type microphone.
2. Cardioid polar pattern (at 1-kHz).
3. Up to 100-foot operating range.
4. Powered by two AA batteries, 8-hour battery life.

D. Desktop Microphones:

1. Microphone Base:
   a. Logic enabled for LED and mute control.
   b. Programmable mute switch (push-to-mute, push-to-talk, logic, local).
   c. Low-cut filter.
   d. 20-foot, attached microphone cable with 5-pin male XLR termination.
2. Microphones:
   a. Gooseneck construction, 10-inch length.
   b. Condenser (electret bias) type microphone.
   c. 50-Hz to 17-kHz frequency response.
   d. Cardioid polar pattern.
   e. Bi-color status indicator.

2.06 AUDIO DISTRIBUTION EQUIPMENT

A. DSP Audio Matrix Mixer:

1. 8-input/8-output design.
2. Software programmable features include:
   a. Standard, automatic and matrix mixers.
   b. Graphic and parametric equalization.
   c. Dynamic Processing: Compression, limiting and ducking.
   d. Digital delay up to 2000-ms.
3. Bi-directional RS-232 control port for control via third-party control systems.
4. Ethernet-ready network port for network control and monitoring.

2.07 AUDIO AMPLIFICATION

A. Audio Power Amplifier:

1. Two-channel, (70-volt, 1-kHZ, 0.05-percent total harmonic distortion).
2. 20-Hz to 20-kHz frequency response, plus or minus 2-dB.
3. 3-pin XLR and 3-pin detachable terminal block input connectors.
4. Short circuit, open circuit, thermal, ultrasonic and RF protection.
5. On/off muting, DC-fault power supply shutdown.
6. 70-volt isolation transformer.

2.08 LOUDSPEAKERS

A. Flush Ceiling-Mount Passive Loudspeaker:

1. 6.5-inch coaxial woofer and 3/4-inch tweeter.
2. 89-dB SPL nominal sensitivity (1-W at 1 meter).
3. 150-W continuous program power capacity.
4. 70-Volt Multi-Tap Transformer: 60-W, 30-W, 15-W and 7.5-W taps.
5. 110-degree nominal dispersion, conical coverage.
6. Formed steel, UL-listed back can.

7. Include mounting hardware and paintable grille.

B. Flush Wall-Mount Passive Loudspeaker:

1. 6.5-inch woofer and 1-inch tweeter.
2. 88-dB SPL nominal sensitivity (1-W at 1 meter).
3. 100-W continuous program power capacity.
4. 70-Volt Multi-Tap Transformer: 30-W, 15-W, 7.5-W and 3.7-W taps.
5. Supply with rough-in frame.

C. Surface-Mount Passive Loudspeaker:

1. 8-inch woofer and 1-inch tweeter.
2. 70-Volt Multi-Tap Transformer: 60-W, 30-W, 15-W and 7.5-W taps.
3. 102-dB SPL nominal sensitivity (15-W tap at 1 meter).
4. 175-W continuous program power capacity.
5. 90-degree horizontal and 90-degree vertical nominal coverage angle.
6. Weather-resistant enclosure and transducers.
7. Surface mounting assembly and hardware.
8. Include additional mounting hardware where applicable:

2.09 VIDEO DISTRIBUTION EQUIPMENT

A. Digital Audio-Video Matrix Switcher:

1. 8-input/8-output modular design. Input modules must accept HDMI, DVI, RGBHV, standard analog video formats.
2. Capable of receiving and distributing uncompressed digital video and audio over shielded twisted-pair cabling.
3. Support video resolutions up to 4K.
4. HDCP content protection support.
5. Software and front-panel setup and diagnostic tools.
6. Ethernet-ready network port.
7. Provides power to remote devices from internal power supply, 110W (4.6A, 24V DC).

B. Digital Audio-Video Matrix Switcher Accessories:

1. HDMI Input Module:
   a. HDMI input, capable of accepting DVI and DisplayPort Multimode signals when used with an appropriate cable adapter.
   b. HDCP content protection support.
   c. Local HDMI and stereo audio outputs.
   d. Compatible with Digital Audio-Video Matrix Switcher.
2. Twisted-Pair/HDBASE-T Input Module:
   a. Accepts input from remote audio-video input devices via shielded twisted-pair cabling.
   b. Twisted-pair input receive audio, video and control signals from remote devices.
   c. HDCP content protection support.
   d. Local HDMI, stereo audio, control signal and remote device power outputs.
   e. Compatible with Digital Audio-Video Matrix Switcher.
3. DVI/RGB Input Module:
   a. Video input accepts DVI digital video input or analog RGB/component video signals.
   b. Local balanced stereo audio input and HDMI output.
   c. HDCP content protection support.
   d. Device must include an RGB to DVI-I adapter.

e. Compatible with Digital Audio-Video Matrix Switcher.

4. Twisted-Pair/HDBASE-T Output Module:
   a. Transmits audio-video signals over shielded twisted-pair cabling.
   b. Compatible with Digital Audio-Video Matrix Switcher.

C. All-In-One Presentation Switcher:

1. 6-input/2-output design.
2. Includes video input capable of component, composite, S-video and RGB-type video signals.
3. Includes HDMI and twisted-pair/HDBASE-T inputs/outputs.
4. Includes control system with RS-232, IR and relay ports.
5. Includes audio amplifier with 70V transformer isolated output.

2.10 VIDEO DISPLAY EQUIPMENT

A. Video Projector:

1. 5000 ANSI lumens.
2. 16:9 aspect ratio.
3. Up to 4K resolution.
4. Digital and analog inputs.
5. Include zoom lens.

2.11 CONTROL SYSTEM EQUIPMENT

A. Control System Processor:

1. Real-time, event driven, multi-tasking, multi-threaded operating system with dual-bus architecture.
2. Six bi-directional RS-232/422/485 ports, supporting baud rates up to 115.2-k baud.
3. Eight infrared/serial outputs. IR output up to 1.2 MHz, serial up to 115.2-k baud.
4. Eight digital input/output ports, which can also be used as analog input ports.
5. Eight relay outputs rated 1A, 30V AC/DC.
6. Expansion slots for expansion modules.

2.12 CONTROL SYSTEM USER-INTERFACE

A. Control System Interface:

1. Touch-panel with 4.9-inch diagonal TFT active matrix color LCD, 16:9 aspect ratio, 800x480-pixel resolution, 1000:1 contrast ratio and projected capacitive, multi-touch screen.
2. 512-MB SDRAM, 4-GB flash memory.
3. Ethernet-ready network port.
4. Flush wall-mount with back-box.

2.13 WIRE AND CABLE

A. Cable and Adapter Types:

1. Microphone-level and line-level audio cable 22 AWG, stranded conductors, shielded. Plenum-rated.
2. Loudspeaker-level cable, 18 AWG, stranded, two conductors. Plenum-rated.
3. High resolution RGBHV cable, 25 AWG, five coaxial conductors. Plenum-rated.
4. Combination audio/RGBHV cable, pre-terminated with 3.5 mm audio and HD15 male to HD15 female connectors, 6-foot length. Plenum-rated.

5. Control cable for RS-232 communications applications with quantity of conductors as required by manufacturer's specifications for each controlled device. Plenum-rated.
6. Control cable for electric projection screen. Comply with screen and control system manufacturer's specifications. Plenum-rated.
7. High-performance HDMI cable, 22 AWG minimum, supports data rates up to 4.95 Gbps; HDMI 1.3 Category 2 compliant, pre-terminated with male connectors. Plenum-rated.
8. High-performance HDMI-to-DisplayPort crossover cable. Plenum-rated.
9. Pre-terminated VGA cable, 6-foot length. Plenum-rated.
10. Shielded Cat6A for HDBASE-T applications. To be installed by Division 27, Section 27 15 00, Communications Horizontal Cabling, provider.

2.14 ASSISTIVE LISTENING EQUIPMENT

A. RF Wireless Assistive Listening System:

1. Two-channel FM transmitter.
2. Remote antenna.
3. Four wireless three-channel FM receivers.
4. Assistive listening signage kit.

2.15 ARCHITECTURAL CONNECTIVITY

A. Custom A-V Outlet Plates:

1. Flush-mounted, stainless-steel faceplates.
2. Jack/connector configuration as shown on Drawings.
3. Size as shown on Drawings, to fit in industry standard back box unless specifically noted otherwise.
4. Label jacks and connectors as indicated on Drawings, with 1/4-inch Arial-type font.

B. Twisted-Pair/HDBASE-T:

1. Transmitter:
   a. Two auto-switched inputs (HDMI and VGA with 3.5 mm stereo audio).
   b. Transmits audio-video signals over Crestron Digital Media cable.
   c. USB port which supports USB HID class devices.
   d. Fits in standard double-gang box with double-gang decora type faceplate.
   e. Compatible with switcher.
2. Receiver:
   a. HDBASE-T input, digital video output.
   b. RS-232 or other method for two-way communications between control system and display.
   c. HDCP content protection support.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Examination: Examine areas and conditions under which audio-video equipment will be installed. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.

B. Install complete system in strict accordance with manufacturer's recommendations. Complete electrical connections to all system components.

C. Install wiring in raceways where routed through inaccessible areas. Use J-hooks for cable installed in areas with accessible ceilings.

D. Install equipment so it is held firmly in place. This includes racks, rack equipment, loudspeakers, control equipment, conduit, etc.

E. Label switches, jacks, outlets, etc. in a logical and readable manner. Labels are to correspond with connection designations on shop drawings.

F. Do not install electronic equipment in any space until other work within the space has been completed, to prevent dust, dirt, debris, etc. from damaging equipment.

G. Mount modules for modular equipment in strict accordance with manufacturer's specifications.

H. Store loose devices and cables in rack-mounted drawers, cabinets, or Owner-approved location. Notify Owner of location of loose devices and cables during training.

I. Wiring:

1. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA) and NEC. Meet established state and local electrical codes.
2. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.
3. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.

J. System Programming:

1. Programming of the control systems and user interfaces is the responsibility of the A-V Contractor. Program the user interface using manufacturer supplied configuration software and templates.
2. Program the control system and user-interface to provide novice-level functionality with features including, but not limited to, the following:
    a. Display power on/off.
    b. Source selection of audio and video devices.
    c. Volume control of all audio sources.
    d. Power on/off and source selection of video displays.
    e. Display system and device status.
    f. Control of dimmable lighting zones.
    g. Control of projection screens and motorized shades.

K. Performance Requirements:

1. Coordinate with Division 26, Electrical for installation of electrical service, raceways, conduit, back boxes and the like, necessary to support the systems specified.
2. Conceal wiring in walls and ceiling spaces during construction.
3. Determine requirements for plenum-rated cable. When doubt exists, seek determination in writing by AHJ prior to ordering.

L. Inspection and Testing Upon Completion:

1. Verify that projectors are adjusted such that the projected image fills the projection screen at the center of its zoom range.

2. Warranty materials and installation to be free of defects in material and workmanship after final acceptance of installation and test per Division 01, General Requirements.
3. Upon completion of the installation, furnish copies of complete operational instructions, complete with record drawings. Include part numbers and names, addresses and telephone numbers of parts source. One hard copy and two digital copies on CD required for materials.
4. Nothing contained in this specification to be construed to relieve the Contractor from furnishing a complete and acceptable system in all its categories. The Architect will reject any materials or labor that are or may become detrimental to the accomplishment of the intents of these Specifications.

M. Training:

1. Provide Owner with manufacturer's operating instructions.
2. Provide representatives to instruct the Owner's personnel in the operation of each system, its components and equipment.
3. Demonstrate to the Owner all system features and operations.
4. Provide comprehensive training for the Owner's Authorized Representative for the operation, maintenance and troubleshooting of the systems. Provide two copies of configuration data file for control systems and touch-panel user interfaces on CD.

N. Clean-Up:

1. Remove unused materials and debris from the work and storage areas. Leave areas in an undamaged and acceptable condition.
2. Save the shipping boxes for the Owner in case of need to return product for service.

3.02 EQUIPMENT MOUNTING HARDWARE

A. Fasten free-standing equipment racks to the floor using a minimum of four 3/8-inch concrete anchors. In raised floor areas, secure equipment racks to the concrete floor below.

B. Position free-standing equipment racks according to the Drawings with a minimum of 3 feet clearance in front. Report any discrepancies to the Architect.

C. Mount equipment within rack as shown in rack elevations on Drawings.

D. Fill unused rack space with blank rack panels.

3.03 VIDEO DISPLAY MOUNTING HARDWARE

A. Position projector mounting hardware according to the Drawings, fastened to structure.

B. Size extension columns so the projector lens aligns to the top of the projection screen.

C. Coordinate backing requirements for flat-panel display mounting hardware with Architect prior to rough-in.

3.04 POWER DISTRIBUTION

A. Mount power distribution in rack as shown in rack elevations on Drawings.

B. Connect equipment cords from rack-mounted equipment to the power distribution unit.

3.05 AUDIO AMPLIFICATION

A. Furnish and install amplifiers that will supply sufficient power to speakers without exceeding 70 percent of the amplifier's maximum rated output power

B. Audio Signal Routing: Furnish and install required signal routing mixers, equalizers, or processors such that the user can produce and route an audio signal to any location or equipment within the system.

C. Speakers: Furnish and install flush mounted ceiling speakers of professional commercial grade. Locate speakers as noted on drawings.

3.06 WIRE AND CABLE

A. Install per manufacturer's instructions and recommendations.

B. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA) and NEC. Meet established state and local electrical codes.

C. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.

D. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.

E. Label cables using a machine printed label, at each end of the cable within 12-inches of the termination point. Handwritten labels are not permitted. Labels to correspond with cable designations on shop drawings.

3.07 ASSISTIVE LISTENING EQUIPMENT

A. Furnish and install an assistive listening system located as indicated on the drawings.

B. Ensure User signal is clearly receivable at any point within the room where the transmitter is located.

C. Provide the minimum number of assistive listening user headsets or neck loops required by Code.

3.08 ARCHITECTURAL CONNECTIVITY

A. Input Plates:

1. Furnish and install user equipment input plates in the locations indicated and per the details shown on the drawings.
2. Furnish and install active input plates where cabling exceeds the maximum distance limitations for signal transmission.
3. Input plates are to have, at a minimum, an HDMI input into the A/V system.

END OF SECTION

SECTION 31 1000 - SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

C. Removal of existing paved surfaces.

1.02 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

B. Section 01 5713 - Temporary Erosion and Sediment Control.

C. Section 31 2200 - Grading: Topsoil removal.

D. Section 31 2200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

E. Section 31 2323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. Reference: Project Geotechnical Report.

1.04 PROJECT CONDITIONS

A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

PART 2 PRODUCTS

2.01 MATERIALS

A. As specified in Section 31 2323 - Fill and Backfill

PART 3 EXECUTION

3.01 SITE CLEARING

A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, ~~playing fields, lawns,~~ and planting beds, **and seeded areas.**

B. Do not begin clearing until vegetation to be relocated has been removed.

C. Do not remove or damage vegetation beyond the limits indicated on drawings.

~~1. Exception: Specific trees and vegetation indicated on drawings to be removed.~~

~~D. Install substantial, highly visible fences at least 6 feet high to prevent inadvertent damage to vegetation to remain:~~

~~1. At vegetation removal limits.~~

~~2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.~~

~~3. Around other vegetation to remain within vegetation removal limits.~~

~~E. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.~~

F. Vegetation Removed: ~~Do not burn, bury, landfill, or leave on site, except as indicated.~~ **Must remain on site and be consolidated and buried under rough seeded areas at the southwest region of the site.**

~~1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.~~

~~2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 24 inches.~~

~~3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.~~

G. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to the owner. Coordinate any such work with Landscape Architect prior to construction.

3.04 DEBRIS

A. Remove debris, junk, and trash from site, **excluding any soil materials**.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 31 2200 - GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rough grading the site for site structures, building pads, and surface improvements.

B. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing.

B. Section 31 2316 - Excavation.

C. Section 31 2316.13 - Trenching: Trenching and backfilling for utilities.

D. Section 31 2323 - Fill: Filling and compaction.

1.03 REFERENCE STANDARDS

A. Reference: Project Geotechnical Report.

1.04 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of Oregon, Highway Department standards.

1.06 PROJECT CONDITIONS

A. Protect above- and below-grade utilities that remain.

B. Protect plants, lawns, and other features to remain as a portion of final landscaping.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 MATERIALS

A. As specified in Section 31 2323 - Fill

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

A. Stockpile topsoil to be re-used on site; ~~remove remainder from site~~. **No topsoil to be removed from site.**

B. Stockpile subsoil to be re-used on site; ~~remove remainder from site.~~ **No subsoil to be removed from site.**

C. Stockpiles: Contractor shall be responsible for identifying and coordinating stockpile locations on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

E. Place topsoil in areas indicated - Refer to Landscape Plans as required.

F. Place topsoil where required to level finish grade.

G. Place topsoil to thickness as scheduled - Refer to Landscape Plans as required.

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and foreign material while spreading.

J. Near plants spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

L. Lightly compact placed topsoil.

M. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 CLEANING

A. ~~Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.~~ **No soils may be removed from site. All areas used for stockpiled topsoil and subsoil must be graded to prevent standing water.**

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 2316 - EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

C. Temporary excavation support and protection systems.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 31 1000 - Site Clearing: Vegetation and existing debris removal.

C. Section 31 2200 - Grading: Grading.

D. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

E. Section 31 2323 - Fill: Fill materials, backfilling, and compacting.

F. Section 33 4100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

G. Section 31 2316.26 – Rock Removal: Removal of rock during excavation.

1.03 REFERENCE STANDARDS

A. Reference: Project Geotechnical Report.

1.04 QUALITY ASSURANCE

A. Temporary Support and Excavation Protection Plan:
   1. Indicate sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property.
   2. Include drawings and calculations for bracing and shoring.
   3. Bracing and shoring design to meet requirements of OSHA’s Excavation Standard, 29 CFR 1926, Subpart P.

B. Designer Qualifications: For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in Oregon.

1.05 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, rock outcroppings, and other features to remain.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

1.06 DEFINITIONS

A. Common Excavation: Removal of all materials not classified as rock excavation as specified in Section 31 2316.26 – ROCK REMOVAL.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for topsoil removal.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Engineer.

3.03 TEMPORARY EXCAVATION SUPPORT AND PROTECTION

A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.
   1. Excavations in stable rock or in less than 5 feet in depth in ground judged as having no cave-in potential do not require excavation support and protection systems.
   2. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:
      a. Sloping and benching systems.
      b. Support systems, shield systems, and other protective systems.

B. Leave excavation support and protection systems, used as formwork or within 10 feet of existing foundations, permanently in place, unless otherwise noted.
   1. Cut off top 4 feet below grade, abandon remainder.

C. Excavation support and protection systems not required to remain in place may be removed subject to approval of the owner or owner's representative.
   1. Remove temporary shoring and bracing in a manner to avoid harmful disturbance to underlying soils and damage to buildings, structures, pavements, facilities and utilities.

3.04 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

H. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

~~I. Remove excavated material that is unsuitable for re-use from site.~~

J. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 2200.

K. Remove excess excavated material removed **more than three (3) feet below existing grade** from site.

3.05 FILLING AND BACKFILLING

A. Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Engineer before placement of foundations.

3.07 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

SECTION 31 2316.13 - TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Site grading.

B. Section 31 2316 - Excavation: Building and foundation excavating.

C. Section 31 2323 - Fill: Backfilling at building and foundations.

D. Section 33 4100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

D. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

E. Reference: Project Geotechnical Report.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Soils: As defined in Section 31 2323 – FILL.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. Verify that survey bench marks and intended elevations for the Work are as indicated.

C. Protect plants, lawns, and other features to remain.

D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

1.07 SPECIAL CONDITIONS

A. Excavated soils must remain on-site. No removal of soils is permitted.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. As specified in Section 31 2323 - Fill

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.

3.03 TRENCHING

A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 5 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. **See Section 31 2316.26 for removal of larger material.**

H. Remove excavated material that is unsuitable for re-use from site.

I. Stockpile excavated material to be re-used in area designated in Section 31 2200.

J. Remove excess excavated material from site.

K. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

L. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Engineer.

M. No soils may be removed from site. See Section 31 2200 – Grading for additional information.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Granular Fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers in accordance with Project Geotechnical Report.

G. Soil Fill: Place and compact materials in equal continuous layers in accordance with Project Geotechnical Report.

H. Compaction densities shall be in accordance with Project Geotechnical Report.

I. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

J. Correct areas that are over-excavated.
   1. Thrust bearing surfaces: Fill with concrete.
   2. Other areas: Use structural fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Utility Piping, Conduits, and Duct Bank:
   1. Bedding: Use granular fill.
   2. Cover with granular fill.
   3. Fill up to subgrade elevation.
   4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

B. At Pipe Culverts:
   1. Bedding: Use granular fill.
   2. Cover with granular fill.
   3. Fill up to subgrade elevation.
   4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

C. Over Subdrainage Piping at Foundation Perimeter and Under Slabs:
   1. Drainage fill and geotextile fabric: Section 31 23 23 and 33 4600.
   2. Fill up to subgrade elevation.

3.07 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.08 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D2922 or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: In conformance with current Oregon APWA/ODOT Standard Specifications for Construction.

3.09 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water. **No soils removed in the course of trenching activities may be removed from site.**

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 31 2316.26 - ROCK REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of identified rock during excavation.

1.02 RELATED REQUIREMENTS

A. Section 31 2323 - Fill: Fill materials.

B. Section 31 2316 - Excavation.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. Rock Removal: By the cubic yard measured before disintegration. Includes preparation of rock for removal, mechanical disintegration of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.

C. Trench Rock Removal: By the cubic yard measured before disintegration. Includes preparation of rock for removal, explosive disintegration of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.

1.04 DEFINITIONS

A. Site Rock: Solid mineral material with a volume in excess of 1/3 cubic yard or solid material that cannot be removed with conventional rock removal equipment.

B. Trench Rock: Solid mineral material with a volume in excess of 1/6 cubic yard or solid material that cannot be removed with conventional rock removal equipment.

C. Rock: Solid mineral material of a size that cannot be removed with conventional rock removal equipment.

D. Conventional Rock Removal Equipment: 320C Caterpillar Excavator (45k-55k Operating Weight) or approved alternative equipment meeting the following equivalencies:

1. Excavator equipped with medium stick and rock ripping bucket equipped with two (2) “Rock Teeth”.
2. Equipment with a production rate of 30 bank cubic yards per hour minimum.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions and note subsurface irregularities affecting work of this section.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.03 ROCK REMOVAL

A. Excavate and remove rock by mechanical methods only; use of explosives is prohibited.

B. Mechanical Methods: Drill holes and utilize expansive tools to fracture rock.

C. If rock is uncovered requiring the explosives method for rock disintegration, notify the Architect.

D. Form level bearing at bottom of excavations.

E. Remove shaled layers to provide sound and unshattered base for footings.

F. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

G. Remove excavated materials from site.

H. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 31 2323.

3.04 FIELD QUALITY CONTROL

A. Independent agency field inspection will be provided under provisions of Section 01 4000 - Quality Requirements.

B. Provide for visual inspection of foundation bearing surfaces and cavities formed by removed rock.

END OF SECTION

SECTION 31 2323 - FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for footings, slabs-on-grade, paving, site structures, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 31 2200 - Grading: Site grading.

C. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.

D. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

E. Section 33 4100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

E. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

F. Reference: Project Geotechnical Report.

1.04 DEFINITIONS

A. Finish Grade Elevations: As indicated on drawings.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Soil Samples: 10 pounds sample of each type of fill; submit in air-tight containers to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

E. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where shown on plan.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. All ~~materials~~ **structural and granular fill** shall be in accordance with Project Geotechnical Report.

B. Topsoil per Section 32 9113 – Soil Preparation.

C. Imported Earth Fill: Approved earth fill materials, free of subsoil clay lumps, brush, weeds, roots, rock larger than 1-1/2 inches in any dimension, and other material harmful to plant growth.

D. On-site Excavated Fill: All excavated material encountered within three (3) feet of existing surface elevation, including:

1. Brush, weeds, and organic material.

2. Root balls and stumps.

3. Clay lumps and rock 4 inches and smaller.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable
   1. Non-woven: ~~GEOTEX 801~~ **MIRIFI 180N** or approved equal with laps per manufacturers specification.
   2. Woven: ~~GEOTEX 200ST~~ **ACF WSF200** or approved equal with laps per manufacturers specification.
   3. Filter: ~~GEOTEX 801~~ **MIRIFI 140N** or approved equal.
   5. ~~Waterproof Membrane~~ **Vapor barrier**: 10mil thick by StegoWrap or approved equal installed per manufacturers specification.
   4. Storm Facility Liner: FIRESTONE 45mil EPDM or approved equal with laps and cover seams per manufacturer specification.

2.03 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

D. Verify structural ability of unsupported walls to support imposed loads by the fill.

E. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers in accordance with the Project Geotechnical Report.

G. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

H. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
   2. Other areas: Use structural fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

I. Compaction densities shall be in accordance with the Project Geotechnical Report.

J. Reshape and re-compact fills subjected to vehicular traffic.

K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D2922 or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: In conformance with current Oregon APWA/ODOT Standard Specifications for Construction.

F. Proof roll compacted fill at surfaces that will be under slabs-on-grade and paving.

3.05 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Leave unused materials in a neat, compact stockpile.

C. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 1123 - AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Paving aggregates.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for base course.

B. Section 31 2316.13 - Trenching: Compacted fill over utility trenches under base course.

C. Section 31 2323 - Fill: Compacted fill under base course.

D. Section 32 1216 - Hot Mix Asphalt Paving: Finish and binder asphalt courses.

E. Section 32 1313 - Concrete Paving: Finish concrete surface course.

F. Section 33 0513 - Manholes and Structures: Manholes including frames.

G. Section 33 4100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

E. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

F. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

G. Reference: Project Geotechnical Report.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Samples: 10 lb sample of each type of aggregate; submit in air-tight containers to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials in accordance with Project Geotechnical Report.

B. Geotextile Fabric: ~~Non-biodegradable~~ **Per Section 31 2323 – Fill.**
~~1. Woven: GEOTEX 200ST or approved equal with laps per manufacturers specification.~~

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Place aggregate in maximum 8" layers and roller compact to specified density.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

D. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: In conformance with current Oregon APWA/ODOT Standard Specifications for Construction.

F. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade and paving.

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 1313 - CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, integral curbs, and gutters.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories.

B. Section 03 2000 - Concrete Reinforcing.

C. Section 03 3000 - Cast-in-Place Concrete.

D. Section 07 9200 - Joint Sealants: Sealing joints.

E. Section 31 2200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.

F. Section 31 2323 - Fill: Compacted subbase for paving.

G. Section 32 1123 - Aggregate Base Courses: Base course.

H. Section 32 1216 - Hot Mix Asphalt Paving: Asphalt wearing course.

I. Section 32 1713 - Parking Bumpers: Precast or recycled parking bumpers.

J. Section 32 1726 - Tactile Warning Surfacing: Tactile and detectable warning tiles for pedestrian walking surfaces.

K. Section 33 0513 - Manholes and Structures: Manholes and Drains, including frames; gutter drainage grilles, covers, and frames for placement by this section.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

C. ACI 305R - Hot Weather Concreting; 2010.

D. ACI 306R - Cold Weather Concreting; 2010.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

J. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

K. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

L. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

O. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

P. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

Q. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

R. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

S. Reference: Project Geotechnical Report.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI 301.

B. Concrete Sidewalks and Curbs: 3,500 psi 28 day concrete, 4 inches thick, buff color Portland cement, wood float broom finish.

C. Concrete ~~Driveway~~ **Vehicular Pavement and Valley Gutters**: 4,000 psi 28 day concrete, 6 inches thick, ~~# 4 continuous rebar at 16" on center each way~~ **reinforcement per plan**, buff color Portland cement, wood float broom finish.

D. Concrete Retaining Walls: 4,000 psi 28 day concrete, thickness **and reinforcement** per plan, buff color Portland cement, smooth rubbed finish.

E. Miscellaneous Items (Sign Post Foundations, Flag Poles, etc.): As indicated on plans.

2.02 FORM MATERIALS

A. Form Materials per ACI 301.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
   1. Thickness: 1/2 inch.

2.03 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength; deformed billet steel bars; unfinished.

B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

C. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Concrete Materials: As specified in Section 03 3000.

2.05 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1, Class A.

B. Tactile Warning Surfaces: See Section 32 1726.

2.06 CONCRETE MIX DESIGN

A. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

C. Concrete Properties:
   1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; As indicated on drawings.
   2. For concrete surfaces in areas supporting vehicular traffic, such as roadway aprons and loading zones, the concrete shall have a low to moderate flexural strength (modulus of rupture: 550 psi). This property shall be identified in the mix design.
   3. Total Air Content: 6 percent, determined in accordance with ASTM C173/C173M.
   4. Maximum Slump: 4 inches.
   5. Maximum Aggregate Size: 3/4 inch.

2.07 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted granular base is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. See Section 32 1123 for construction of base course for work of this Section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement. Hold top of pre-molded joint filler down 1/2" and seal upper 3/8" with approved joint seal material.

3.05 REINFORCEMENT

A. Place reinforcement as indicated.

B. Interrupt reinforcement at contraction joints.

C. Place dowels to achieve pavement and curb alignment as detailed.

3.06 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

C. Place concrete continuously over the full width of the panel and between predetermined construction joints.

D. Place concrete to specified pattern.

E. Retaining walls shall be at a minimum 80% design strength and 7 days cure prior to any backfill placement.

3.07 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Place 3/8 inch wide expansion joints at ~~20 foot intervals~~ **9 times typical scored panel size maximum (example: 5 foot panels require an expansion joint every 45 feet)** and to separate paving from vertical surfaces, other components and in pattern indicated.

1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
2. Secure to resist movement by wet concrete.

C. Provide scored **contraction** joints **at 3 times typical scored panel size maximum (example: 5 foot panels require a contraction joint every 15 feet)**.

1. Sawn joints shall be green sawn a minimum of 1/8 inch wide, 1/3 the depth of the pavement within 12 hours of concrete placement.

2. Troweled joints shall be a minimum of 1/8 inch wide, 1/3 the depth of the pavement, with 1/4 inch radii.

~~D. Install joints as specified on the plan set.~~

D. Provide scored dummy joints at a length roughly equivalent to sidewalk width, 10 foot maximum (example: 5 foot wide sidewalk requires a dummy joint approximately every 5 feet).

1. Dummy joints shall be equally spaced between expansion joints.

E. No horizontal joints are permitted on site retaining walls.

F. Install joints as otherwise specified on the plan set.

3.08 FINISHING

A. Area Paving: Light broom, texture perpendicular to pavement direction.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

C. Curbs and Gutters: Light broom, texture parallel to pavement direction.

D. Retaining Walls: Smooth rubbed finish. Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal. Repair surface defects, including tie holes, immediately after removing form work.

E. See plans for additional information relating to Finishing Requirements.

F. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation From True Position: 1/4 inch.

3.10 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.
   2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
   3. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
   1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
   2. Perform one slump test for each set of test cylinders taken.

C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION

SECTION 32 1713 - PARKING BUMPERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast concrete parking bumpers and anchorage.

~~B. Recycled rubber parking bumpers and anchorage.~~

1.02 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

D. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide unit configuration, dimensions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Parking Bumpers: Precast concrete, complying with the following:
   1. Nominal Size: 4-6 inches high, 6-8 inches wide, 5-6 feet long.
   2. Cement: ASTM C150/C150M, Portland Type I - Normal; white color.
   3. Concrete Materials: ASTM C330/C330M aggregate, water, and sand.
   4. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
   5. Air Entrainment Admixture: ASTM C260/C260M.
   6. Concrete Mix: Minimum 5,000 psi compressive strength after 28 days, air entrained to 4 to 6 percent.
   7. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
   8. Embed reinforcing steel, and drill or sleeve for two dowels.
   9. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
   10. Minor patching in plant is acceptable, providing appearance of units is not impaired.

~~B. Parking Bumpers: Recycled rubber, conforming to the following:~~
   ~~1. Nominal Size: 4-6 inches high, 6-8 inches wide, 5-6 feet long.~~
   ~~2. 100% recycled plastic.~~
   ~~3. Will not crack.~~
   ~~4. Impervious to salt, oil, gasoline, and other road chemicals.~~
   ~~5. Optional colors available for ADA parking spaces (blue).~~
   ~~6. Installation instructions and hardware are included.~~

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units without damage to shape or finish. Replace or repair damaged units.

B. Install units in alignment with adjacent work per manufacturers specifications.

END OF SECTION

SECTION 32 1723.13 - PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols, curb markings, and lettering.

B. "No Parking" fire lane painting.

1.02 RELATED REQUIREMENTS

A. Section 32 1216 - Hot Mix Asphalt Paving.

B. Section 32 1313 - Concrete Paving.

1.03 REFERENCE STANDARDS

A. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne; Rev. E, 2007.

B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

C. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

D. ASTM E303-93 (2013) – Pendulum Test Method for Dynamic Slip Resistance.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. 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. Installation methods.

C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

D. Maintenance Materials: Furnish the following for the owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint: 2 containers, 1 gallon size, of each type and color.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Supply 2 containers of each color for the owner’s use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.
   1. Roadway markings: White.
   2. Parking lot **striping**: ~~Yellow~~ **White**.
   3. ~~Handicapped Symbols~~ **Accessible parking 'wheelchair' symbols**: Blue **and white**.
   4. Symbols and text: White.
   5. Fire lane striping: red with white text.
   6. No parking and hazard zones: Yellow with white text (as applicable).

B. ~~Line and Zone Marking Paint: White or Yellow (see plan).~~

C. Paint For Obliterating Existing Markings: FS TT-P-1952; black for bituminous pavements, gray for Portland cement pavements.

D. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

E. Tactile Warning Surfaces: See Section 32 1726.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Obliteration of existing markings using paint is acceptable in lieu of removal on the private site only (not within the public right-of-way); apply the black paint in as many coats as necessary to completely obliterate the existing markings.

D. Clean surfaces thoroughly prior to installation.
   1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
   2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.

E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

G. Temporary Pavement Markings: When required or directed by Engineer, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
   1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.

3.03 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

C. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

D. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

E. Apply uniformly painted markings of color(s), lengths, and widths as indicated on drawings true, sharp edges and ends.
   1. Apply paint in two coats.
   2. Wet Film Thickness: 0.015 inch, minimum.
   3. Width Tolerance: Plus or minus 1/8 inch.

F. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
   1. Mark the International Handicapped Symbol at indicated parking spaces.
   2. Hand application by pneumatic spray is acceptable.

G. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.04 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to the owner.

END OF SECTION

SECTION 32 1726 - TACTILE WARNING SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plastic and cast iron tactile and detectable warning tiles for pedestrian walking surfaces.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete for sidewalks and platforms.

B. Section 32 1313 - Concrete Paving: Concrete sidewalks.

C. Section 32 1723.13 - Painted Pavement Markings: Crosswalk and curb markings.

1.03 REFERENCE STANDARDS

A. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

~~C. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).~~

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

E. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

F. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

G. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2010.

H. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2015.

I. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

J. SAE AMS-STD-595 - Colors Used in Government Procurement; 2017a.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.

C. Shop Drawings: Submit plan and detail drawings. Indicate:

1. Locations on project site. Demonstrate compliance with referenced accessibility standards.
2. Sizes and layout.
3. Pattern spacing and orientation.
4. Attachment and fastener details, if applicable

D. Warranty: Submit manufacturer warranty; complete forms in the owner's name and register with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.

B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

~~B. Cast Iron Tiles: Provide manufacturer's standard ten year warranty against manufacturing defects, breakage or deformation.~~

C. Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Tactile and Detectable Warning Surface Tiles:
1. Access Tile, a brand of Access Products, Inc.: www.accessproducts.com
2. ADA Solutions, a division of SureWerx USA: www.adatile.com
3. Armor-Tile, a brand of Engineered Plastics, Inc.: www.armortiletransit.com

~~B. Cast Iron Detectable Warning Plates:~~
~~1. ADA Solutions, a division of SureWerx USA: www.adatile.com~~
~~2. Neenah Foundry, a division of Neenah Enterprises, Inc.: www.nfco.com~~

2.02 TACTILE AND DETECTABLE WARNING DEVICES

A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory-applied removable protective sheeting.
1. Installation Method: Cast in place.
2. Shape: Rectangular.
3. Dimensions: per plan inches by per plan inches.
4. Pattern: In-line pattern of truncated domes complying with ADA Standards.
5. Edge: Square.
6. Joint: Butt.
7. Color: SAE AMS-STD-595, Table IV, Federal Yellow No. 33538.

~~B. Cast Iron Detectable Warning Plates:~~
~~1. Material: Cast gray iron; ASTM A48/A48M, Class 30 A (minimum).~~
~~2. Installation Method: Cast in place.~~
~~3. Shape: Rectangular.~~
~~4. Dimensions: per plan inches by per plan inches.~~
~~5. Pattern: Truncated cones in compliance with ADA Standards.~~
~~6. Joint: Manufacturer standard, bolted connection.~~
~~7. Finish: Manufacturer's factory-applied powder coat.~~
~~8. Color: SAE AMS-STD-595, Table IV, Federal Yellow No. 33538.~~

2.03 ACCESSORIES

A. Fasteners: ASTM A666, Type 304 stainless steel
1. Type: Countersunk, color matched composite sleeve anchors
2. Size: 1/4 inch diameter and 1-1/2 inches long.

B. Adhesive: Type recommended and approved by surfacing tile manufacturer.

C. Sealant: Elastomeric sealant of color to match adjacent surfaces; approved by surfacing tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. When installation location is near site boundary or property line, verify required location using property survey.

B. Verify that work area is ready to receive work:
   1. If existing conditions are not as required to properly complete the work of this section, notify Engineer.
   2. Do not proceed with installation until deficiencies in existing conditions have been corrected.

C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.02 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's written instructions.
   1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
   2. Do not install when ambient or substrate temperature has been below 40 degrees F during the preceding 8 daylight hours.

B. Field Adjustment:
   1. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
   2. Orient so dome pattern is aligned with the direction of ramp.

C. Install units fully seated to substrate, square to straight edges and flat to required slope.

3.03 INSTALLATION, CAST IN PLACE PLASTIC TILES

A. Tamp and vibrate units as recommended by manufacturer.

B. Place and position weights on units while concrete cures as recommended by manufacturer. Ensure no voids or air pockets exist between top surface of concrete and underside of units.

~~3.04 INSTALLATION - CAST IN PLACE, CAST IRON PLATES~~

~~A. Install by method described in manufacturer's written instructions.~~

~~B. Place units into wet concrete.~~

~~C. Press assembly into concrete to achieve final elevation.~~

~~D. Finish concrete adjacent to plate. Remove wet concrete spilled onto plate surface.~~

3.05 CLEANING PLASTIC UNITS

A. Remove protective plastic sheeting within 24 hours of installation.

B. Remove excess sealant or adhesive from joints and edges.

C. Clean two days prior to date of scheduled inspection.

3.06 PROTECTION

A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.

B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

END OF SECTION

SECTION 32 3300 – SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the Following:

1. Bicycle Racks
2. Skateboard Deterrents

1.02 REFERENCED SECTIONS

A. Section 033000 – Cast-in-place Concrete.

1.03 SUBMITTALS

A. Product Data: For each product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. Bicycle Rack (U-style):

1. Manufacturer: Huntco Site Furnishings or approved equal
2. Style: The Staple (HP Series), inverted “U” style.
3. Material: 2” Schedule 40 round steel.
4. Mounting: Surface flange mount per manufacturer’s installation instructions.
5. Finish: Manufacturer’s T304 Stainless Steel #4 Satin Finish.
6. Website: www.huntco.com

B. ~~Skateboard Deterrents:~~

1. ~~Manufacturer: Tapco.~~
2. ~~Style: FA 135, surface mount Skate Stoppers.~~
3. ~~SKU (Tapco): 124367~~
4. ~~Finish: 6061-T6 Aluminum with Type II Clear Anodized~~
5. ~~Mounting: For ¾” or greater chamfer corner. Two offset through-holes for SMART PINS PLUS anchors with two-part epoxy.~~
6. ~~Spacing: Follow manufacturer’s recommendations, 18” from end of wall or planter and approximately 36” on center, avoiding concrete control joints.~~
7. ~~Phone: 800-236-0112~~
8. ~~Website: www.tapconet.com~~

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions and report to Architect in writing any conditions that may adversely affect installation prior to commencing work.

3.02 INSTALLATION

A. Install pre-fabricated units and miscellaneous elements in accordance with manufacturer’s printed instructions, field-assembly requirements, and installation details.

B. Anchor to substrate according to manufacturer’s instructions. Supply fastening hardware not supplied by the manufacturer as required for mounting and anchoring pre-fabricated units.

C. Install items level and plumb.

3.03 ADJUSTING

A. Adjust as required.

3.04 CLEANING AND REPLACEMENT

A. After completing site furnishing installations, inspect components. Remove blemishes, dirt, and debris. Repair damaged finishes to match original finish. Replace items where finishes cannot be repaired.

END OF SECTION

SECTION 32 3113 - CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Posts, rails, and frames.
B. Wire fabric.
C. Barbed wire.
D. Concrete.
E. Manual gates with related hardware.
F. Automatic gate operators.
G. Accessories.

1.02 REFERENCE STANDARDS

A. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire; 2022.
B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
E. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.
F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2023.
G. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric; 2017 (Reapproved 2022).
H. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; 2018 (Reapproved 2022).
I. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2018 (Reapproved 2022).
J. ASTM F2200 - Standard Specification for Automated Vehicular Gate Construction; 2020.
K. BHMA A156.3 - Exit Devices; 2020.
L. CLFMI CLF-PM0610 - Product Manual; 2017.
M. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.
N. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing; 2023.
O. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric); 1990.
P. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
Q. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

R. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

S. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

T. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

C. Design Calculations: For high wind load areas, provide calculations for fence fabric and accessory selection as well as line post spacing and foundation details. See CLFMI WLG 2445 for line post and spacing guidance.

D. 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.

E. Manufacturer's Installation Instructions: Indicate installation requirements for gates and operators.

F. AIS Certificate: Certify that products comply with American Iron and Steel (AIS) provision for the Consolidated Appropriations Act of 2017 (Section 746 Division A of Title VII), and subsequent statutes, mandating domestic preference.

G. Maintenance Data: Provide maintenance data on gates and operators.

H. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

1.04 QUALITY ASSURANCE

A. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer including necessary erection accessories, fittings and fasteners.

1.05 EXISTING UTILITIES

A. Locate and identify, with visible marking, existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during excavation operations.

B. Should uncharted piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with the owner and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner. The cost of repairing charted utilities shall be paid by the Contractor at no additional cost to the Owner.

C. Do not interrupt existing utilities service facilities occupied and used by the Owner or others, except when permitted in writing by the Owner’s Representative and then only after acceptable temporary utility services have been provided.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for automatic gate operators.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Chain Link Fences and Gates:

1. Master-Halco, Inc: www.masterhalco.com/#sle.
2. Merchants Metals: www.merchantsmetals.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Automatic Gate Operators:

1. DoorKing, Inc.; Model 9150: www.doorking.com.
2. Tymetal Corp; Tiger System: www.tymetal.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

A. Line Posts: 1.9 inch diameter.

B. Corner and Terminal Posts: 2.38 inch diameter.

C. Gate Posts: Provide gate posts for supporting single gate leaf or one leaf of a double gate installation, for nominal gate widths as follows:

1. Single less than 6 feet wide:
   a. 2.9 inch diameter Schedule 40 pipe.
2. Double less than 12 feet wide:
   a. 3-1/2 inch diameter Schedule 40 pipe.
3. Horizontal Sliding Gate:
   a. Guide posts for Class 1 horizontal-slide gates equal the gate post height, 1 size smaller, but weight is not less than 3.11 lb/ft.; installed adjacent to gate post to permit gate to slide in space between.
   b. 3-1/2 inch diameter Schedule 40 pipe.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66 inch diameter for welded fabrication.

F. Fabric: 2 inch diamond mesh interwoven wire, 9 gauge, 0.1483 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.

G. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.

H. Tie Wire: Aluminum alloy steel wire.

2.03 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 F668 polymer-coated steel chain link fabric.
2. Comply with CLFMI CLF-PM0610.

C. Barbed Wire:

1. Zinc-coated steel, complying with ASTM A121 Type Z Coating Class 1; 2 strands of 0.099 inch diameter wire, with 2-pointed barbs at 4 inches on center.

D. Concrete:

1. Ready-mixed, complying with ASTM C94/C94M; normal Portland cement; 2,500 psi strength at 28 days, 3 inch slump; 1-1/2 inch nominal size aggregate.

2.04 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; see Section08 0671 - Door Hardware Schedule for lockset/handle specifics

1. Provide latch guard to prevent unauthorized access from exterior, preventing access to panic bar latch from outside.

B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.

C. Latches: Finished to match fence components.

1. Locking: Mechanical, with electric strike and keycard reader.

2.05 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 III.
2. Operating type: drive belt.
3. Control Functions: Open, Pause, Close.
4. Maximum Open/Close Time: 20 seconds.
5. Access: Card, Keypad, Remote, and License Reader.
   a. In-ground sensing loops for egress trigger
6. Maximum gate weight: 1,500 pounds (560 kilograms).
7. Horsepower Rating: 1 HP, suitable for connected load.
8. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
9. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   a. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      1) Outdoor Locations: Type 3R.
   b. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

2.06 LIGHT-DUTY ARCHITECTURAL HARDWARE

A. Exit Devices: Stainless steel, 36 inches (914 mm) wide.

1. Performance Criteria: Comply with BHMA A156.3, Grade 1.
2. Provide strike of type recommended by manufacturer for application indicated.
3. Stainless Steel Finish: 711.

B. Hinge Set: Self-closing, for top and bottom support of swinging gate.

1. Swing Direction: One way.
2. Finish: Black Powder Coat.

2.07 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

C. Extension Arms: Cast steel galvanized, to accommodate 3 strands of barbed wire, single arm, vertical.

2.08 FINISHES

A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.

B. Components and Fabric: Vinyl coated over coating of 2.0 ounces per square foot galvanizing.

C. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

D. Color(s): Black.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.02 PREPARATION

A. Removal: Obstructions or debris.

3.03 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Excavation: Drill holes of diameters and spacings as indicated on drawings, for post footings in firm, undisturbed, or compact soil. Spread soil from excavations uniformly adjacent to the fence line or adjacent areas of the site as directed.

C. Setting Posts:

1. Remove loose and foreign materials from sides and bottoms of holes and moisten soil prior to placing concrete. Check grading for elevation of top of footings.
2. Install footing reinforcement as indicated on drawings.
3. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
4. Set intermediate posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
5. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials or other acceptable curing methods.

D. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

E. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

F. Do not stretch fabric until concrete foundation has cured 28 days.

G. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

H. Position bottom of fabric 2 inches, maximum, above finished grade.

I. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.

J. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

K. Install bottom tension wire stretched taut between terminal posts.

L. Install support arms sloped outward and attach barbed wire; tension and secure.

M. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer.

1. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories. Space so that frame members are not more than 8 feet apart.
2. Provide full internal weld for frame corners. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15 inches O.C. Attach hardware to provide security against removal or breakage. Install diagonal cross-bracing consisting of 3/8 inch diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.
3. Install operator in accordance with manufacturer's instructions and in accordance with NFPA 70.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Do not infringe on adjacent property lines.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

D. Barbed Wire: Randomly inspect three locations against design for:

1. Spacing of barb wire.
2. Quantity of loops per length of fence.

E. Gates: Inspect for level, plumb, and alignment.

3.06 CLEANING

A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

B. Clean fence with mild household detergent and clean water rinse well.

C. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

D. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

3.07 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

B. Demonstration: Demonstrate operation of system to Owner's personnel.

1. Use operation and maintenance data as reference during demonstration.
2. Briefly describe function, operation, and maintenance of each component.

END OF SECTION

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SECTION 32 8424 – IRRIGATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide underground landscape irrigation system as indicated on the Drawings and as herein specified.

1.02 REFERENCE STANDARDS

A. ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM D1784: Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

C. ASTM D1785: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40 and 80.

D. ASTM D2466: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

E. ASTM D2564: Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

F. ASTM F656: Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

1.03 SUBMITTALS

A. Product Submittals:

1. Submit product data showing manufacturer's name, catalog number, technical data, and photo or drawing for each component of the irrigation system.
2. Submit product data no later than 30 days prior to beginning work.

B. Water Pressure Tests:

1. Submit report of water pressure tests at irrigation water supply connection(s).
2. Submit report of irrigation pressure tests for main line prior to backfilling.

C. Submit Record Drawings at closeout of contract to include:

1. Variations or changes to system.
2. Main and lateral lines.
3. **Valves.**
4. ~~Automatic control valves.~~
5. ~~Quick coupling valves.~~
6. ~~Drain valves.~~
7. ~~Flush valves.~~
8. Wire runs.
9. Wire splice valve box locations.
10. Operating and Maintenance instructions for all irrigation equipment.

1.04 SITE CONDITIONS

A. Weather Requirements:

1. Do not solvent weld polyvinyl chloride pipe when ambient temperature is below 40ºF or above 95ºF.

2. Do not solvent weld polyvinyl chloride pipe in wet conditions.

B. Schedule for Installing Pipe, Sleeves, Sprinkler Heads, and Drip Irrigation:

1. Schedule installation of pipe sleeves below paving and walks prior to construction.
2. Schedule installation of sprinkler heads and drip lines after **main line pressure testing and lateral line leak testing requirements** ~~and final grading~~**.**

C. Complete removal of materials deleterious to plant growth as indicated in Section 329113 – Soil Preparation prior to start of irrigation installation.

1.05 DAMAGES

A. Restore structures or facilities damaged by irrigation work to original condition.

B. Repair damage caused by leaks or breaks in equipment and materials furnished or installed in this contract for one year after date of final acceptance.

1.06 EXISTING UTILITIES

A. Locate and identify, with visible marking, existing underground utilities in areas of work. Utilities to remain in place shall be protected during excavation operations.

B. Consult with utility owner for instructions before proceeding if uncharted piping or other utilities are encountered during execution of work.

C. Cooperate with Owner and public or private utility companies in keeping their respective services and facilities in operation. Coordinate temporary interruptions to existing services and facilities and provide temporary utility services.

1.07 REGULATIONS

A. Work to be accomplished in accordance with applicable Local, State and Federal codes and regulations.

1.08 RECORD DRAWINGS

A. Maintain a current record of pipe, wire, and equipment placement, and record variations or changes.

B. Include Record Drawings in Operating and Maintenance Manual.

1.09 WARRANTIES

A. Equipment Warranty: Provide manufacturer’s standard warranty for all specified equipment.

B. Installer's Warranty:

1. Warranty all irrigation pipes, fittings, and lines to be free of leaks for one year from the date of final acceptance.
2. Warranty shall include repair of trench backfill that settles more than 1" and repair of plantings, paving, and improvements damaged by settlement of trench backfill soils during warranty period.

1.10 QUALIFICATIONS

A. Irrigation Installer: The landscape construction professional as defined in ORS 671.520 and performing work under this section of the contract shall hold a valid landscape contractor’s license in accordance with ORS 671.510 to 671.760.

PART 2 PRODUCTS

2.01 PVC PIPE

A. Polyvinyl Chloride Plastic (PVC) Pipe: PVC 1220, Type 1, normal impact, I.P.S., N.S.F. approved or accepted substitute.

1. Main and Lateral (Zone) Lines: Schedule 40 PVC pipe, conforming to ASTM D1784, ASTM D1785 and PS22.
2. PVC pipe to be new, defect free, continuously and permanently marked with manufacturer's name or trademark, size, schedule and type of pipe.

2.02 PVC PIPE FITTINGS

A. PVC Fittings: PVC 1220, schedule 40, type 1, normal impact, I.P.S., N.S.F. approved meeting requirements of ASTM D2466 or accepted substitute.

B. PVC nipples to be standard weight schedule 80, with molded threads.

2.03 PVC SOLVENT CEMENT

A. For pipe diameter up to 1-1/2”: Weld-On 721 blue color, or accepted substitute, meeting N.S.F. approval for Type I and II PVC and requirements of ASTM D2564.

B. For pipe diameter 2” and larger: Weld-On 711 gray color, or accepted substitute, meeting N.S.F. approval for Type I and II PVC and requirements of ASTM D2564.

2.04 PVC PRIMER

A. Weld-On P-70, purple color, or accepted substitute meeting requirements of ASTM F656.

2.05 PVC SLEEVES

A. Schedule 40 PVC, sized a minimum of 6” or two times the diameter of the pipes scheduled to be contained in the sleeve, whichever is larger.

2.06 GALVANIZED STEEL PIPE AND FITTINGS

A. Pipe: Schedule 40, hot-dipped galvanized, conforming to ASTM A53.

B. Fittings: Hot-dipped galvanized, malleable iron.

2.07 IRRIGATION HEADS

A. See schedule on the Drawings.

2.08 DRIP COMPONENTS

A. General: See schedule and details on the Drawings.

B. Drip Headers: See schedule on the Drawings.

C. Drip Fittings: Use only drip fittings that are recommended by the manufacturer.

D. Drip Irrigation Flush Valves: Netafim TLFV-1, 1-gallon flush valve

E. Drip Irrigation Air-Relief Valve: Rainbird ARV050 ½” Air-Vacuum Relief Valve, per manufacturer requirements.

F. Drip Staples: Netafim TLS6-1000 6-inch staple, 4-foot on-center spacing.

2.09 VALVES AND ACCESSORIES

A. Control Valves: See schedule on the Drawings.

B. Main Line Isolation Valves:

1. Manufacturer: Kennedy Ken-Seal II or approved equal.
2. Type: Resilient wedge gate valve, 150-PSI min. rating, with cast iron body, handwheel, stainless steel gate valve, resilient rubber seat, and flanged fittings.
3. Size: Same size as line on which it is installed, unless otherwise indicated on the Drawings.

C. Valve Boxes for Control and Isolation Valves: 12" minimum size box, one box for each valve, with locking lid, and with 3" and/or 6" extensions as needed to facilitate required installation.

1. Valve boxes shall be no closer than 12 inches apart, when multiple valve boxes are placed together.
2. Manufacturer: Carson, Armor, or approved equal with “T” top lid.

D. Manual Drain Valve:

1. Brass ball valve, 1" size, lever-operated.
2. **Swing Check Valve: Spears 2” PVC Swing Check Valve (S1520-20) or approved equal.**

E. Ball Valve: Brass ball valve, size as noted, lever-operated.

F. Manual Angle Valve: Brass manual angle valve with unions and “T” stem, same size as line on which it is installed.

G. Quick Coupling Valves: See schedule on the Drawings.

H. Valve Boxes for Quick Coupling Valves and Manual Drain Valves: Carson, Armor, or approved equal, **6” or** 10” diameter round valve boxes, **per Drawings,** one box for each valve.

I. Flow ~~Sensor~~ **Meter**: See schedule on the Drawings. ~~Size sensor for flow rather than pipe size.~~

J. Master Valve: See schedule on the Drawings.

K. **Flow Meter** Communication Cable: PE-89 communication cable, from flow **meter** ~~sensor and master valve~~ to controller.

L. Pressure Reducing Valve: See schedule on Drawings

M. Air-relief Valves:

1. Manufacturer & Model: Nelson ACV200B Air Control Valve with brass base.
2. Size: Same size as line on which it is installed, unless otherwise recommended by the manufacturer.

2.10 IRRIGATION CONTROLLER

A. Controller: See schedule on the Drawings.

B. Weather Sensor: ~~See schedule on the Drawings.~~ **None**

2.11 IRRIGATION CONTROL WIRE, DECODERS, AND SURGE PROTECTION

A. Controller to Decoder: No. 14 AWG, solid copper, jacketed two-conductor, direct-burial cable as recommended by the manufacturer.

B. Decoder to Solenoid: ~~As recommended by the manufacturer.~~ **Use pre-installed valve wires, no allowable extensions.**

C. Valve Control: One, two, or four-zone decoders as recommended by the manufacturer.

D. Surge Protection: Lightning arrestor surge protection as recommended by the manufacturer.

2.12 BACKFLOW PREVENTION DEVICE

A. Backflow Prevention Device: See schedule on the Drawings.

2.13 WATER SOURCE

A. New domestic water service dedicated for landscape irrigation as indicated on the Drawings.

2.14 OTHER MATERIALS

A. Keys:
   1. Two (2) keys for each type of locking valve box, cover, or valve with integral locking lid.
   2. Two (2) valve-operating keys of type and length required to operate manual drain valves.

B. Electrical Connectors: Water-tight electrical connectors.
   1. 3-M DBY.
   2. RainBird DB Series.
   3. Or accepted substitute.

C. Locator Wire: All main lines to be marked with continuous 14-gauge, single-strand locator wire, with light blue color coating. Provide minimum 3’-0” long coiled loop of locator wire in each valve box.

D. Concrete for Thrust-Blocking: Concrete for thrust blocks to be from same source and conform to pipe manufacturer's recommendations and applicable ASTM requirements.

E. Pipe Joint Tape: Minimum of 1/2" Teflon tape intended for use in wrapping threaded PVC and/or galvanized pipe fittings and joints, as required.

F. Drain Rock: 1/4" round clean, washed pea gravel.

G. Steel Concrete Nails: 1-1/2” heavy-duty 10-Gauge shank concrete nails.

PART 3 EXECUTION

3.01 GENERAL

A. Do not allow work to be covered or enclosed until it has been reviewed, pressure tested, and approved by the Landscape Architect.

B. Code Requirements:
   1. Installation of materials and equipment shall be in accordance with manufacturer's written specifications and recommendations, and all local and state codes.
   2. Contractor is responsible for identifying conflicts between manufacturer's written specifications and recommendations, local and state codes, and the Contract Documents.
   3. Contractor shall correct work installed to meet manufacturer’s or code requirements at no additional cost.

C. Minor changes necessary to conform to ground conditions may be made without the Landscape Architect's approval. Changes shall be recorded on the Record Drawings.

D. Obtain written permission to shut off any water lines prior to work. Keep disruptions in service to a minimum.

E. Maintain system and protect it from damage, including damage caused by vandalism or adverse weather conditions, until date of final acceptance. Repair damage at no additional cost to the Owner.

3.02 PIPE TRENCHING

A. Minimum depth of cover **from top of prepared topsoil** to top of irrigation piping shall be as follows:
   1. Lateral Lines: Minimum depth of 12", maximum depth of 18”.
   2. Mainline: Minimum depth of 18", maximum depth of 24” to top of pipe.
   3. Sleeves under vehicular pavement: Minimum depth of 18”, maximum of 24”.

B. Backfill trenches in cool part of day to minimize expansion and contraction of PVC pipe.

C. Remove debris, trash, rocks, and other foreign material from irrigation trenches.
   1. Irrigation lines to have a firm, uniform bearing surface for entire length of each line.
   2. Wedging or blocking of pipe other than specified thrust blocking is not permitted.

D. Before backfilling trenches, pipe shall be flushed clear and clean of dirt and foreign material. (See FLUSHING, TESTING, AND ADJUSTING)

E. Backfill trenches in layers of not more than 6" in depth and compact each layer.
   1. **Fill trenches to top of subsoil with prepared subsoil.**
   2. Fill trenches **between top of subsoil and top of topsoil with prepared topsoil** ~~to finish grade with planting soil.~~
   3. Restore disturbed surfaces to original condition or better.

F. Repair or replace materials and equipment damaged or destroyed while backfilling.

3.03 PIPE

A. Exercise care in handling and storing pipe and fittings.
   1. Store materials under cover before using.
   2. Transport materials in a vehicle of adequate size and capacity to prevent bending or concentration of an external load at any point on materials.
   3. Materials or portions of materials that are damaged shall be discarded and replaced.

B. Remove foreign matter and dirt from inside pipe or fittings before lowering into trench.

C. Install pipe and fittings per manufacturer's specifications with specified materials. Use Teflon tape on threaded joints.

D. Install locator wire on top side of pipe.
   1. Tape locator wire to pipe at no less than 20'-0" intervals.
   2. Sections of locator wire shall be spliced together with watertight splice connectors, to provide a continuous run.

E. Install concrete thrust blocks at changes of direction for main line pipe 2-1/2" or greater in diameter. Pour a minimum of 1.5 cubic feet of pre-mixed concrete against pipe and firm soil, in accordance with pipe manufacturer's recommendations.

F. Snake pipe in trenches where applicable to allow for expansion and contraction as recommended by manufacturer.

G. Cut pipe ends square and remove burrs.

H. Repair settlement of backfilled trenches during warranty period and completely restore and repair plantings, paving and other site improvements disturbed by irrigation construction.

3.04 DRIPLINE EXCAVATION, TRENCHING, AND BACKFILL

A. Excavate and install pipes at minimum cover indicated in drawings or specifications. Excavate trenches at appropriate width for connections and fittings.

B. Minimum cover for dripline components (distance from top of pipe **or tubing** to finish grade):

1. ~~Buried PVC manifold and supply header pipe to dripline grid layouts: 12" to top of pipe.~~
2. ~~Buried dripline lateral pipe downstream of PVC manifold and supply header pipe: 2" to top of dripline pipe.~~
3. **Buried irrigation lateral piping for drip zones: 12"**
4. **Buried irrigation manifold and supply header tubing: 5"**
5. **Buried irrigation in-line drip tubing: 5"**

C. Backfill only after buried lines have been reviewed, tested, and approved.

3.05 BACKFLOW PREVENTION DEVICE

A. Install complete with fittings, valve boxes and extensions. Verify that backflow prevention device is tested and approved by authorities having jurisdiction.

3.06 PRESSURE REDUCING VALVE

A. Install complete with fittings, valve boxes and extensions.

3.07 FLOW ~~SENSOR~~ **METER** AND MASTER VALVE

A. Install in accordance with manufacturer's recommendations, complete with fittings, valve boxes and extensions.

3.08 ISOLATION AND AIR-RELIEF VALVES

A. Install complete with fittings, valve boxes and extensions.

B. Air-relief Valves: Install in quantities and locations as recommended by the manufacturer.

3.09 CONTROL VALVES

A. Valve boxes to be installed **flush with** ~~with top of box 1/2" above~~ finish grade.

B. Flush mainline pipe before installing control valve assemblies.

C. Install valves in box allowing room to perform ongoing maintenance.

D. Place drain rock in valve box to within 2" of bottom of valve assembly.

E. A maximum of two one-inch valves may be installed per jumbo size valve box. Install one control valve assembly per valve box for valves larger than one inch.

F. Provide jumbo valve box if necessary to allow room for maintenance.

G. Connect control valve decoders to irrigation controller according to manufacturer's instructions.

3.10 DRAIN VALVES

A. Install complete with fittings, valve boxes and extensions. ~~Install a minimum of two cubic feet of drain rock at each drain valve location~~

3.11 QUICK COUPLING VALVES

A. ~~Install quick coupling valves on double swing joint assemblies plumb and flush to grade. Angle of nipple relative to main line shall be no more than 45 degrees and no less than 10 degrees.~~ Install quick coupling valves as detailed on the Drawings.

3.12 IRRIGATION HEADS

A. Install irrigation heads of types, sizes, and coverage indicated in Irrigation Legend at locations shown on the Drawings.
   1. Minor changes in head location may be necessary to achieve the required coverage.
   2. Make changes at no additional expense to the Owner.
   3. Notify the Landscape Architect for approval prior to making major changes.
   4. Document changes on the Record Drawings.

B. Locate heads no closer than 6” from any adjacent edge of paving curb, wall, or fence.

3.13 IRRIGATION SLEEVES

A. Install sleeves for irrigation lines and/or control wire under pavement prior to placing pavement materials.
   1. Extend sleeves beyond pavement edge a minimum of 12".
   2. If length of required sleeve is greater than the length of a single piece of pipe, solvent weld joints, otherwise sleeves shall be one continuous length of pipe.

B. Tape ends of sleeve closed with a minimum of three layers of duct tape to keep soil out of sleeve until irrigation lines and/or control wire are installed.

C. Permanently attach a single length of 14-gauge locator wire to the entire length of the sleeve.

D. Stake both ends of sleeves with a readily visible stake extending 12" above grade and below grade to the bottom of sleeve. After curb or sidewalk is installed mark sleeve location with steel concrete nail.
   1. Mark above-grade portion of stake with words 'Irrig. Sleeve.’
   2. Prior to removing stakes install concrete nail at sleeve location and note location on Record Drawings. Do not remove stakes until irrigation lines and/or control wires are installed and inspected.

3.14 IRRIGATION CONTROL WIRE

A. Controller to Decoder: Lay two-wire communication wire in trench under mainline and/or lateral lines whenever they occupy the same trench. Place communication wire in sleeves when under paving, and in conduit when not in common trench with mainline and/or lateral lines.

B. Decoder to Solenoid: Make connections according to manufacturer’s installation instructions.

C. Wire splices to be moisture proof using specified electrical connectors according to manufacturer’s installation instructions.
   1. Make splices only in valve boxes.
   2. Provide minimum 1'-0" length of coiled slack between wire splices.

3.15 FLUSHING, TESTING, AND ADJUSTING

A. Thoroughly flush all main and lateral (zone) lines before testing and installation of irrigation heads and before backfilling trenches.

B. Do not install irrigation heads and drip irrigation components until after main line pressure testing and lateral line leak testing has been completed and approved.

C. Do not backfill irrigation trenches before main line pressure testing and lateral line leak testing has been completed and approved.

1. Soil may be placed in trenches between fittings and couplings to insure stability of line under pressure.
2. Fittings and couplings must be left uncovered for visual inspection for full period of test.
3. Do not test until last solvent welded joint has had a minimum of 24 hours to set and cure, or longer if required by manufacturer's instructions.

D. Before testing, fill main lines with water and expel air from pipes.

E. For irrigation systems with concrete thrust blocks:

1. Allow minimum 5-day cure before testing.
2. Allow 3-day cure for high early strength concrete.

F. Main line pressure testing:

1. Minimum Pressure Test on Main Lines, Valves, Joints and Fittings: 100 pounds per square inch without losing more than 3 pounds per square inch for a period of 1 hour. Provide airless paint sprayer with compressor, or other equipment, to achieve required hydraulic test pressure without injection of air into main lines.
2. Close all valves and cap all piping and fittings as necessary to isolate main line and conduct pressure testing.
3. Perform preliminary test and repair any leaks or defects.
4. Testing to be performed with a certified liquid-filled pressure gauge.
5. Perform final pressure test in the presence of the Landscape Architect.
6. Contractor shall provide minimum 48-hour notice to Landscape Architect requesting observation of final pressure test.
7. Piping may be pressure tested in sections if approved by Landscape Architect.

G. Lateral (zone) line leak testing:

1. **Perform lateral line leak test before installing sprinkler heads, rotors, or drip irrigation components.**
2. **Cap or crimp each riser pipe or flexible connection for sprinklers, rotors or drip irrigation prior to leak testing.**
3. Perform lateral line leak testing for each control valve in numerical sequence, immediately after main line pressure testing has been approved, in the presence of the Landscape Architect.
4. Open each control valve, one at a time, under main line ~~dynamic~~ pressure to demonstrate the absence of leaks at valves, pipe joints, and fittings.

H. Where inspected work does not comply with specified requirements or if pressure tests fail, replace rejected work until compliance is achieved.

I. Adjust and balance irrigation system to provide uniform coverage.

1. Change, reset or adjust heads, nozzles, headers, and emitters as required to provide uniform coverage and match final grades.
2. Perform final coverage test by operating each control valve in the presence of the Landscape Architect when the irrigation system has been completely installed and adjusted.

J. Locator wires must be tested and approved. Wire tests to be conducted by Owner or designated representative.

K. Drip line and emitter lateral leakage and operational testing:

1. Subject installed dripline tubing and emitter lateral piping to water pressure equal to specified operating pressure for ten (10) minutes. Test with control zone components and dripline flush valve components installed.
2. Partially backfill buried pipe and tubing to prevent movement under pressure. Expose couplings, fittings, and valve components.
3. Visually inspect valve assemblies and fittings for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until test segment is free from leaks. Cement or caulking to seal leaks is prohibited.
4. Activate each dripline and emitter lateral control zone valve in sequence and inspect for leaks and any deficiencies in coverage uniformity.

3.16 IRRIGATION CONTROLLER

A. Install controller and cabinet at location shown on the Drawings according to manufacturer's installation instructions.

B. Connect controller to power supply according to all code requirements and manufacturer's installation instructions.

C. Install electrical surge protection for irrigation control system according to all code requirements and manufacturer's installation instructions.

D. ~~Install weather sensor and connect to irrigation controller according to manufacturer's installation instructions.~~

3.17 CLEAN-UP

A. Remove packaging, excess materials, and trash, and dispose of in a legal manner.

3.18 FINAL SUBMITTALS AND TRAINING

A. Irrigation Valve Schedule, laminated on both sides with plastic, for placement inside irrigation controller.

B. Clean print of final Project Record Drawing, reduced by 50% and with zones clearly color-coded, for delivery to Owner's Representative.

C. Provide a minimum of two (2) hours of training and orientation with Owner's Representative to demonstrate operation, adjustment, and maintenance of irrigation system. Review spring activation and winterization operations as part of the Owner's training and orientation procedures.

END OF SECTION

SECTION 32 9113 – SOIL PREPARATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Placing existing and imported topsoil in planting and seed areas.

B. Preparing planting soil ~~materials and~~ **in** areas to be planted with shrubs, ground cover, and seed at locations indicated on the Drawings and as herein specified.

1.02 REFERENCES

A. Definition of Noxious Weed: As designated on State of Oregon Dept. of Agriculture's Noxious Weed List. Species include but are not limited to Blackberry, Canada Thistle, Dandelion, Horsetail, Morning Glory, Nut Sedge, Poison Oak, Rush Grass, Annual Bluegrass, Bermuda Grass, Brome, Crabgrass, Johnson Grass, Nut Grass, and Quack Grass.

1.03 SUBMITTALS

A. Topsoil:

1. Submit written verification of source and type of imported topsoil.
2. Submit analysis of existing (on-site) and imported topsoil from licensed soils testing laboratory for approval prior to reuse of existing topsoil or delivery of imported topsoil. See paragraph 2.1 A. for test requirements.
3. Sample: Submit 1/2-gallon sample each of existing and imported topsoil.

B. Submit manufacturer's or vender's certified analysis of compost, fertilizers, and soil amendments.

1.04 QUALITY ASSURANCE

A. Qualifications of Topsoil:

1. Prior to delivery of imported topsoil, submit written statement giving location of property from which topsoil will be obtained. The Landscape Architect may inspect site.

B. Regulatory Requirements: Meet State of Oregon licensing requirements for the application of herbicides.

C. Packing and Shipping: Deliver commercial fertilizer in original containers with labels indicating weight, chemical analysis and name of manufacturer.

D. Storage and Protection:

1. Store fertilizers and amendments in dry place and protect from contamination.
2. Protect soil materials from deterioration by moisture, erosion, freezing temperatures, and chemical contamination during storage and handling.
3. Protect existing and new improvements from damage and staining.
4. Provide protective cover and barriers as necessary to prevent damage and staining.

1.05 SITE CONDITIONS

A. Environmental Requirements: Prepare soil only when topsoil is not in a wet, muddy, or frozen condition.

B. Complete subgrade preparation prior to placing topsoil (see paragraph 3.02, this section).

C. Scheduling: Schedule preparation of areas to be seeded within 48 hours prior to application of seed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Existing (On-site) and Imported Topsoil:

1. Fertile, friable, natural loam, surface soil, capable of sustaining vigorous plant growth; porous and free draining; free of subsoil clay lumps, brush, noxious weeds, weed seeds, roots, stones larger than 1-1/2 inches in any dimension and other material harmful to plant growth. Throughout landscape installation landscape shall be kept free of weeds. All landscape areas shall be treated to remove noxious weeds, and weed seeds.
2. Topsoil samples and analysis from a licensed soils laboratory shall be submitted to the Landscape Architect for approval prior to delivery or use of any topsoil on the project site. Soil sample shall be a composite acquired from four different sections of the stockpiled soil or four different locations on the site at a depth between six and twelve inches, for a total combined quantity of one-half gallon. Sampling shall be observed by the Architect or Inspector of Record and a written verification describing the sampling locations and process observed shall be provided to the Landscape Architect. Soil test shall include the following: sieve analysis of soil particle size; magnesium, nitrogen, phosphorous, boron, zinc, and potassium levels; soluble salt level; pH; organic matter; and infiltration rate. Test results shall include specific recommendations for soil conditioners, amendments and fertilizers to adjust the soil to meet the description noted above. A written narrative summarizing the analysis and recommendations shall be included in the submittal.
3. Acceptable gradation as defined by USDA triangle of physical characteristics as measured by hydrometer:
    a. Sand: 15 to 60 percent.
    b. Silt: 10 to 60 percent.
    c. Clay: 5 to 30 percent.

B. On-Site or Imported Earth Fill: ~~Approved excavated earth fill materials, free of subsoil clay lumps, brush, weeds, roots, stones larger than 1-1/2 inches in any dimension and other material harmful to plant growth.~~ **See Section 31 2323 – Fill.**

C. Lime: Dolomite limestone, calcium magnesium carbonate, 50% passing through a 100 mesh sieve, 95% to 100% passing through a 20 mesh sieve, agricultural ground grade, minimum neutralizing value of 90%.

D. Compost: 1/4-inch minus fir or hemlock sawdust aged a minimum of 2 years, or approved substitute.

E. Fertilizers and Amendments:

1. Seed Area Fertilizer: Best Fertilizer Triple Pro 15-15-15, or approved equal.
2. Planting Bed Fertilizer: Best Fertilizer Triple Pro 15-15-15, or approved equal.
3. Mycorrhizae Soil Amendment: Plant Success Mycorrhizae Tablets, or approved equal.

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Site Verification of Conditions:

1. Examine site for conditions which will adversely affect execution, permanence, quality of work, survival of plant material, and survival of ~~rough~~ seed.
2. Verify that grade and slopes of seed areas and planting beds are acceptable to the Landscape Architect prior to beginning soil preparation.
3. Report existing conditions detrimental to completion of soil preparation work.

4. Begin Work required in this Section only after conditions are satisfactory.
5. Start of Work in this Section denotes acceptance of existing conditions.

B. Protection of Existing Site:

1. Protect utility lines and site improvements.
2. Stake location of underground utilities and avoid excavation in these areas beyond safe limits.
3. Hand excavate where required to avoid utility line damage.

3.02 SUBGRADE PREPARATION

A. Removal of Materials Deleterious to Plant Growth including the following:

1. Remove all gravel, aggregate base rock material, asphalt, concrete, roots of any dead tree or tree to be removed, and all construction debris from planting beds to a minimum depth of ~~18"~~ **22** inches below ~~finish grade~~ **top of prepared topsoil**, and a minimum depth of 12" inches below ~~finish grade~~ **top of prepared topsoil** for areas to be seeded.
2. Replace with earth fill, if necessary, to bring subgrade to correct levels prior to placing topsoil.

B. Scarify Subgrade:

1. For shrub and groundcover areas, scarify subgrade to a depth of 12 inches in two directions at 90 degrees to each other, where topsoil is scheduled to be placed, to ensure interfacing of subsoil and topsoil, and to achieve specified compaction density.
2. For areas to be seeded, scarify subgrade to a depth of 6 inches in two directions at 90 degrees to each other, to ensure interfacing of subsoil and topsoil, and to achieve specified compaction density. This shall be completed in areas where topsoil is scheduled to be placed, and where native soils are to be amended.
3. Repeat cultivation and scarification prior to placing topsoil planting mix in planting and seed areas where compaction exceeds 75% of maximum density, and where surface soils have sealed and/or formed a soil lens inhibiting drainage.

3.03 PREPARATION

A. Stockpiling:

1. Stockpile and protect existing and imported topsoil on site in designated location as directed by Owner's representative.
2. Do not mix other excavated materials with stockpiles.

B. Preparing Shrub and Ground Cover Planting Bed Areas:

1. Place 12" depth of topsoil at areas to be planted with shrubs and groundcovers.
2. Place 18" depth of topsoil where trees are to be placed in a diameter of 3 times the root ball.
3. Spread 4" depth of compost, and 13.5 pounds per 1,000 square feet of Planting Bed Fertilizer.
4. Apply additional soil amendments as required by soil test analysis at the rate indicated by the analysis.
5. Till soil amendments into topsoil to a minimum depth of 8".
6. Float amended topsoil to 3" below finish elevations.
7. Place Mycorrhizae Tablets in each plant pit at the time of planting according to the manufacturer's specifications:
    a. 1 tablet for each 4" pot
    b. 2 tablets for each 1 gallon container
    c. 4 tablets for each 3 gallon container
    d. 8 tablets for each 5 gallon container
    e. 10 tablets per inch of stem width for each tree (e.g. 20 tablets for each 2" caliper tree)

C. Preparing Areas to be Seeded:

1. Place 4" depth of topsoil.
2. Apply lime 2 weeks prior to seeding if indicated by soil test analysis at the rate indicated by the analysis.
3. Spread 2" depth of compost and 6.7 pounds per 1,000 square feet of Seed Area Fertilizer.
4. Apply additional soil amendments as required by soil test analysis at the rate indicated by the analysis.
5. Till soil amendments into topsoil to a minimum depth of 6".

D. Finish Grading for Areas to be Seeded:

1. Remove high spots and fill depressions.
2. Drag and hand rake seed areas to produce smooth, even grades.
3. Maintain existing grades at limits of Work.
4. Slope to grades acceptable to the Landscape Architect.
5. Provide positive, 2% minimum drainage and as shown on the Drawings.
6. Provide positive, 2% drainage away from each tree.
7. Remove gravel and stones larger than 1".
8. Remove or break up soil clods larger than 1".
9. Remove sticks, trash, debris, and material deleterious to plant life.

3.04 COMPLETION

A. Adjusting and Cleaning:

1. Restore eroded, settled, or compacted soil to specified condition prior to landscape planting and seeding.
2. ~~Remove excess topsoil and soil amendments from adjacent paving, curb, and walk surfaces.~~
3. Provide protective cover and barriers as necessary to prevent damage and staining.
4. Remove debris, topsoil, fertilizer, soil amendments, and soil mixes from curbs, walks, paving, and other improvement surfaces daily.
5. Sweep and hose down curb, pavement, and walk areas daily as necessary to maintain clean surfaces.
6. Transport surplus materials to a legal disposal area.

END OF SECTION

SECTION 32 9200 – HYDROSEEDING

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. Hydroseeding of seed areas.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
2. Maintenance Fertilizer
3. Hydro (Wood Fiber) Mulch
4. Tackifier

B. Submit seed vendor's certified statement of analysis for seed mix.

1. Comply with standards established by the Association of Official Seed Analysts.
2. Seed shall have a guaranteed minimum germination rate of 80%.
3. Seed must contain a maximum of 1.0% total weed seed by weight.

1.03 REGULATORY REQUIREMENTS

A. Meet State of Oregon licensing requirements for the application of herbicides.

1.04 DELIVERY, STORAGE AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

1.05 SITE CONDITIONS

A. Environmental Requirements:

1. Apply seed when wind velocity is less than 5 miles per hour at the site.
2. Do not seed when the air temperature is below 40ºF or above 90ºF.

B. Scheduling:

1. Perform seeding work after seeding areas are prepared, and other work affecting ground surface has been completed.
2. Seed between April 15 and October 15, unless otherwise approved by the Owner.
3. Apply seed within 4 hours after final preparation of seeding areas.
4. If approved by Owner to seed after October 15, increase seed mixture by one pound per 1000 square feet per week up to a total of 12 pounds per 1000 square feet.

1.06 MAINTENANCE

A. Establishment Period: Begin maintenance immediately after each area is seeded and continue until project construction is complete or acceptance conditions have been met, but for not less than the following periods:

1. Sixty (60) days from the date of seeding, or
2. When the establishment period has not elapsed or seed is not fully established before the end of the planting season, continue maintenance during the next planting season.

B. Maintenance:

1. Irrigate seeded areas at a maximum rate of 0.5" of water per hour to keep soil materials moist.

2. Do not operate equipment on seeded areas for the first 30 days to irrigate, weed, or replace seed without using plywood protection boards over prepared areas.
3. Apply Fertilizer within the maintenance period at 5 pounds per 1,000 square feet if required to supplement establishment after germination or as directed by the Landscape Architect.
4. Water fertilizer thoroughly into soil.

C. Repair of Seeded Areas:

1. Apply seed to bare areas that occur in seeded areas during the maintenance period.
2. Reseed areas where soil erosion or poor germination causes bare areas.
3. Immediately remove and replace seeded areas showing excessive growth of undesirable perennial and annual weeds, deficient growth, or damage.
4. Completely remove weeds including weed roots.
5. Remove and replace unaccepted areas in accordance with requirements in this Section.

D. Maintenance Conclusion: Notify Owner in writing 14 days minimum prior to Owner assuming maintenance responsibility for seeded areas.

E. Acceptance:

1. Acceptance of seeded areas is contingent upon meeting the requirements of this Section and the establishment of a healthy, weed-free stand of the seed mix.
2. Coverage Requirements: 90% coverage over any 10 sq. ft. area, with bare spots not exceeding 12 by 12 inches.
3. Re-establish unaccepted areas and provide maintenance as necessary to achieve specified results.

1.07 QUALIFICATIONS

A. Installer Qualifications: The landscape construction professional as defined in ORS 671.520 and performing work under this section of the contract shall hold a valid landscape contractor's license in accordance with ORS 671.510 to 671.760.

PART 2 – PRODUCTS

2.01 SEEDING MATERIALS

A. **Maintenance** Fertilizer and Accessories:

1. **Maintenance** Fertilizer: Best Turf Gold 22-5-6, or approved equal.
2. Vapor Retarder: 6 mil thick, black polyethylene sheet.

B. Seed Mixes:

1. Dry Seed: Distributed by ProLawn Services, Medford, Oregon, (541) 373-7373. Provide mix in the following percentages:
   - 50% Pseudoroegneria spicata / Bluebunch Wheatgrass
   - 35% Festuca idahoensis / Idaho Fescue
   - 10% Poa secunda / Sandberg Bluegrass
   - 5% Linum lewisii / Blue Flax
2. Riparian Seed: PT 402 Native Riparian Mix, distributed by Pro Time Lawn Seed, Portland, OR, (503) 239-7518, ptlawnseed.com.
3. Filtration Swale Bottom Seed: PT 499 Clean Water Services Native Wet Area Mix, distributed by Pro Time Lawn Seed, Portland, OR, (503) 239-7518, ptlawnseed.com.
4. Meadow Seed: PT 454 Native Urban Meadow Mix, distributed by Pro Time Lawn Seed, Portland, OR, (503) 239-7518, ptlawnseed.com.
5. All seed shall be State of Oregon Department of Agriculture Certified Blue Tag Seed.
6. Inoculate all seed blends with mycorrhizae according to the manufacturer's recommended application rate.

C. Hydro Mulch:

1. Material: Virgin wood cellulose fiber containing no growth or germination inhibiting factors.
2. Application Metering Material: Green dye to facilitate visual metering.
3. Performance Characteristics: Forms homogenous slurry upon agitation for rapid and even dispersal.
4. Acceptable Wood Fiber Mulches: Eco-Fiber by Profile Products or approved equal.

D. Binder or Tackifier: Agritek-PAM or approved equal.

2.02 PESTICIDES AND HERBICIDES

A. Pesticides and herbicides, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides or herbicides unless authorized in writing by Authorities Having Jurisdiction (AHJ).

B. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.03 EQUIPMENT

A. Hydraulic Hydro-seeding Equipment: Continuous mixing and agitating action to mix water, seed, ~~fertilizer,~~ and mulch and distribute the mixture on seeding areas.

B. Temporary Fence:

1. Posts: Pre-painted 6’ long steel tee posts, or accepted substitute.
2. Fence: 4' high orange plastic safety fence.

PART 3 – EXECUTION

3.01 PERFORMANCE

A. Verification of Conditions:

1. Inspect condition of areas to be seeded.
2. Verify compliance with required soil preparation as specified and as shown on the Drawings.
3. Start of Hydroseeding Work indicates acceptance of subgrade and ~~surface~~ **finish grade** conditions.

B. Protection of Adjacent Surfaces Prior to Seeding:

1. Protect existing utility systems, paving, walks, curbs, and other site improvements from damage during seeding.
2. Install 10 feet minimum width vapor retarder sheet cover at perimeter of hydro-seeding area to prevent hydroseeding drift on adjacent surfaces.

C. Surface Preparation for Seeding:

1. Comply with required soil preparation as specified and as shown on the Drawings.
2. Lightly irrigate dry planting soil.
3. Allow time for free surface water to drain prior to seeding.

D. Hydroseeding:

1. Seed all new areas shown on Drawings.
2. Apply seed, mulch, ~~fertilizer,~~ amendments, and water uniformly in one application with hydraulic equipment to prepared areas.
3. Dry Seed: Apply 4 pounds seed per 1000 square feet.
4. Riparian Seed: Apply 2 pounds seed per 1000 square feet.
5. Filtration Swale Bottom Seed: Apply 0.5 pounds seed per 1000 square feet.

6. Meadow Seed: Apply 0.25 pounds seed per 1000 square feet.
7. Apply 70 pounds (dry weight) wood fiber mulch for each 1,000 square feet and 2 pounds binder or tackifier for each 1,000 square feet.
8. Apply mixture through a pressure spray distribution system providing a continuous, non-fluctuating discharge of mixture in the above quantities uniformly on seeding areas.
9. Apply seed and mulch mixture using a sweeping, horizontal motion of spray distribution system.

3.02 PESTICIDE AND HERBICIDE APPLICATION

A. Apply pesticides, herbicides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations.

B. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.03 COMPLETION

A. Adjusting and Cleaning:

1. Contractor may adjust method of seeding application only when written request is acceptable to the Owner.
2. At completion of Work in each area, remove debris, equipment, and surplus materials.
3. Wash walks, walls, and paving areas adjacent to seeded areas to completely remove seed, mulch, soil materials, and stains from exposed surfaces.

B. Installation of Temporary Fence:

1. Install temporary fence at perimeter of seeded areas where necessary to prohibit public access, and as directed by the Owner.
2. Install posts at 10 feet on center maximum, to a minimum depth of 18”.
3. Keep fence erect and taut at all times.
4. Remove fence upon conclusion of the maintenance period.

END OF SECTION

SECTION 32 9300 – PLANTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Planting trees, shrubs, and ground covers.

B. Mulching.

C. Plant establishment and warranty period.

1.02 SUBMITTALS

A. Product Submittals:

1. Bark Mulch: Submit 1/2 gallon product sample of bark mulch prior to delivery at the site.
2. Plant Guys: Submit a minimum 6-inch long physical sample of plant guys.
3. Path Edge Restraint: Product data to include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

B. Quality Assurance Submittals:

1. Submit written confirmation of plant order with landscape bid. Substitution requests for plants must be submitted prior to bidding. See submittal procedures.
2. Submit Certificates required by law with plant shipments in the Closeout Manual.
3. Submit notification to Owner 14 days minimum prior to Owner assuming plant maintenance responsibility that indicates the recommended landscape maintenance procedures for the next 60 days.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with minimum requirements for plant quality, grade tolerances, and caliper to height ratios as specified in American Standards for Nursery Stock, ANSI Z60.1.
2. Meet or exceed the specifications of federal, state, and county laws requiring inspection of plants and planting material for plant disease control.

B. Plant Names:

1. Conform to Sunset Western Garden Book, current edition.
2. Botanical names take precedence over common names.

C. The Landscape Architect may reject plant material that does not meet specified standards at any time prior to Final Acceptance.

1.04 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping:

1. Notify the Landscape Architect of the delivery schedule so plant materials may be inspected upon delivery.
2. Do not deliver more plant materials than can be planted in 48 hours.
3. Deliver packaged materials in manufacturer's unopened containers, fully identified by name, brand, type, weight, and analysis.

B. Storage and Protection:

1. Protect plants against damage and dehydration.
2. Cover plant roots and root balls with soil or other accepted material upon delivery, if not scheduled for planting within 4 hours.
3. Store plant materials in shade and protect against harmful weather.
4. Store packaged materials to prevent damage and intrusion of foreign matter.

1.05 SITE CONDITIONS

A. Environmental Requirements:

1. Do not plant when air temperature is less than 35ºF or above 90ºF.
2. Do not plant when ground is frozen, excessively wet or dry.
3. Do not plant when wind velocity exceeds 25 mph.

B. Scheduling:

1. Conduct landscape work when within the acceptable planting season for each kind of plant.
2. Coordinate Work with other contractors.

1.06 PLANT WARRANTIES

A. Warranty begins on date of Final Acceptance.

B. Plant materials shall be in healthy condition at end of one-year warranty period, or for one full growing season after installation, whichever is longer.

C. Replace unhealthy plants within 15 days or as approved by the Landscape Architect.

D. Corrective Work shall be done within 15 days or as approved by the Landscape Architect.

E. Contractor is not responsible for plants damaged by vandalism or theft during warranty period.

1.07 MAINTENANCE SERVICE AND PERIOD

A. Begin maintenance service immediately after planting and continue until Final Acceptance.

B. Water, weed, fertilize, spray, cultivate, mulch, reset plants to correct grade and upright position, remove dead wood, and perform other necessary maintenance work necessary for healthy growth.

C. Remove fallen leaves, cones, and plant litter from landscape areas.

D. Irrigate planting soils when necessary to avoid drying out of plant materials and to promote healthy growth.

1.08 QUALIFICATIONS

A. Installer Qualifications: The landscape construction professional as defined in ORS 671.520 and performing work under this section of the contract shall hold a valid landscape contractor's license in accordance with ORS 671.510 to 671.760.

PART 2 PRODUCTS

2.01 PLANTS

A. Nursery Stock:

1. Healthy, well-branched and rooted, full-foliaged when in leaf, free of disease, injury, insects, weeds, and weed roots.
2. Typical of plant species and variety.
3. Plants held in storage will be rejected if they show signs of growth during storage.
4. Do not use cold storage plants.
5. Where drawings indicate row planting, furnish plants matched in form.
6. Plants larger than specified in the plant list may be used when acceptable to the Landscape Architect at no additional cost to Owner.
7. If use of larger plants is acceptable to the Landscape Architect, then increase the spread of roots or root ball in proportion to the plant size.

B. Plant Names:

1. Furnish plants true to name.
2. Tag a minimum of one of each bundle or lot with common and botanical name.

C. Balled and Burlapped Plants (B&B):

1. Ball and Burlap with natural ball of size to insure healthy growth.
2. Dig with firm natural balls of earth of sufficient diameter and depth to encompass the feeding root system necessary for full recovery of the plant.
3. Comply with ball sizes listed by American Standard for Nursery Stock.
4. Cracked or broken balls are not acceptable.

D. Container Grown Plants:

1. Furnish plants in removable containers or integral peat pots.
2. Furnish plants well rooted to ensure healthy growth.
3. Furnish plants grown in containers from six months to two years prior to delivery, with roots filling container but not root bound.
4. Furnish plants grown in container for sufficient length of time for root system to hold container soil together.

E. Trees:

1. Furnish species that mature at heights over 25 feet with a single main trunk.
2. Do not furnish trees that have a main trunk with two or more co-dominant leaders.
3. Do not furnish conifers which have been sheared as for Christmas tree stock.
4. Trees shall not contain pruning wounds with a diameter of more than 1 inch. Pruning wounds must be made at branch collar and have sound bark on all edges.

F. Shrubs and Ground Covers:

1. Furnish plants with spread and height requirements typical for the species in the specified container size.
2. Furnish plants in a moist and vigorous condition, free of dead wood, bruises, root injuries, and branch injuries.

G. Plant List: As indicated on the Drawings.

1. Contractor shall verify plant quantities indicated on the Drawings. Quantity errors on the Drawings are not the responsibility of the Owner or the Landscape Architect. Provide sufficient quantities of plants to complete work shown on the Drawings.

2.02 ACCESSORIES

A. Bark Mulch:

1. Free from weeds, seeds, and material harmful to plant life.
2. Shredded hemlock or fir bark, medium grade, free of wood chips, maximum size to pass 3/4" mesh screen.

B. Wood Stakes:

1. Wood Species and Grade: Douglas Fir, WCLIB or WWPA No. 2 or Construction grade.
2. Nominal Size for Deciduous Trees: 2" x 2" square, or 2” diameter round, by 8 feet long, or larger if needed.

C. Plant Guys:

1. Broad belt-type strapping or plastic chain, minimum 1" width.

D. Plant Hydration System:

1. “Tree Diaper” product, size 36”. Manufactured by Tree Diaper. Phone: 630.350.9500.

E. Path Edge Restraint:

1. Manufacturer: Permaloc or approved equal
2. Model: CleanLine

3. Size: 3/16” thickness x 5.5” height
4. Material: Aluminum
5. Finish: Mill Finish (manufacturer’s standard)
6. Website: https://permaloc.com/edging/cleanline/

PART 3 EXECUTION

3.01 ACCEPTABLE PLANT INSTALLERS

A. Employ a planting field superintendent to be present and direct performance of planting Work.

Planting superintendent shall be familiar with planting materials and methods of installation.

3.02 PERFORMANCE

A. Verification of Conditions:

1. Examine planting areas and site conditions prior to starting work.
2. Verify location of underground utilities prior to starting work.
3. Starting work indicates acceptance of existing site conditions.

B. Protection:

1. Protect utility lines.
2. Barricade and cover excavations as required to protect pedestrians, employees, equipment, and adjacent property.
3. Protect existing shrubs and trees from damage, discoloration, and soiling.
4. Protect existing and new improvements from damage, discoloration, and soiling.
5. Provide protective cover and barriers as necessary to prevent damage and staining.

C. Preparation:

1. Comply with requirements in Section 32 91 13, Soil Preparation.
2. Excavate pit to a minimum of three times diameter of root ball or root system, not less than 6" deeper for shrubs, and not to exceed depth of root ball for holes for balled trees.
3. Assure plant pit drainage by flooding prior to planting.
4. Immediately prior to planting, scarify bottom and sides of hole with shovel.

D. Path Edge Restraint: Install in accordance with manufacturer’s instructions and as detailed on the Drawings.

E. Placement of Trees and Shrubs:

1. Set top of root ball 1-1/2 inches above ~~finished grade~~ **top of prepared topsoil**.
2. If hole is too deep, fill hole with compacted soil to correct levels. Deep planting is not permitted.
3. Install plants upright and face plants to give best appearance and relationship to adjacent plants and structures.
4. Remove root ball containers completely.
5. After trees have been set in plant pit, remove top and sides of wire baskets. Use bolt cutters to cut wire in several places and remove wire from plant pit. Remove fasteners and burlap wrapping from top third of root ball. Do not bury wire and fasteners in landscape; dispose of legally.
6. Trim broken and frayed roots and any circularly growing roots conforming to the container shape.
7. Adjust plant locations to minimize conflicts with irrigation equipment.

F. Installation of Tree Support: Guy and stake deciduous trees from two directions with guys ~~guy wire,~~ and stakes as detailed on the Drawings.

G. Planting Trees and Shrubs:

1. Cut off broken and frayed roots.
2. Place and compact prepared planting soil carefully to avoid injury to roots and fill voids.
3. When hole is filled to within 4" of ~~finish grade~~ **top of prepared topsoil**, fill with water and let stand until water is absorbed by soil.
4. Backfill with prepared ~~soil mix~~ **topsoil** and compact to eliminate voids.
5. Place Mycorrhizae Tablets in each plant pit as specified in Section 32 91 13, Soil Preparation. Ensure tablets are in direct contact with plant roots or rootball.
6. Do not perform initial watering of trees and shrubs by irrigation system. Water plants thoroughly by hand with a hose immediately after planting.
7. Plant Hydration System: For trees not provided with automatic irrigation (see ~~plan~~ **Drawings**), install 36” Tree Diaper per manufacturer’s direction. Minimum four stakes per tree diaper.

H. Planting Ground Covers:

1. Install plants at spacing indicated.
2. Dig holes large enough to allow spreading of roots.
3. Backfill with prepared soil mix and compact to eliminate voids.
4. Place Mycorrhizae Tablets in each plant pit as specified in Section 32 91 13, Soil Preparation. Ensure tablets are in direct contact with plant roots.
5. Slightly dish soil surface at each plant and water thoroughly.

I. Pruning Trees and Shrubs: Prune trees and shrubs to remove damaged, dead and poorly connected branches.

J. Mulching:

1. Apply ~~4"~~ **3-inch** thick layer of bark mulch over planting beds within two days after planting.
2. **Keep mulch 2 inches away from tree trunk.**
3. Lift plant foliage above mulch where required to prevent mulch contact with foliage.

3.03 ADJUSTING AND CLEANING

A. Remove defective trees, plants, and ground covers from the site within 8 hours after site delivery.

B. Repair damage to utility lines and site improvements because of planting work.

C. Reshape finish grade to match adjacent surfaces.

D. Replace defective trees, plants, and ground covers prior to Final Acceptance or where necessary during next planting season.

E. Remove excess materials from the site.

F. Sweep clean adjacent paving, curbs, walls, and walk surfaces.

END OF SECTION

SECTION 33 1416 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Private water system improvements including:

1. Site domestic water systems.

2. Site fire water systems.

B. Water pipe ~~for site conveyance lines~~.

C. Fittings.

D. ~~Pipe valves~~. **Valves.**

E. Fire hydrants.

F. Fire Department Connections (FDC).

~~D. Pipe and fittings for site water lines including domestic water lines and fire water lines.~~

~~E. Valves and Fire hydrants~~.

G. Backflow prevention assemblies.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete for thrust restraints.

B. Section 31 2316 - Excavation: Excavating of trenches.

C. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

D. Section 31 2323 - Fill: Bedding and backfilling.

E. Section 33 0110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.

1.03 REFERENCE STANDARDS

A. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

B. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

C. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.

D. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.

E. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2015.

F. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

G. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 1998 (Reapproved 2011).

H. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2012.

I. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.

J. AWWA C502 - Dry-Barrel Fire Hydrants; 2014.

K. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; 2011.

L. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2009.

M. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; 2010.

N. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2007.

O. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

P. Medford Water Commission – Standards for Water Facilities.

Q. Medford Water Commission – Standards for Backflow Prevention Devices.

R. Medford Water Commission – Standards for Fire Protection Services.

S. Oregon Plumbing Specialty Code, 2023.

T. NFPA 13, Standard for the Installation of Sprinkler Systems, 2025.

U. NFPA 24, Standard for the Installation of Private Fire Service Mains and their Appurtenances, 2025.

V. ASME B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings 2021.

W. ASME B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, mechanical joint and fitting restraint devices, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with municipality requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPE

~~A. Ductile Iron Pipe: AWWA C151/A21.51.~~

~~1. Fittings: Ductile iron, standard thickness.~~

A. Mechanical Joint Ductile Iron Pipe and Fittings:

1. Pipe:

a. Pressure rating: class or pressure rating per plan.

b. Mechanical Joint Pipe: AWWA C151 with MJ bell and plain spigot end.

c. Exterior Coating: black asphaltic unless noted otherwise.

d. Interior Lining: Cement mortar lining per ANSI/AWWA C104/A1.4.

e. Joint meeting ANSI/AWWA C111/A21.11.

2. Fittings:

a. Pressure rating: 350 psi unless noted otherwise.

b. Exterior Coating: black asphaltic unless noted otherwise.

c. Interior Lining: Cement mortar lining per ANSI/AWWA C104/A1.4.

d. Mechanical Joint Fitting: ANSI/AWWA C110/A21.10 (standard) or ANSI/AWWA C153/A21.53 (compact), joint meeting ANSI/AWWA C111/A21.11.

3. Glands, Gaskets, and Bolts:

a. Glands: ductile or gray iron per ANSI/AWWA C111/A21.11

b. Gaskets: rubber per ANSI/AWWA C111/A21.11, Styrene Butadiene Rubber (SBR).

c. Bolts: steel per ANSI/AWWA C111/A21.11

4. Corrosion Protection:

a. Polyethylene encasement (8-mil minimum) meeting AWWA C105/A21.5 where noted.

~~B. Copper Tubing: ASTM B88, Type K, Annealed:~~

~~C. PVC Pipe: ASTM D1785, Schedule 40.~~

~~1. Fittings: ASTM D2466, PVC.~~

~~2. Joints: ASTM D2855, solvent weld.~~

~~D. PVC Pipe: AWWA C900 Class 150:~~

~~1. Fittings: AWWA C111/A21.11, Schedule 40 per ASTM D2466 or schedule 80 per ASTM D2467.~~

~~2. Joints: ASTM D3139 compression gasket ring.~~

~~E. MunciPex: AWWA C904~~

~~1. Fittings: Produced to Copper Tube Size SDR9, AWWA C800~~

B. PVC Pipe under 4" diameter: ASTM D1785 Schedule 40 unless noted otherwise.

1. Fittings: ASTM D2466, PVC.

2. Joints: ASTM D2855, solvent weld.

C. PVC Pipe 4" diameter and over: AWWA C900 DR18, blue in color, unless noted otherwise:

1. Fittings: AWWA C111/A21.11.

a. Pressure rating: 350 psi unless noted otherwise.

b. Exterior Coating: black asphaltic unless noted otherwise.

c. Lining: Cement mortar lining per ANSI/AWWA C104/A1.4, unless noted otherwise.

d. Push-On Joint:

e. Mechanical Joint Fitting: ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 (compact fittings)

i. Joint meeting ANSI/AWWA C111/A21.11.

f. Flange:

2. Joints: ASTM D3139 compression gasket ring (push-on joint).

D. Trace Wire: ~~Magnetic detectable conductor, brightly colored blue plastic covering, imprinted with "Water Service " in large letters.~~ **Electrically continuous, corrosion-resistant copper wire (14 AWG minimum size) with blue (meeting APWA Uniform Color Code for Underground Utility Lines) 30-mil thick minimum thermoplastic insulation jacket imprinted with "Water Service" or approved alternative in large letters. Wire shall be rated for direct burial use and UL approved. Ends of tracer wire shall be accessible at each end of the underground piping**

2.02 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Up To 3 Inches:
   1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.

C. Gate Valves 3 Inches and Over:
   1. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.

D. Ball Valves Up To 2 Inches:
   1. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA inlet end, compression outlet with electrical ground connector, with control rod, valve key, and extension box.

E. Swing Check Valves From 2 Inches to 24 Inches:
   1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

2.03 HYDRANTS

A. Hydrants: ~~Type as required by utility company and/or Fire Marshal.~~ **Conforming to AWWA C502. Mueller Centurion A423 or Kennedy Guardian K-81D allowed per Medford Water Commission standards.**

B. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle, pumper nozzle must face street.

C. Finish: Primer and two coats of enamel in color **yellow.** ~~required by utility company~~.

2.04 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2316.13.

B. Cover: As specified in Section 31 2316.13.

2.05 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03 3000.

B. Backflow Preventer: Per plan.

C. Meter: Coordinate with Water Division as applicable.

D. Mechanical Joint & Fitting Restraint: All pipe and fittings shall be restrained as specified on plan set. Mechanical restraint shall be by Romac Industries, Inc., or EBAA Iron, Inc., or approved equal. Fitting and joint restraint systems shall be installed as specified by respective system manufacturer for the type of pipe being restrained. ~~Contractor shall submit for approval the manufacturers installation specifications for product being used.~~

E. Fire Department Connection: Per plan.

F. Ball Drip: Per plan.

G. Pipe Supports: Per plan.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

A. See Section 31 2316.13 for additional requirements.

3.04 INSTALLATION - PIPE

~~A. Maintain separation of water main from sewer piping in accordance with applicable code.~~

A. Install domestic water lines in accordance with Oregon Plumbing Specialty Code (OPSC).

1. Maintain separation of domestic water main from sewer piping in accordance with Oregon Plumbing Specialty Code.

2. Establish elevations of buried piping to ensure top of pipe is below local frost line or not less than 24-inches, whichever is greater.

~~B. Establish elevations of buried piping to ensure not less than 2.5 ft of cover from finished grade for fire line. Domestic water line elevation to be established below local frost line.~~

B. Install fire water lines in accordance with NFPA 13 and NFPA 24.

1. Establish elevations of buried piping to ensure top of pipe is below local frost line or not less than 36-inches, whichever is greater.

C. Install ductile iron piping and fittings to AWWA C600.

D. Route pipe in straight line, **unless noted otherwise**.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

F. Install access fittings to permit disinfection of water system performed under Section 33 0110.58.

G. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.

3.05 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway ~~in accordance with Section 21 1100~~. **Set hydrant "bury line" flush with adjacent finish grade.**

D. Set hydrants to grade, with nozzles at least 20 inches above ground ~~in accordance with Section 21 1100~~.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

~~B. Perform field inspection and testing in accordance with Section 01 4000.~~

B. Domestic water systems:

1. Flush water piping and appurtenances per Oregon Plumbing Specialty Code and Medford Water Commission Standards.

2. Pressure test (hydrostatic) to 150 psi.

3. Provide documentation of Agency approval of water system installation to Engineer.

~~C. Pressure test water piping as required per the Medford Water Commission Standard Specifications for Development.~~

C. Fire water systems:

1. **Flush water piping and appurtenances as required by NFPA 24 and Medford Water Commission Standards.**
2. **Pressure test (hydrostatic) fire water piping and appurtences as equired by NFPA 24. Test to 200 psi or 50 psi above static pressure, whichever is greater. Pressure shall be maintained (within 5 psi) for two (2) hours.**
3. **Provide documentation of passing test on a copy of the "Contractors' Material and Test Certificate for Underground Piping" from NFPA 24 and furnish copies to Engineer, Owner, and Fire Department.**

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the owner.

END OF SECTION

SECTION 333123 - SANITARY SEWERAGE FORCE MAIN PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage force main piping, fittings, and accessories.
B. Connection of facility sanitary force main and inverted siphon system to headworks.

1.02 RELATED REQUIREMENTS

A. Section 312316 - Excavation: Excavating of trenches.
B. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
C. Section 312323 - Fill: Bedding and backfilling.
D. Section 330561 - Concrete Manholes.
E. Section 333113 - Site Sanitary Sewerage Gravity Piping.

1.03 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

A. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds; 2020.
B. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.
C. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.
D. ASTM D2464 - Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2023.
E. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
F. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 2019.
G. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe; 2014 (Reapproved 2021).
H. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm); 2022.
I. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's data sheets for each item of equipment and material provided, showing compliance with requirements; include materials, pressure ratings, seats and seals, clearances for operation and maintenance, and other characteristics.
C. Hydrostatic Test Report: Document results of field quality control testing. Submit copies of all reports of field tests.
D. Project Record Documents:
    1. Record location of piping, connections, valves, valve vaults, valve manholes, thrust restraints, and invert elevations.
    2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not damage pipe, fittings and accessories, and pipe coatings during delivery, handling, and storage.

B. Do not place materials on private property without written permission of property owner.

PART 2 PRODUCTS

2.01 FORCE MAIN PIPE MATERIALS

A. PVC Pipe:
   1. PVC Pipe and Fittings: Less than 4 inches (100 mm) diameter: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21, with screw joints, push-on joints, or solvent weld joints.
   2. PVC Pipe and Fittings: 4 inches (100 mm), diameter and larger: ASTM D2241, SDR 21, or AWWA C900, Class 100, with push-on joints.
   3. Ductile Iron Pipe and Fittings: 4 inches (100 mm), diameter and larger: AWWA C-51 Class 50 with restrained joints and fittings.
   4. Joints:
      a. Threaded Joint Fittings: ASTM D2464, Schedule 80.
      b. Push-On Joint Fittings: ASTM D3139, with ASTM F477 gaskets.
      c. Solvent Cement: ASTM D2564.
      d. Restrained joint fittings for Ductile Iron Pipe.
      e. Couplings for use with plain end pipe with centering rings or stops to center the coupling on the joint.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 PIPE ACCESSORIES

A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Force Main Sewer Service" in large letters, color coded per APWA standards, 30-mil thick HDPE insulation, 14-ga minimum, UL-rated for direct burial.

2.03 BEDDING AND COVER MATERIALS

A. Pipe Bedding Material: As specified in Section 312316.13.

B. Pipe Cover Material: As specified in Section 312316.13.

PART 3 EXECUTION

3.01 GENERAL

A. Perform work in accordance with Oregon Plumbing Specialty Code.

3.02 EXCAVATION, TRENCHING, AND BACKFILLING

A. See Section 31 2316.13 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling. Correct over-excavation. See Section 312316.13 for additional requirements.

3.03 PREPARATION

3.04 INSTALLATION - PIPE

A. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories at the locations indicated on layout drawings and in accordance with manufacturer's instructions. Seal watertight.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).

D. Connect to pump station and downstream sanitary manhole.

E. Install trace wire 6 inches (150 mm) above top of pipe; coordinate with Section 312316.13.

3.05 JOINTING

A. PVC Pipe:

1. Screw Joints: Wrap male threads with joint tape or apply an approved thread lubricant, then threading the joining members together. Tighten joint with strap wrenches which will not damage pipe and fittings. Tighten joint no more than 2 threads past hand-tight.
2. Push-On Joints: Bevel ends of pipe to facilitate assembly. Mark pipe to indicate when the pipe is fully seated. Lubricate gaskets to prevent displacement. Place gasket in proper position in bell or coupling while joint is made.
3. Solvent-Weld Joints: Comply with manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 014000 - Quality Requirements.
   1. If tests indicate Work does not meet specified requirements, remove defective Work, replace and retest at no cost to Owner.
B. Hydrostatic Tests
   1. Pipeline testing includes both a pressure test and a leakage test.
   2. Pressure Test: Test in accordance with Oregon Plumbing Specialty Code (OPSC) requirements.
   3. Leakage Test: Test in accordance with Oregon Plumbing Specialty Code (OPSC) requirements.
   4. Deflection Test: Test in accordance with Oregon Plumbing Specialty Code (OPSC) requirements
   5. Retesting:
      a. If any deficiencies are revealed during any test, identify and correct deficiencies and reconduct tests and correct new deficiencies revealed until the results of the tests are within specified allowances, without additional cost to the Owner.

3.07 PROTECTION

A. Water is not permitted to run or stand in trench while pipe laying is in progress, before the joints are completely set, or before trench has been backfilled.
B. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION