PROJECT MANUAL

FOR

RELOCATE CAMPGROUND

AT

SCHAFER STATE PARK

IN

MASON COUNTY

BID OPENING: 1:00 P.M., TUESDAY, AUGUST 9, 2022

BOOK TWO

WASHINGTON STATE PARKS & RECREATION COMMISSION
1111 ISRAEL ROAD SW
TUMWATER, WA 98501-6512
POST OFFICE BOX 42650
OLYMPIA, WASHINGTON 98504-2650
SCHAFTER STATE PARK
RELOCATE CAMPGROUND

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Section 334600 – Stormwater Management
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END OF SECTION
PART 1 – GENERAL

1.1 SUMMARY

A. This Section covers the installation of all plumbing from the main shutoff valve located 1 foot beyond exterior slabwork. This Section includes all plumbing fixtures for the building as described hereinafter and/or as shown on the Drawing and includes, but is not limited to the following:

1. Domestic cold water system
2. Domestic hot water system
3. Domestic tempered water system
4. Waste and vent system
5. Plumbing fixtures
6. Gas piping

1.2 RELATED SECTIONS:

A. Section 033000 - Cast-in-Place Concrete
B. Section 044300 - Stone Masonry
C. Section 061000 - Rough Carpentry

1.3 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with provisions of the Uniform Plumbing Code, latest version. Install all Work in accordance with standards, prescribed by local and/or State codes.

PART 2 – PRODUCTS

2.1 DOMESTIC WATER SYSTEM PIPING/TUBING

A. All aboveground piping shall be PEX Type A, B or C, that complies with ASTM F-875 and ASTM F-877, or copper tubing, Type K or L that complies with ASTM B-88.

1. Use PEX pipe in straight 20 foot lengths color in order to maintain a straight and clean appearance of all exposed pipe.
2. Use PEX pipe color code for cold and hot water installations.
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2.2 DOMESTIC WATER METER

A. Manufacturer:
   1. Daniel L Jerman Co.

B. Water Meter:
   1. DLJ Multi-Jet, sized to match building water main.
   2. Dry contact (reed) or solid state pulse output.
   3. Complies with International Standard ISO 4064

2.3 PROPANE PIPING AND REGULATOR

A. All propane piping above grade shall be Schedule 40 black steel pipe. Regulator shall be REGO regulated LV-4403, 2-stage regulator, 3/4 inch inlet/outlet.

2.4 FITTINGS AND UNIONS

A. All fittings shall be as follows:
   1. For PEX pipe use cold expansion polymer fittings with PEX reinforcement rings that complies with ASTM F-1960, cold expansion metal fitting with PEX reinforcement rings that complies with ASTM F-1960.
   2. For copper pipe use Type M, hard drawn fittings for solder or brazed connections.

B. Unions to be of same size and type as pipe being joined. Provide unions where specified in the plans and at all valves, meters, equipment, etc., to accommodate removal and replacement of all equipment. Steel unions shall be galvanized and provide dielectric break unions where connections of dissimilar metal piping occur.

2.5 GATE VALVES (INTERIOR BUILDING)

A. 125 psi, cold water rated, iron body, bronze or brass mounted, double disc, inside screw, rising stem as manufactured by RED-WHITE, JENKINS, or CRANE. Provide shut-off valve at each fixture supply line in pipe chase to allow shutoff of individual fixtures. Size valves to match pipe size.

2.6 BALL VALVES

A. Bronze body and trim, full port three piece construction, burna-N ring seal, operating handle nut to be stainless steel, operating torque at rated pressure to be 25 foot-pounds or less, threaded connections.
   1. Manufacturers: RED-WHITE, JENKINS, OR CRANE
2.7 CHECK VALVES
   A. Check valves shall be CRANE No. 37, bronze swing check valve.

2.8 ESCUTCHEONS
   A. Escutcheons shall be provided on all exposed piping passing through floors, walls, and ceilings, and sized to fit the pipe, or, if insulated, to fit the insulation. Deep escutcheons shall be used where the sleeve and/or fittings extend past to the finished surface. Escutcheons 2” and smaller shall be plastic.

2.9 PRESSURE REGULATOR
   A. Pressure regulator shall be WILKINS Model 500 XLYSBR, water pressure reducing valve 2” nominal size with reduced pressure range of 25 – 75 psi.

2.10 WATER HAMMER ARRESTOR
   A. Water hammer arrestors shall be ZURN WH2950 (WILKENS) arrestors, size as indicated.

2.11 HOSE BIBBS AND BACKFLOW PREVENTER
   A. Interior hose bibs shall be CHICAGO #293, 1/2 inch with loose T handle.
   B. Interior wall hydrant, 3 in. MFR#: HY 430 shall be WATTS ZORO #:G3415151 with hydrant key, zinc, 3-1/4 in L, ZURN, ZORO #: G4627271, MFR #: P1300-PART-13-KEY.
   C. Exterior hose bib shall be ARROWHEAD #465-08LF freeze-proof with integral vacuum breaker.
   D. Backflow preventers shall be WATTS No. 8C.

2.12 SHOWER HEADS
   A. Shower heads shall be SYMMONS 4-151 universal institutional shower heads with 2 GPM flow restrictions.

2.13 SHOWER & SHOWER HEAD DIVERTER VALVE (TEMPERED AND COLD WATER)
   A. Shower valve shall be Symmons S-86-2 Temptrol Tub Shower Valve with ADA compliant handles.

2.14 COIN OPERATED SHOWER SYSTEM
   A. Manufacturer: Fluid Manufacturing, Lodi California
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      1) Coin: Tokens
   d. Solenoid Valve: CMSV-221 Solenoid Valve
   e. Camlock and Key: CMLS-MLS, HLS Camlock and Key Set

2.15 TEMPERATURE GAUGE
   A. Temperature gauge shall be MCMASTER-CARR bimetal thermometer Model #3946k11. Gauge shall have 3 inch face, bottom connection, 2 1/2 inch stem, 1/2 inch NPT threaded connection. Temperature Range 0 to 200 or 50 to 240 inches.

2.16 THERMOSTATIC MIXING VALVE
   A. Mixing valve shall be Watts 0206003.

2.17 LAVATORY AND ASSOCIATED PARTS
   A. Lavatories shall be KOHLER “Greenwich” Model 2032, wall mounted vitreous china lavatory.
      1. Provide concealed arm carriers at each lavatory.
      2. Color: White

2.18 LAVATORY FAUCET (COMFORT STATION)
   A. Faucet: T & S Brass and Bronze Works, Inc., Model B-0805 Series

2.19 LAVATORY AND ASSOCIATED PARTS (WELCOME CENTER)
   A. Lavatories shall be KOHLER “Greenwich” Model K1721, wall mounted vitreous china lavatory.
      1. Provide concealed arm carriers at each lavatory.
      2. Color: White
   B. P-trap to be KOHLER K-8998 polished chrome with 1-1/4” OD inlet and 1-1/4” OD outlet.
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2.20 WATER CLOSET (WELCOME CENTER)

A. Toilet: Toilet shall be TOTO DRAKE two piece elongated toilet CST744SL-white. The elongated bowl shall be 12” rough-in. Toilet shall be made of vitreous china. Toilet shall be 1.6 gpf. ADA compliant with 16-1/2” high bowl.

B. Seat: Seats shall be white, split front, plastic. Brevia seat with cover.

2.21 LAVATORY FAUCET (WELCOME CENTER)

A. Lavatory faucet shall be T & S Brass and Bronze Works, Inc., Model B-0805 Series.

B. Angle Stops: KOHLER K-7607 polished chrome angle supply and stop (loose key type.)

C. Drain & Trap: KOHLER K-13885 offset drain with open strainer (13”). KOHLER, cast brass adjustable “P” trap with tubing outlet, under sink protectors, and cleanout plug as shown on Drawings detail.

2.22 STORAGE ROOM UTILITY SINK (WELCOME CENTER)

A. Provide “Swanstone White Composite Laundry Sink” wall hung sink with two handle faucet with swing spout.

2.23 TOILETS/SEATS

B. Toilets shall be as follows:

1. ADA toilets shall be KOHLER K-96057 HIGHCLIFF Lite toilet, 1.6 gallons per flush, vitreous white.

2. Seats shall be BEMIS Lustra solid plastic seat, 1955SSCT, extra heavy elongated open front seat with check hinge, color white.

2.24 FLUSHOMETERS

A. Flushometers shall be:

1. Toilets.

   a. SLOAN Royal Flushometer, Model 111.

2.25 MOP BASIN FAUCET

A. Faucet shall be CHICAGO #305 VBR with bucket holder.
2.26 STOP AND DRAIN VALVES

A. Provide drain valves with vacuum breakers at low points of the supply lines to toilet areas, hot water heaters and cold water supply to shower facilities to allow for complete drainage and winterization of building plumbing systems.

2.27 PROPANE GAS ALARM

A. Propane gas alarm shall be CCI CONTROLS Gastrack Model 7540 LP gas alarm with manufacturer provided rechargeable batteries.

PART 3 – EXECUTION

3.1 GENERAL

A. Drawings are diagrammatic, and not intended to show in detail all features of Work. Take measurements. Do all cutting on the job. Drawings do not attempt to show exact details of all piping. No extra payments allowed where obstructions in Work of other trades or Work under this Contract require offsets in piping. Check locations of piping to determine that it clears all openings and structural members, that it may be properly concealed, and that it clears lighting fixtures and plumbing fixtures having fixed locations. Take all working measurements from building. Verify against those shown on Drawings. If they are found to vary from the latter, report same to the Project Representative at once for drawing adjustments before proceeding with the Work.

3.2 PIPING METHODS

A. Piping shall be installed parallel to walls and risers and shall be straight and plumb. Piping in finished areas shall be concealed except as noted otherwise and except for runouts in local connections. Piping shall be carefully laid out and installed to allow sufficient space for installation and maintenance of the system. All domestic hot and cold water piping shall be graded so that it can be drained through a fixture or hose bibb, including all down loops. All drainage and waste lines shall be sloped as required by code or a minimum of 1/8” per foot, whichever is greater or as otherwise shown on the Drawings. All piping, including waste and vent piping, shall be installed to allow provisions for expansion and contraction and shall have approved anchoring.

1. Pipe joint (threaded)

   a. All changes in size shall be made with reducing fittings. No bushings shall be used. All joints shall be tight and piping reamed to full size to insure smooth flow. All joints to be made with compatible materials per applicable codes. Pipe nipples with the unthreaded Section 1 inch or less in length shall be cut from extra heavy pipe. Close nipples shall not be used. All changes in direction shall be made with
fittings and no pipe bending will be permitted except for soft temper copper. Ream each end of steel or wrought iron pipe for screwed joint connections to full pipe diameter. Remove all burrs on copper tubing. Fittings shall comply with ASA dimensions and shall be galvanized where specified with the respective system. Street elbows shall not be used. Ells shall be long radius.

2. Pipe joints (soldered)
   a. All copper tubing used in domestic water systems shall be assembled with SIL FOS or equal silver base hard solder sweat fittings except connections to valves and controls shall be made with 95/5 tin-antimony solder. All joints between copper and iron or steel shall be made with EPCO, or equal, dielectric unions.

3.3 SLEEVES
   A. Sleeves of black steel to be provided where pipes pass through masonry walls or concrete floors. Where seepage is likely to occur, pipe sleeves to be caulked. Sleeves through floors subject to water shall project 1/2 inch above finished floor. After pipe has been installed, fill area around pipe with mastic.

3.4 PLATES
   A. All piping passing through finished walls, floors, and ceilings shall be fitted with nickel or chrome-plated plates, set with screws for holding plate in position.

3.5 CLEANOUTS
   A. Provide cleanouts at base of each soil and waste stack, at changes in direction of piping, at intervals of not over 50 feet in straight lines, and elsewhere as may be required. Cleanouts shall be of the same size as the pipe. The cleanouts shall be located in accessible locations. Check all mechanic apparatus for location prior to installing. Floor cleanouts shall have flush brass cleanout plate. Exposed floor area cleanouts made absolutely flush with finished floor without any projection.

3.6 FLASHING
   A. On roofs, all pipes penetrating the roof shall pass through pipe flashing jacks.

3.7 TESTING
   A. Domestic water lines
      1. Test all hot and cold water pipe lines for leaks at a minimum pressure of 125 psi for 1 hour. All pipe, valves, fittings, and tanks shall be water tight under the test. Repair any leaks and repeat tests until system is water tight. Make final test in presence of the
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Project Representative. All pressure lines shall be under working pressure at the time of final inspection.

B. Drainage lines

   1. All drainage lines shall be tested with water or air pressure of not less than 5 pounds per square inch for 15 minutes with no loss in pressure and shall be witnessed by the Project Representative. Repair any leaks and repeat rest until the lines pass the test requirements.

C. Propane lines

   1. All propane lines shall be tested at 60 psi for 30 minutes, with no loss in pressure. Do not subject the pressure regulator or propane equipment to the test pressure.

3.8 FUMIGATION (DOMESTIC WATER LINES)

A. Before putting system into service, disinfect all portions of the domestic water system with a dosage of 50 parts chlorine per million parts of water. Flush sections of the system to be disinfected at adequate velocity to remove solids and contaminated materials. Introduce chlorine mixture into the system in such a manner which will ensure uniform distribution. Retain the mixture in the system for a minimum of 24 hours. Following chlorination, thoroughly flush system until no chlorine can be detected.

3.9 SHOWER FIXTURES

A. Install all fixtures as shown on the Drawings. Each shower will have two (2) shower heads. Flow to either head will be controlled by a diverter valve located downstream from the shower valves.

B. In the pipe chase, solenoid valves shall be located in the plumbing just upstream of each shower diverter valve. The solenoid valves shall not open until it is energized by a separate circuit from the relay enclosure.

3.10 PROPANE WATER HEATERS

A. Heaters shall be installed per the manufacturer’s recommendation and the building codes. The heaters shall be manifolded in pairs and valved so that one (1) heater can be removed with the other heater operating. All inlet and outlet plumbing shall be installed with equal number of bends and pipe lengths to provide balanced flow conditions.

B. The exhaust vents for each pair of propane water heaters shall be manifolded and discharge through the roof.

C. The propane tank shall be provided by the propane supplier through a lease with the Park. The Contractor shall provide the gas line from the comfort station water heaters to an approved location at the propane tank pad for connection to the propane tank. Coordinate with the propane tank supplier.
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3.11 PROPANE REGULATOR

A. Install regulator on interior of comfort station pipe chase. Provide vent piping for regulator to exterior of building.

END OF SECTION
SECTION 221300 – FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes all labor, materials, tools and equipment required to install a complete drain, waste, and vent systems as indicated on the Plans, described in these specifications and to satisfy code. Applicable to the comfort station and welcome center.

1.2 RELATED SECTIONS:

A. Section 033000-Cast-in-Place Concrete
B. Section 044300 - Stone Masonry
C. Section 093013-Ceramic Tiling
D. Division 22-Plumbing
E. Division 33-Utilities

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications, installation instructions and general recommendations for each product specified.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with provisions of the Uniform Plumbing Code, current edition. Install all Work in accordance with standards, prescribed by local and/or State codes.

PART 2 - PRODUCTS

2.1 WASTE AND VENT PIPING

A. Waste and vent piping shall be Schedule 40 ABS Type I or PVC Type I D-W-V piping.
2.2 WASTE AND VENT FITTINGS

A. Waste and vent fittings shall be ABS Type I or PVC Type I for D-W-V piping.

2.3 SHOWER ADJUSTABLE FLOOR DRAINS

A. Manufacturer:

2. All floor drains shall be equipped with an approved automatic trap primer to provide a continuous trap seal on floor drain trap.

2.4 AUTOMATIC TRAP PRIMER

A. Manufacturer:

2. Trap primers (trap primer valve) shall be a product specifically designed only for automatic water release to replenish water evaporated from floor drain traps, with factory made splitter (distribution unit) by same manufacturer.

2.5 BACKWATER VALVES

A. Manufacturer:

1. Basis-of-Design: Clean Check, Inc; Model 3” ABS/PVC Extendable Backwater Valve.

2.6 CLEANOUT ACCESS HOUSING

A. Access cap for cleanouts shall be ZURN CO-2520-NT, adjustable, nickel bronze cover, (4”).

PART 3 - EXECUTION

3.1 FLOOR DRAINS

A. Coordinate forming of floor construction to receive drains to required invert elevations.

B. Install floor drains at the locations and grades indicated in the plans.
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C. Provide complete plumbing for an automatic trap primer on each floor drain trap in accordance with plumbing code requirements. Locate primer in an accessible but out of the way location to allow maintenance access and avoid damage.

3.2 FLASHER

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Place vent pipes 12 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size.

C. Lay out venting system so that vent stacks penetrate roofline at rear sides of building, and on ridge of roof away from front view.

D. Seal floor drains watertight to adjacent materials.

3.3 TESTING OF DRAINAGE PIPING

A. Completed drainage lines shall be tested with air pressure of not less than 5 psi for a period of at least 30 minutes. All piping shall maintain the full 5 psi pressure for the entire test duration without addition of air.

B. Repair any leaks and repeat tests until system is tight. Make final test in the presence of the Project Representative or drainage system will not be accepted.

C. Provide any additional tests required by local building authority. Notify Project Representative of tests and results.

3.4 CLEANOUTS

A. Provide, at base of each soil and waste stack, at changes in direction of piping, at intervals of not over 50 feet in straight lines, and elsewhere as may be required. Cleanouts shall be of the same size as pipe. Cleanouts shall be located in accessible locations. Floor cleanouts with flush brass cleanout plate. Exposed floor area cleanouts made absolutely flush with finished floor without any projection.

END OF SECTION
SECTION 223413 – INSTANTANEOUS, TANKLESS, DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section covers installation of instantaneous water heaters including complete wall mounting, hot and cold water piping hookup, liquid propane piping hookup, flue vent piping and related items of Work.

B. Related Sections:

1. Section 044300-Stone Masonry.
2. Section 220000-Plumbing.
3. Division 33-Utilities.

1.2 SUBMITTALS

A. Product Data: Submit water heater manufacturer's product data, catalogs, specifications, and detailed installations instructions.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with provisions of the Uniform Plumbing Code, current edition. Install all Work in accordance with standards, prescribed by local and/or State codes.

PART 2 - PRODUCTS

2.1 INSTANTANEOUS TANKLESS GAS WATER HEATERS (COMFORT STATION)

A. Acceptable Manufacturer and Model:

   a. Greentherm C 950 ES Commercial.

2.2 WATER HEATERS

A. Electric instantaneous water heater shall be Powerstream Model RP7 Water Heater shall have an adjustable heat setting selector. Heater shall be 240 volts, 15 amps.
2.3 PROPAINE WATER HEATER VENTING

A. Water heater vent and vent chimney piping shall be pre-fabricated, double wall-insulated, stainless steel suitable for venting of gas fired appliances. Pipe and fittings, bends, elbow, etc. shall be U.L. listed and approved for intended application.

B. Provide roof jack/flashing, storm collar, and vent cap/topper of same material as vent piping.

C. Size chimney vent pipe to meet code requirements.

1. Reference specification: Manufacturers specification in size may be used as long as it meets or exceeds code requirements as set by the local jurisdiction and the IBC, latest edition.

2.4 RELIEF VALVE

A. 3/4 inch Bronze Pressure Relief Valve suitable for water heater application. Size valve for pressure and temperature limits per application codes.

PART 3 - EXECUTION

3.1 WALL MOUNTING

A. Water heaters shall be walls mounted inside the plumbing chase of the restroom building as indicated on the plans.

B. All water heaters are to be mounted on and supported from a 3/4 inch CD-X plywood backboard assembly fabricated and secured to masonry wall, as shown in the plans.

C. Provide for code required clearances between top of heater units and existing ceiling and as indicated in the plans.

3.2 WATER HEATER INSTALLATION

A. Install water heaters in strict accordance with manufacturer's instructions and recommendations, UPC requirements, and the plans.

B. Make all hot and cold water piping and liquid propane gas supply connections to each water heater unit following manufacturer's instructions and plumbing code standards.

C. Ensure tight leak free connections, joints, fittings, and valves. Test all fittings and joints for leaks per UPC standard practices for both water and LP gas piping.

D. Provide unions on all connecting piping to allow water heater removal.

E. Vent pressures relief valve to building exterior or building floor drain/mop basin.
3.3 SUPPLY AND EXHAUST VENTING

A. Water heaters are to be positioned and wall mounted such that the top exit flues will vent into a single chimney.

B. Extend chimney vertically through the clear attic space and penetrate the roof adjacent to the center ridgeline on the rear side of each building. Position the chimney pipe to be centered between existing trusses at the roof penetration.

C. Allow proper minimum clearances between combustible materials and vent piping per codes.

D. Install roof jack/flashing at pipe roof penetration to provide weathertight seal. Apply roofing felt and shingles around vent roof penetration.

E. Ensure adequate and proper support for all vent piping both vertically and laterally.

3.4 START-UP AND OPERATION

A. Following testing, inspection and approval of completed water heater installations, perform fill, start-up and operation procedures for both heaters to demonstrate proper operation and performance in the presence of the Project Representative. Correct any/all deficiencies or problems encountered, to the satisfaction of the Project Representative.

B. Follow manufacturer's fill, start-up and operating instructions.

3.5 MANUFACTURER’S LITERATURE

A. Encase a copy of the manufacture in plastic and attach to water heater of future reference.
SECTION 231300 – FACILITY FUEL-STOREAGE TANKS

PART 1 - GENERAL

1.1 WORK IN THIS SECTION

A. This section covers the installation of a propane gas tank, gas piping, connections, testing, and other work and/or materials necessary to provide a complete working system.

PART 2 - PRODUCTS

2.1 ABOVEGROUND PROPANE TANK

A. Propane gas tank shall be a new 500-gallon aboveground tank, conforming to the latest edition of the ASME code for pressure vessels, complies with NFPA 58, and listed by Underwriter’s Laboratories, Incorporated. Tank shall contain all required regulators, miscellaneous piping, gauges, and other equipment necessary to provide a complete system.

B. Storage tank to be purchased.

2.2 BLACK STEEL PIPE

A. Riser piping shall be standard weight (Schedule 40) black steel pipe, threaded and coupled, ASTM A53. Piping below grade shall be protectively coated per UPC Standards.

B. Fittings shall be standard black iron threaded fittings.

2.3 POLYETHYLENE (PE) PIPE

A. Buried propane supply pipe shall be polyethylene gas piping, SIDR9, ASTM D2513, with standard manufacturer’s information.

B. Fittings shall be heat fused polyethylene materials. Transition fittings shall be approved compression type couplings.

2.4 PIPE IDENTIFICATION TAPE

A. Underground type plastic line markers shall be permanent, bright colored, continuous printed plastic tape, intended for direct burial service, not less than 6” x 4 mills thick. Provide yellow tape with black printing reading “Caution Gas Line Buried Below”.
PART 3 - EXECUTION

3.1 PROPANE GAS PIPING INSTALLATION

A. All lines shall have a minimum burial cover of 36”. Propane gas supply piping shall be installed in accordance with NFPA 54 and UPC. All above grade piping shall be black iron from a point 2’ below ground surface.

B. Make all joints tight and test completed joints and piping for gas leaks to ensure a completely safe and leak free supply system. After installation, the propane line shall be tested at 25 psig for 1 hour with no loss in pressure. Do not subject the pressure regulator or propane equipment to the test pressure.

END OF SECTION
SECTION 233700 – AIR OUTLETS AND INLETS

PARK 1 - GENERAL

1.1 SUMMARY
A. This Section covers Work necessary for the construction of air outlet and inlet systems for the buildings.

1.2 RELATED SECTIONS
A. Section 044300 – Stone Masonry.
B. Section 081613 - Fiberglass Doors.

PART 2 - PRODUCTS

2.1 EXTERIOR AIR OUTLET
A. Diffusers shall be soffit mounted “Airtec” Series MV2S, without dampers.

2.2 VENTILATOR FANS
A. Toilet room exhaust fans shall be Nutone, Fan; Model QTXEN110.
B. Shower room exhaust fans shall be Nutone, Humidity Sensing Fan; Model QTXEN110S.

2.3 AIR BAFFLE
A. Air damper shall be an in-line unit for 6” diameter ductwork designed to prevent the backflow of air in the exhaust ventilator.

2.4 EXTERIOR AIR INLET
A. Exterior air inlet has been incorporated with the Reinforced Fiberglass Doors. See Section 081613 – Fiberglass Doors.

2.5 DUCTING
A. Ventilation ducting will be 6” PVC pipe with R8 Insulation
PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall provide an air outlet for the shower rooms through individual Humidity Sensing Exhaust Fans, as shown in the Drawings.

B. The Contractor shall provide an air outlet for the toilettrooms through individual Exhaust Fans, as shown in the Drawings.

END OF SECTION
SECTION 238316 – RADIANT HEATING HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes radiant heating piping, including pipes, fittings, and piping specialties.

1.2 SUBMITTALS

A. Product Data: For each type of radiant heating pipe, fitting, manifold, specialty, and control.

B. Shop Drawings: Show piping layout and details drawn to scale, including valves, manifolds, controls, and support assemblies, and their attachments to building structure.

C. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PEX PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. FlorHeat Company (The).
2. HeatLink USA Inc.
3. Infloor Radiant Heating Inc.
4. IPEX Inc.
5. REHAU.
6. Slant/Fin Corp.
7. Stadler-Viega.
8. Uponor Wirsbo Co.
10. Warmboard, Inc.
12. Zurn Plumbing Products Group.

B. Pipe Material: PEX plastic according to ASTM F 876.

C. Oxygen Barrier: Limit oxygen diffusion through the tube to maximum 0.10 mg per cu. m/day at 104 Degrees Fahrenheit (40 Degrees Celsius) according to DIN 4726.

D. Fittings: ASTM F 1807, metal insert and copper crimp rings.
2.2 PEX/AL/PEX PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. IPEX Inc.
   2. Stadler-Viega.
   3. Rehau.

B. Pipe Material: PEX plastic bonded to the inside and outside of a welded aluminum tube according to ASTM F 1281.

C. Oxygen Barrier: Limit oxygen diffusion through the pipe to maximum 0.10 mg per cu. m/day at 104 Degrees Fahrenheit according to DIN 4726.

D. Fittings: ASTM F 1974, metal insert fittings with split ring and compression nut (compression joint) or metal insert fittings with copper crimp rings (crimp joint).

E. Flame-Spread and Smoke-Developed Indexes: 25 and 50 or less, respectively, tested according to ASTM E 84.

F. Pressure/Temperature Rating: Minimum 100 psig and 210 Degrees Fahrenheit.

2.3 DISTRIBUTION MANIFOLDS

A. Manifold: Rehau 240021-N
   1. Factory installed on supply and return connections.

B. Manual Air Vents:
   1. Body: Bronze.
   2. Internal Parts: Nonferrous.
   3. Operator: Key furnished with valve, or screwdriver bit.
   4. Inlet Connection: NPS 1/2.

C. Zone Control Valves:
   1. Use Taco ZVC 403

D. Controllers: Use Honeywell L4006H1004

F. Backflow Preventer: Use Apollo RP40N

G. Circulator: Use Taco 00R-MSFI-IFC

H. Mounting Brackets: Copper, or plastic or copper-clad steel, where in contact with manifold.

2.4 PIPING SPECIALTIES

A. Cable Ties:
   1. Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
   3. Tensile Strength: 20 pounds, minimum.
   4. Temperature Range: Minus 40 to plus 185 Degrees Fahrenheit.

B. Modular Interlocking Blocks:
   1. Polypropylene snap-together blocks with grooves to support piping.
   2. Galvanized sheet metal or aluminum emission plates.
   3. Natural mineralboard cover panel.

2.5 CONTROLS

A. Wall-Mounting Thermostat: Use Rehau Programmable Digital Thermostat #236487-001 with floor sensor.

PART 3 – EXECUTION

3.1 APPLICATIONS

A. Install the following types of radiant heating piping for the applications described:
   1. Piping in Interior Reinforced-Concrete Floors: PEX.

3.2 INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Shop or Coordination Drawings.

B. Install radiant heating piping continuous from the manifold through the heated panel and back to the manifold without piping joints in heated panels.

C. Connect radiant piping to manifold in a reverse-return arrangement.

D. Do not bend pipes in radii smaller than manufacturer's minimum bend radius dimensions.
E. Install manifolds in an accessible location in the Pipe Chase Room.

F. Fire- and Smoke-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire-stop materials approved for the use.

G. Piping in Interior Reinforced-Concrete Floors:
   1. Secure piping in concrete floors by attaching pipes to reinforcement using cable ties.
   2. Space cable ties a maximum of 18 inches (457 mm) o.c., and at center of turns or bends.
   3. Maintain 2-inch (50-mm) minimum cover.
   4. Install a sleeve of 3/8-inch- (9.5-mm-) thick, foam-type insulation or PE pipe around tubing and extending for a minimum of 10 inches (250 mm) on each side of slab joints or through footing stem walls to protect the tubing passing through expansion or control joints. Anchor sleeve to slab form at control joints to provide maximum clearance for saw cut.
   5. Maintain minimum 40-psig (275-kPa) pressure in piping during concrete placement and continue for 24 hours after placement.

H. Revise locations and elevations from those indicated as required to suit field conditions and ensure integrity of piping and as approved by Engineer.

I. After system balancing has been completed, mark balancing valves to permanently indicate final position.

J. Perform the following adjustments before operating the system:
   1. Open valves to fully open position.
   2. Check operation of zone control valves.
   3. Set temperature controls so all zones call for full flow.
   4. Purge air from piping.

K. After the concrete or plaster heating panel has cured as recommended by concrete supplier, operate radiant heating system as follows:
   1. Start system heating at a maximum of 10 Degrees Fahrenheit (6 Degrees Celsius) above the ambient radiant panel temperature, and increase 10 Degrees Fahrenheit (6 Degrees Celsius) each following day until design temperature is achieved.
   2. For freeze protection, operate at a maximum of 60 Degrees Fahrenheit (16 Degrees Celsius) supply-water temperature.

3.3 FIELD QUALITY CONTROL

A. Prepare radiant heating piping for testing as follows:
   1. Open all isolation valves and close bypass valves.
   2. Open and verify operation of zone control valves.
   3. Flush with clean water, and clean strainers.
B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Subject piping to hydrostatic test pressure that is not less than 1.5 times the design pressure but not more than 100 psig. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning radiant heating piping components that do not pass tests, and retest as specified above.

D. Prepare a written report of testing.

END OF SECTION
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SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Raceways
2. Building wire and connectors
3. Supporting devices for electrical components
4. Electrical identification
5. Electrical-metering components
6. Concrete equipment bases
7. Electrical demolition
8. Cutting and patching for electrical construction
9. Specific Heating and Ventilation Equipment to be furnished under this specification

1.2 SUBMITTALS

A. Product Data: For electrical-metering components.

B. Shop Drawings: Dimensioned plans and sections or elevation layouts and single-line diagram of electricity-metering component assemblies specific to this Project.

C. Submit signed off copies of all electrical construction permits, indicating final acceptance by the local permitting agency.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 (NEC, latest edition) Article 100, by a testing agency acceptable to Authorities Having Jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (NEC, latest edition) and as amended by the Revised Code of Washington (RCW).

1.4 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings for electrical supports, raceways, and cable with general construction Work.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment that requires positioning before closing in the building.
C. Coordinate electrical service connections to components furnished by utility companies.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

1.5 PERMITS

A. Contractor shall submit for and pay all costs associated with plan review and issue of an electrical construction permit as required by the local permitting agencies. All such costs shall be included in the base bid, unless specifically indicated elsewhere in the Contract documents.

PART 2 - PRODUCTS

2.1 SPECIFIC ITEM REQUIREMENTS

A. Comfort Station Exterior Lights - Use Lithonia CNYLED1P 50K MVOLT DDB or equal. Provide photocell on roof facing north.

B. Comfort Station Interior Light Fixtures – Use “Super Max RMQ IC rated up to 25 watts recessed mount LED fixture or equal.

C. Comfort Station Pipe Chase – Use Lithonia OLVTCM or equal.

D. Welcome Center Interior Light Fixtures: Lithonia Lighting, CPANL, CATALOG No. CPANL 2X4 40/50/60LM 50K M2, suspension with wall switch WSX-D sensor switch except for the mudroom.

E. Welcome Center Exterior Light Fixtures: Use “Cascadia LED wallpack light outdoor security fixtures, SKU No. W006676902 with photocell dusk to down wallpack light.

F. Welcome Center Track Lights: Suspender 36 inch 2-Bar In-Line linear LED Lighting System – Aimable Cylinder / Flood Lens from Sonneman Lighting. Model No. SLS0158.

G. Cabin Interior Light Fixture – Use ceiling, surface light, two bult light fixture with glass enclosure from area hardware store. Provide two 13W LED light bulbs.


I. Motion Detector – Provide WATT STOPPER WPIR CI-200 Passive Infrared Sensors with B120E-P Power Packs and S120-P Slave Pack.

J. Power Receptacles - Flush mounted specification grade, 120-volt, duplex receptacles. Receptacles shall be ground fault interrupting type and shall be U.L. Listed and white finish. Device covers shall be stainless steel type, smooth finish.
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K. Exhaust Fans – See Section 233700 – Air Outlets and Inlets.

L. Hand Dryers – “Xcelerator” Model XL-W.

M. Light Switches - Switches shall be specification grade toggle switches rated 20 Amp, 120 volt, UL listed. Finish shall be white. Covers shall be stainless steel type with smooth finish; Leviton, Hubble or G.E.

N. Service Panel “CS” – Use Square D or Cutler hammer 225 AMP 42 Space surface mount service panel.

O. Welcome Center Service Panel – Use Square D or QO 30 40 M200 main breaker load center with indoor cover and door for flush mount.
   1. Breakers shall be Square D or QO-GFI series, size per code for each circuit.

P. Welcome Center Ceiling Fans – Provide HUNTERFAN Model No. 25867, 52” blade size, 36” extension downrods.

Q. Welcome Center Exhaust Fan – Provide BROAN Model No. 678 side discharge fans. Ventilator shall have compact steel housing finished with electrically-bonded epoxy paint. Grille to be with polymeric. Motor assembly shall be removable and permanently lubricated. RPM shall not exceed 1725. Air delivery shall be no less than 50 CFM and sound levels no greater than 2.5 Sones.

R. Cabin Service Panel - Cabin load center shall be flush mounted, 8 – 12 space, 240 volt enclosure with CH8L125RP Type 3 R enclosure.

2.2 CABIN SMOKE ALARM (Furnished by Owner)
   A. Owner furnish fire alarm panel for 4 cabins. Install by Contractor.
   2. Silent Knight 4 Zone Panel
   3. Battery (2 at each location)
   4. Smoke Detector
   5. Horn/Strobe

2.3 CABIN ADA COMPLIANT DOOR CHIME ALERT
   A. Use Nutone door chime alert w/ flashing strobe, Item #: HAR-NT-204WH on all cabins.

2.4 CABIN HEATER
   A. Use Cadet 240V, 1000W wall heater with internal thermostat.

2.5 RACEWAYS
   A. This facility is in a marine environment. Use PVC conduit, junction boxes, and fittings to
reduce the amount of metal parts subject to corrosion.

B. Use PVC expansion fittings at all locations where surface mounted PVC conduit enters/exits the concrete slab.

C. Use PVC expansion fittings where expansion of the conduit is calculated to be more the 1/4 inch, per NAFP 70 (NEC latest edition).

2.6 WIREs, CABLEs, AND CONNECTIONS

A. Conductors, No. 10 AWG and Smaller: Solid or stranded copper.

B. Conductors, Larger than No. 10 AWG: Stranded copper.

C. Insulation: Thermoplastic, rated 600 V, 75 Degrees Celsius minimum, THHN-THWN, or USE depending on application.

D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.7 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating or PVC, approved for use per NAFP 70 (NEC latest edition) requirements.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel: Flange edges turned toward web, and 9/16-inch- (14-mm-) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs. Strength rating to suit structural loading.

D. Slotted Channel Fittings and Accessories: Recommended by the manufacturer for use with the type and size of channel with which used.

1. Materials: Same as channels and angles, except metal items may be stainless steel.

E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

G. Expansion Anchors: Threaded carbon-steel wedge or sleeve type.

H. Toggle Bolts: All-steel springhead type.

2.8 ELECTRICAL IDENTIFICATION

A. Identification Device Colors: Use those prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick (25 mm wide by 0.08 mm thick).

C. Tape Markers for Conductors: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

D. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

E. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape compounded for permanent direct-burial service, and with the following features:
   1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
   2. Embedded continuous metallic strip or core.
   3. Printed legend that indicates type of underground line.

F. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.

G. Warning and Caution Signs: Preprinted; comply with 29 CFR 1910.145, Chapter XVII. Colors, legend, and size appropriate to each application.
   1. Interior Units: Aluminum, baked-enamel-finish, punched or drilled for mechanical fasteners.
   2. Exterior Units: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate with 0.0396-inch (1-mm), galvanized-steel backing. 1/4-inch (6-mm) grommets in corners for mounting.

H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.9 GROUNDING SYSTEM

A. Ground all equipment, including switchboards, transformers, conduit systems, motors, and other apparatus, by conduit or conductor to an independent grounding electrode. Make ground rods accessible for inspection. Ground conductors shall be installed in all conduits. Use of the conduit raceway as an equipment grounding path is not acceptable.
2.10 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right-of-Way: Give to raceways and piping systems installed at a required slope.

3.2 RACEWAY APPLICATION

A. Outdoor Installations:
   1. Exposed: RNC.
   2. Concealed: RNC.
   3. Underground, Single Run: RNC.
   4. Underground, Grouped: RNC.
   5. Connection to Vibrating Equipment: LFMC.
   6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4, unless otherwise indicated.

B. Indoor Installations:
   1. Exposed: RNC.
   2. Concealed in Walls or Ceilings: RNC.
   3. In Concrete Slab: RNC.
   4. Connection to Vibrating Equipment: FMC; except in wet or damp locations: LFMC.
   5. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated or required by code.

3.3 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.
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B. Keep legs of raceway bends in the same plane and keep straight legs of offsets parallel.

C. Use RMC elbows where RNC turns out of slab.

D. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or woven polypropylene or monofilament plastic line with not less than 200 pounds (90-kg) tensile strength. Leave at least 24 inches of slack at each end of pull wires.

E. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inches flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

3.4 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

A. Application: Use wiring methods specified below to the extent permitted by applicable codes as interpreted by Authorities Having Jurisdiction.

B. Concealed Feeders in Concrete: Insulated single conductors in raceway.

C. Exposed Branch Circuits: Insulated single conductors in raceway.

D. Concealed Branch Circuits in Ceilings Walls Gypsum Board Partitions: Insulated single conductors in raceway.

E. Concealed Branch Circuits in Concrete: Insulated single conductors in raceway.

F. Underground Feeders and Branch Circuits: Insulated single conductors in raceway.

G. Remote-Control Signaling and Power-Limited Circuits, Classes 1, 2, and 3: Insulated conductors in raceway unless otherwise indicated.

3.5 WIRING INSTALLATION

A. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.6 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, slotted channel system components.

B. Dry Locations: Steel materials.

C. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four with, 200 pounds minimum design load for each support element.
3.7 SUPPORT INSTALLATION

A. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

B. Size supports for multiple raceway or cable runs so capacity can be increased by a 25 Percent minimum in the future.

C. Support individual horizontal single raceways with separate, malleable-iron pipe hangers or clamps except use spring-steel fasteners for 1-1/2-inch and smaller single raceways above suspended ceilings and for fastening raceways to slotted channel and angle supports.

D. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

E. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated:

1. Wood: Wood screws or screw-type nails.
2. Gypsum Board: Toggle bolts. Seal around sleeves w/joint compound, both sides of wall.
3. Masonry: Threaded expansion anchors approved for masonry with machine screws and bolts. Seal around sleeves with mortar, both sides of wall.
4. New Concrete: Concrete inserts with machine screws and bolts.
5. Existing Concrete: Expansion bolts or threaded studs driven by powder charge and provided with lock washers.
7. Light Steel Framing: Sheet metal screws.
10. Fasteners: Select so load applied to each fastener does not exceed 25 Percent of its proof-test load.

3.8 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for
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RELOCATE CAMPGROUND

voltage and phase identification.

E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.

F. Install warning, caution, and instruction signs where required to comply with 29 CFR 1910.145, Chapter XVII, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Indoors install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

G. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.9 FIRESTOPPING

B. Fire-and Smoke-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire-stop materials approved for the use.

3.10 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair, refinish and touch up disturbed finish materials and other surfaces to match adjacent undisturbed surfaces.

3.11 PREPARATION

A. Coordinate as necessary with other trades to assure proper and adequate provision in the Work of those trades for interface with Work in this Section.

B. Electrical system Drawings are diagrammatic and do not necessarily show exact locations of conduit, ducts, and equipment unless specifically dimensioned. Diagrams must not be used for obtaining linear runs of wiring or conduit.

C. Cutting into structural parts of the building will not be permitted without expressed prior approval of the Engineer. Any damage shall be repaired to the satisfaction of the Engineer and all cost thereof shall be borne by the Contractor.

3.12 TESTING AND INSPECTION

A. Provide all personnel and equipment to make the required tests and secure the required
approvals from the Engineer and governmental agencies having jurisdiction.

B. In the Engineer's presence test all parts of the electrical system and prove that all such items provided under this Section function electrically in the required manner. Contractor is to notify the Engineer two (2) days before the testing.

C. When materials and/or workmanship is found to not comply with the specified requirements, within three (3) days after receipt of notice of such non-compliance remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.

3.13 PROJECT COMPLETION

A. Upon completion of the Work of this Section, thoroughly clean all exposed portions of the electrical installation removing all traces of soil, labels, grease, oil, and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.

END OF SECTION
SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following lighting control devices:
   1. Time switches.
   2. Outdoor photoelectric switches.
   3. Indoor occupancy sensors.

B. See Division 26, Section - 262726 "Wiring Devices" for manual light switches.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. TORK

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide TORK; TORK Digital Model DZS200A w/ Astronomic Option or a comparable product by one of the following:
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1. Area Lighting Research, Inc.; Tyco Electronics.
2. Grasslin Controls Corporation; a GE Industrial Systems Company.
3. Intermatic, Inc.
5. Lightolier Controls; a Genlyte Company.
6. Lithonia Lighting; Acuity Lighting Group, Inc.
8. Square D; Schneider Electric.
9. TORK.
10. Touch-Plate, Inc.
11. Watt Stopper (The).

D. Comparable product requirements:

1. Shall be a 2 channel digital time switch.
2. Dry contact configuration shall be single pole double throw (SPDT).
3. Clock input power shall be 120V AC.
4. Contact rating shall be 120V AC NO: 20A NC: 10A.
5. Controller shall program in AM/PM format.
6. Controller shall program in one minute resolution.
7. Display shall be of LCD type.
8. Controller shall be capable of 99 set points; separate scheduling for each day of the week.
9. Controller shall have 365 day holiday capabilities with 24 single dates and 4 seasons of unlimited duration.
10. Different daily schedules shall be programmable within each season.
11. Controller shall have Daylight Saving or Standard time.
12. Controller shall have automatic Leap Year correction.
13. Schedules shall be retained for 40 years without power.
14. Controller shall have 30 day backup for real time using field replaceable 9V lithium battery.
15. Controller shall be capable of manual override ON of OFF to the next scheduled event using 1 button for each channel.
16. Unit shall have NEMA Type 3 indoor/outdoor enclosure as standard.
17. Controller shall be capable of having 2 different pulse durations 1-99 seconds, user settable and assignable to each channel.
18. Controller shall be capable of having astronomic on one or both channels with 1-99 minutes, plus or minus offset from Sunrise or Sunset.

2.2 INDOOR OCCUPANCY SENSORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Watt Stopper (The).

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings.
D. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
4. Mounting:
   a. Sensor: Suitable for mounting in any position on a standard outlet box.
   b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
   c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
6. Bypass Switch: Momentary override of the on/off function in case of sensor failure.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lx); keep lighting off when selected lighting level is present.

E. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.

1. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm).
2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
3. Detection Coverage (Corridor): Detect occupancy within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling.

2.3 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Watt Stopper (The).

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings.

1. Use a power pack/contact relay per manufacturer’s requirements.
2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements of NFPA 70 and local codes.

B. Classes 2 and 3 Control Cable: Comply with manufacturer's requirements, NFPA 70, and local codes.

C. Class 1 Control Cable: Comply with manufacturer’s requirements, NFPA 70, and local codes.

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

B. When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.2 CONTACTOR INSTALLATION

A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with manufacturer’s requirements, NFPA 70, and local codes.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions, NFPA 70, and local codes.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring:

1. Identify controlled circuits in lighting contactors.
3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
2. Operational Test: Verify operation of each lighting control device, and adjust time delays.

B. Lighting control devices that fail tests and inspections are defective work.

END OF SECTION
SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.
   2. Snap switches.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
   1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
   2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
   4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
1. **Products:** Subject to compliance with requirements, provide one of the following:
   a. Cooper; 5351 (single), 5352 (duplex).
   b. Hubbell; HBL5351 (single), CR5352 (duplex).
   c. Leviton; 5891 (single), 5352 (duplex).
   d. Pass & Seymour; 5381 (single), 5352 (duplex).

2.3 **GFCI RECEPTACLES**

   A. **General Description:** Straight blade, with line-load terminals. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

   B. **Duplex GFCI Convenience Receptacles, 125 V, 20 A:**
      1. **Products:** Subject to compliance with requirements, provide one of the following:
         a. Cooper.
         b. Pass & Seymour; 2084.
         c. Leviton.
         d. Hubbell.

2.4 **SNAP SWITCHES**

   A. Comply with NEMA WD 1 and UL 20.

   B. **Switches, 120/277 V, 20 A:**
      1. **Products:** Subject to compliance with requirements, provide one of the following:
         a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
         b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
         c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
         d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

2.5 **WALL PLATES**

   A. **Single and combination types to match corresponding wiring devices.**
      1. **Plate-Securing Screws:** Metal with head color to match plate finish.
      2. **Material for Finished Spaces:** 0.035-inch- (1-mm-) thick, satin-finished stainless steel.
      3. **Material for Unfinished Spaces:** Smooth, high-impact thermoplastic or galvanized steel.
      4. **Material for Damp Locations:** Thermoplastic, or cast aluminum, with spring-loaded lift cover, and listed and labeled for use in "wet locations."
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B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum, or thermoplastic with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:
   1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
   2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
   3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
   4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
   1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
   2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
   3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
   4. Existing Conductors:
      a. Cut back and pigtail, or replace all damaged conductors.
      b. Straighten conductors that remain and remove corrosion and foreign matter.
      c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:
   1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
   3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
   4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
   5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
   6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
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SECTION 265600 – SITE ELECTRICAL  

PART 1 - GENERAL  

1.01 SUMMARY OF WORK  

A. The work shall include providing all labor, materials, tools, and equipment necessary for the electrical systems complete and fully operational in every respect. This includes, but is not limited to, the following:  

1. Provisions for primary electrical service.  
4. Wiring/Cabling including conduit, junction boxes, handholes, trenching, grounding etc.  
5. Main service pedestal, electrical panels, and circuit breakers.  
6. Campsite power pedestals.  
7. RV receptacle pedestals.  
8. Testing of the entire system.  

1.02 RELATED DOCUMENTS  

A. All Sections of the Project Manual are hereby referenced.  

1.03 CODES AND ORDINANCES  

A. All equipment furnished and work performed shall be in accordance with national, state and city electrical codes, established safety codes and other applicable local codes and ordinances.  

1.04 EXAMINATION OF SITE AND DOCUMENTS  

A. The bidder is required to examine carefully the site of the proposed work, the proposal, plans and specifications and contract forms before submitting a bid. Upon submission of a bid, it is mutually agreed that the bidder is aware of all conditions which will affect his work.  

1.05 CLEAN-UP  

A. Upon substantial completion of the work and before final approval and payment, the contractor shall, at his own expense, remove from the site and adjoining property, and dispose of all surplus and discarded materials, rubbish, temporary buildings, equipment, and debris which may have accumulated during the execution of the work. All fixtures and equipment shall be left thoroughly cleaned and in proper operating condition.
1.06 WORKMANSHIP

A. All workmanship shall be the best approved method of the trade.

1.07 MATERIAL LIST AND DRAWINGS

A. The successful Contractor shall submit to the Engineer, WITHIN 14 CALENDAR DAYS after award of the Contract, a list of all material to be furnished. In addition, six copies of shop drawings of electrical pedestals, campsite power pedestals, power panels, and all other major equipment shall be furnished to the Engineer for approval before ordering. Submittals will be "Approved for Design Only". This shall mean the Engineer has reviewed said submittal and finds no objection (except as noted) to the inclusion of the items into the construction, if it complies with contract drawings and specifications as to quantities, space requirements, dimensions, non-interference with other trades and other affected contract requirements.

1.08 RECORD DRAWINGS

A. Work done shall be recorded as actually installed. One set of prints showing this shall be furnished to the Engineer at the completion of the work and shall be available for inspection during the work. A separate marked up print of the site plan shall be provided showing all underground conduits in their actual installed locations with precise dimensions to existing elements.

1.09 GUARANTEE

A. The Contractor shall guarantee his workmanship and the materials and equipment he furnishes for a period of one year after the date of physical completion of the project. Any item which fails during the guarantee period because of defects in material or workmanship shall be promptly and properly replaced by the Contractor after notification from the Owner.

PART 2 - MATERIALS AND EQUIPMENT

2.01 DESCRIPTION

A. All materials and equipment shall be new, of proven quality and be a standard product of a reputable manufacturer. Storage at the job site shall be in a manner which will prevent any damage or corrosion.

2.02 CONDUIT AND FITTINGS

A. All raceways above grade shall be rigid galvanized steel with zinc protected threads. Fittings shall be of the same material with hot dipped galvanized finish. Field cut threads shall be protected and damaged galvanizing repaired per the conduit manufacturer's recommendations.
B. Conduit used in underground runs shall be Schedule 40 heavy wall rigid PVC, UL labeled with fittings of the same material.

C. The conduits shall be capped during construction by means of manufactured seals to prevent entrance of water and debris. The conduits shall be cleaned before pulling of the wire. Spare conduits shall include a nylon pull rope.

2.03 JUNCTION BOXES AND HANDHOLES

A. Junction boxes for the underground circuit runs shall be concrete with steel frame and bolt down steel cover designed to withstand a 20,000-pound static load. Non-traffic rated boxes shall be suitable for use in driveway and parking lot applications designed to withstand a 20,000-pound static load. Covers shall be labeled “Electric” or “Communication”. They shall be as manufactured by Fogtite or similar. The handhole shall be in accordance with the following table.

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>J11A TYPE II NON-SKID</td>
<td>17&quot; x 28&quot; x 18&quot;</td>
</tr>
<tr>
<td>III</td>
<td>SEATTLE TYPE III NON-SKID</td>
<td>32&quot; x 44&quot; x 18&quot;</td>
</tr>
</tbody>
</table>

B. Each conduit entering the box shall be neatly upswept and shall terminate not less than 5 inches or more than 10 inches below the lid.

C. All junction boxes shall be set on a 6-inch free draining, compacted pea gravel base and be leveled to match grade. The lid shall be set flush with finish grade. Conduits into the junction boxes and service cabinet foundations shall have bell ends installed. Sufficient slack wire shall be provided to enable the splice to be raised a minimum of 18 inches outside of the box.

2.04 CONDUCTORS

A. All wire and cable shall conform to the NEC and meet applicable ICEA specifications. Conductors shall be copper, No. 12 AWG or larger and all conductors No. 10 or larger shall be stranded. Insulation shall be Type THHN/THWN, 600 Volt minimum rated 75° C. and be color coded in a consistent manner. Each conductor shall be identified by Circuit and Phase Number at every handhole and junction box by a PVC wiring marking sleeve.

B. Splices below grade shall be made with compression type connectors, be plastic tie-wrapped and made watertight with an epoxy splice kit, heat shrinkable medium wall flexible Polyolefin tubing or similar products.

C. Splices above grade shall be made with screw type connectors and be plastic tie wrapped.
2.05 PEDESTAL PANELS

A. The main pedestal panel shall be 277/480-volt three phase four wire bussed for 800 amps and contain the main breaker and branch breakers as shown on the drawings. The main breaker shall have a minimum interrupting rating of 65,000 amps and shall be Cutler Hammer Type KS-6 or equal of Square D or Siemens. The branch breakers shall be series rated and be Cutler Hammer Type FH or equal of Square D or Siemens. The panel shall be Cutler Hammer Type PH or equal. The panel shall be UL labeled for service entrance.

B. A CT compartment and a 13-terminal instrument rated meter base (277/4W/3 Element/ED Form 9S) shall be provided in the switchboard as shown on the Drawings. This equipment shall be in accordance with PUD metering department requirements.

C. A transformer shall be provided as required for supplying power to the low voltage panel. It shall be rated as shown on the drawings, 480 - 120/208-volt, three phase with 6 - 2.5% 2 + 4 Taps, Cutler Hammer Type CX-6 or equal.

D. A low voltage panel shall be provided. It shall be rated 120/208-volt three phase four wire bussed for 200 amps. The breakers shall be series rated and shall be Cutler Hammer Type CH and CHB or equal of Square D or Siemens. The Panels shall be Cutler Hammer Type PB or equal.

E. The campsite pedestal panels shall be 120/240-volt, single phase three wire bussed for 400 amps and contain the main breaker and branch breakers as shown on the drawings. The main breaker shall have a minimum interrupting rating of 22,000 amps and shall be Cutler Hammer Type KS-6 or equal of Square D or Siemens. The branch breakers shall be series rated and be Cutler Hammer Type FH or equal of Square D or Siemens. The panel shall be Cutler Hammer Type PH or equal. The panel shall be UL labeled for service entrance.

F. All components shall be contained in free-standing weatherproof pedestal as detailed on the drawings. Cabinet shall be a NEMA 3R enclosure of #12-gauge steel formed construction with screened and gasket vents and a 1/4" polished wire glass meter viewing window. Doors shall be heavy duty, concealed hinge (lift-off type) with stainless steel padlock-able handles, closed cell neoprene gasket, print pockets and directory card holder. Finish shall be black polyester powder coat over zinc rich prime cabinet with white dead fronts and mounting pans. Manufacturer shall be Skyline Electric, RSE Sierra or approved equal.

2.06 MISCELLANEOUS ELECTRICAL EQUIPMENT

A. Additional electrical equipment is required including campsite power pedestals, receptacles etc. This equipment shall be as shown and specified on the drawings.
PART 3 - INSTALLATION METHODS

3.01 PRIMARY SERVICE

A. The existing primary electrical service shall be extended. The Contractor shall provide trenching, trench backfilling and restoration as shown on the drawings from the existing PUD pole to the new PUD vaults and transformer. The Contractor shall coordinate with PUD crews for PUD installation of primary conduit and conductors. Any charges by PUD will be paid by the Owner and shall NOT be included in the bid price.

B. The Contractor shall coordinate all work and scheduled power outages with the Owner and PUD.

3.02 VAULTS

A. The Contractor shall provide excavation, bedding, backfill and restoration for all PUD power vaults, pad mount transformer lids and communication vaults shown on the drawings. The Contractor shall coordinate with PUD crews for PUD installation of the vaults and transformer pad mount lids. Any charges by PUD will be paid by the Owner and shall NOT be included in the bid price.

B. The Contractor shall coordinate all work and scheduled power outages with the Owner and PUD.

3.03 SECONDARY SERVICES

A. The Contractor shall provide trenching, wire and conduit as shown on the drawings, trench backfilling and restoration from the transformers to the electrical cabinet and welcome center. The Contractor shall provide conductors sufficient in length to be attached to the transformers left coiled in the vault. A CT compartment and a 13-terminal instrument rated meter base (277/4W/3 Element/ED Form 9S) shall be in accordance with PUD metering department requirements as appropriate. Any charges by PUD will be paid by the Owner and shall NOT be included in the bid price.

B. The Contractor shall coordinate all work and scheduled power outages with the Owner and PUD.

3.04 GROUNDING

A. Provide a complete grounding system with grounding continuity throughout the system. Ground rods shall be copper clad 3/4" by 10'. Ground wire shall be bare stranded copper.

3.05 DEPTH OF BURIAL

A. All underground runs for the electrical distribution system shall be a minimum of 24 inches below grade.
SCHAFER STATE PARK
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3.06 TRENCHING, EXCAVATION AND BACKFILLING

A. Provide all trenching, excavation and backfilling required for the installation of items included in this Contract. Provide a plastic Marker Tape the entire length of all underground conduit runs. The Marker Tape shall be 3” minimum width, bright red or yellow color installed a minimum of 12” above the top conduit run.

B. Contact the Owner before trenching in any area. In trenching through sodded areas, remove the sod and replace after backfilling and compaction. In trenching through non-sodded earth areas, the Contractor shall compact to 90%, dress with topsoil and reseed with an approved grass seed. Underground runs through asphalt or concrete areas shall be neatly cut, the backfill fully tamped to 95% compaction and the area repaired to match the existing.

C. Underground sprinkler systems, sewers and other systems exist at all the sites. Contact the Owner and call for utility locate to ascertain the location of all underground systems before trenching or excavating. The Contractor shall make his best effort to locate all underground systems before trenching or excavating. If damage still occurs, the underground systems shall be repaired to original condition at the Contractor's expense and be approved by the Engineer before backfilling.

3.07 MARKING OF DEVICES

A. Permanent labels shall be provided for all Control Devices Panel Schedules and One Line Diagrams. Engraved phenolic nameplates shall be provided for all time clock channels, override switches and similar devices as previously specified. Plastic laminated sheets showing the panel schedules and one-line diagrams shall be placed in each panel. If the panels and other equipment are installed in exact accordance with the Drawings, the Panel Schedules and One Line Diagrams from the Drawings may be duplicated and placed in plastic laminated sheets. If only minor variations are made, those items may be modified and used. Otherwise, new panel schedules and one-line diagrams shall be provided.

3.08 TESTING

A. Each circuit shall be tested with a megohm meter. A reading in excess of two (2) megohms shall be deemed satisfactory. The Contractor shall provide a written report of the results of his testing. The written report shall be provided to the Engineer prior to final acceptance of the project. Testing and operation of the entire system shall be performed. The Contractor shall provide manpower and equipment as necessary to correct any defects as may be directed by the Engineer.

END OF SECTION
SECTION 310000 – EARTHWORK GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Perform all excavating, trenching and fill as shown on drawings, as specified herein, and as otherwise required to complete Work of this Contract. Provide all materials, labor and equipment necessary to complete Work of this Division.

B. Visit site. Note all conditions as to character and extent of Work involved.

C. Review geotechnical engineering investigation bound in with these Specifications.

D. Procure and pay for all necessary permits or certificates required to complete the Work specified. Make any and all required notifications and comply with all applicable Federal, State, and local ordinances.

E. Contractor shall be solely responsible for making all excavations in safe manner. Provide appropriate measures to retain excavation side slopes and prevent rock falls to ensure that persons working in or near excavation are protected. Install and maintain shoring, sheeting, bracing and sloping necessary to support sides of excavation, and to prevent any movement which may damage adjacent pavements, utilities or structures, or endanger life and health. Install and maintain shoring, sheeting, bracing, sloping, and barricading as required by OSHA and other applicable governmental regulations and agencies.

1.2 TESTING

A. Contractor shall be responsible for testing of all fill material to make sure it complies with specifications. Contractor shall provide Engineer and Owner copy of all test results at least one week prior to commencing fill work. Cost of testing fill material shall be paid for by Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION
SECTION 310516 - AGGREGATES FOR EARTHWORK (UTILITIES)

PART 1 – GENERAL

1.1 SUMMARY

A. Scope: Provide and install aggregate materials of the types and sizes noted in this section where required by applicable codes, good standard engineering practice, and the approved site design.

B. Section Includes:

1. Coarse aggregate materials and fine aggregate materials for use, related to utilities, throughout the site as indicated on plans.

C. Related Sections:

1. Section 312333 – Utility Excavation & Backfill.

1.2 REFERENCES

A. American Society for Testing and Materials:

3. ASTM D4318-10e1 – A Standard Test method used for determination of plasticity index.

1.3 SUBMITTALS

A. Submittals shall meet the requirements under Section 013300 – Submittal Procedures.

B. Samples to be visually confirmed by Project Representative prior to verification testing.

1. Gravel Backfill for Pipe Zone Bedding: Fifty to sixty pounds (50 – 60 lb) (Two Samples).
2. Bank Run Gravel for Trench Backfill: Fifty to sixty pounds (50 – 60 lb) (Two Samples).
3. Pea Gravel for Drains: Fifty to sixty pounds (50 – 60 lb) (Two Samples).
4. ASTM C-33 Sand: Fifty to sixty pounds (50 – 60 lb) (Two Samples).
5. Drain Rock: Fifty to sixty pounds (50 – 60 lb) (Two Samples).

C. Quality Control Submittals:

1. Gravel Backfill for Pipe Zone Bedding: Name and location of source, stockpile number, and sieve test results.
2. Bank Run Gravel for Trench Backfill: Name and location of source, stockpile number, and sieve test results.
3. Other Aggregates: Name and location of source, stockpile number, and applicable test results.

4. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for Project Representative’s information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

PART 2 - PRODUCTS

2.1 GENERAL

A. All aggregate and backfill material shall be approved and certified weed free, before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items.

2.2 AGGREGATE MATERIALS (FLEXIBLE PIPE)

A. Gravel Backfill for Pipe Zone Bedding: Gravel backfill for pipe bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact and shall meet the following Specifications for grading and quality:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2”</td>
<td>99-100</td>
</tr>
<tr>
<td>1”</td>
<td>75-100</td>
</tr>
<tr>
<td>5/8”</td>
<td>50-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>20-80</td>
</tr>
<tr>
<td>No. 40</td>
<td>3-24</td>
</tr>
<tr>
<td>No. 200</td>
<td>10.0 max.</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>35 min.</td>
</tr>
</tbody>
</table>

*All percentages are by weight.

If, in the opinion of the Project Representative, the native granular material is free from wood waste, organic material, and other extraneous or objectionable materials, but otherwise does not conform to the Specifications for grading and Sand Equivalent, it may be used for pipe bedding for rigid pipes, provided the native granular material has a maximum dimension of 1-1/2 inches.

B. Bank Run Gravel for Trench Backfill: Trench backfill material shall consist of granular material, either naturally occurring or processed. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and
shape that it will compact readily. The maximum particle size shall not exceed 2 inches and shall meet the following Specifications for grading and quality:

**Trench Backfill Grading**

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2”</td>
<td>75-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>22-100</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-10</td>
</tr>
<tr>
<td>Dust Ratio</td>
<td>2/3 max.</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>30 min.</td>
</tr>
</tbody>
</table>

*All percentages are by weight.

2.3 **PEA GRAVEL FOR DRAINS**

**A.** Pea gravel material shall be rounded to sub-rounded material that is non-plastic. A minimum of 70 percent by weight must have at least one fractured face and shall meet the following Specifications for grading and quality:

**Trench Backfill Grading**

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8”</td>
<td>95-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-30</td>
</tr>
<tr>
<td>No. 8</td>
<td>0-15</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-2</td>
</tr>
</tbody>
</table>

2.4 **AGGREGATE MATERIALS (SEPTIC DRAINFIELD)**

**A.** ASTM C-33 Sand: Material must comply with the grading requirements for the sieve sizes shown in the following table:

**ASTM C-33 Sand Grading**

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8”</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>95-100</td>
</tr>
<tr>
<td>No. 8</td>
<td>80-100</td>
</tr>
<tr>
<td>No. 16</td>
<td>50-85</td>
</tr>
<tr>
<td>No. 30</td>
<td>25-60</td>
</tr>
<tr>
<td>No. 50</td>
<td>50-30</td>
</tr>
<tr>
<td>No. 100</td>
<td>0-5</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-1</td>
</tr>
</tbody>
</table>

**B.** Drain Rock: Material must comply with the grading requirements for the sieve sizes shown in the following table:
SCHAFER STATE PARK
RELOCATE CAMPGROUND

Drain Rock Grading

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>99-100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>80-100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>0-40</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-4</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-2</td>
</tr>
</tbody>
</table>

2.5 AGGREGATE MATERIALS (SEPTIC TANK)

A. Bedding: Bedding material shall be primarily sand and gravel, having a plasticity index less than 6. Gradation shall limit the amount passing the No. 200 sieve to 10 percent maximum. Bedding material must comply with the grading requirements for the sieve sizes shown in the following table:

<table>
<thead>
<tr>
<th>Bedding Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
</tr>
<tr>
<td>5/8&quot;</td>
</tr>
<tr>
<td>No. 4</td>
</tr>
<tr>
<td>No. 40</td>
</tr>
<tr>
<td>No. 200</td>
</tr>
<tr>
<td>Sand Equivalent</td>
</tr>
</tbody>
</table>

B. Primary Backfill: Primary backfill must be used to backfill the tank a minimum of 75% up the side wall. This material must be clean, free flowing, and free of dirt, sand, large rocks, roots, organic materials, debris, ice and snow and consist of one of the following:

1. Pea Gravel – Clean naturally occurring rounded aggregate with particle sizes no larger than 3/4” with no more than 5% passing a #8 sieve. Dry bulk density, per ASTM C29, must be a minimum of 95 pounds per cubic foot.

C. Crushed Stone – Washed with angular particle sizes no longer than 1/2" with no more than 5% passing #8 sieve. Dry density must be a minimum of 95 pounds per cubic foot.

Secondary Backfill: Secondary backfill, if used for the final 25% of the backfill process, must be separated from the primary backfill by a geotextile fabric approved by the tank manufacturer. Secondary backfill shall consist of granular material, either naturally occurring or processed (native material shall be used as available and appropriate prior to importing material), and shall be free draining and meet the following requirements for grading and quality:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>75 - 100</td>
</tr>
<tr>
<td>3&quot;</td>
<td>100</td>
</tr>
</tbody>
</table>
2.6 SOURCE QUALITY CONTROL

A. All Aggregates shall be from a pit approved by the Project Representative.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Stockpile excavated material meeting requirements for aggregate materials.
B. Remove excess excavated materials not intended for reuse from site.
C. Place aggregate at locations as described on the contact plans.

3.2 STOCKPILING

A. Stockpile materials at locations designated by Project Representative.
B. Stockpile in sufficient quantities to meet Project schedule and requirements.
C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

A. Remove stockpile; leave area in clean and neat condition. Grade site surface to prevent Free-standing surface water.

END OF SECTION
SCHAFER STATE PARK
RELOCATE CAMPGROUND

SECTION 311000 - SITE CLEARING AND STRIPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Protecting existing vegetation to remain Per Section 015639 Temporary Tree and Plant Protection.
   2. Protect from harm any existing structures, utilities, and other objects not designated for removal.
   3. Removing existing vegetation, as shown in the Drawings.
   4. Selective clearing and grubbing.
   5. Stripping and stockpiling topsoil.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 SUBMITTALS

A. Submit: Clearing procedures and operational sequence with stockpile areas and construction access routes identified for review and acceptance by Project Representative. Include:
   1. Permits for transport and approved disposal of debris as required by State and local codes.
   2. Daily reports that state quantity of soil and topsoil stripped and stockpiled or removed.

1.4 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Protection of Existing Elements:
   1. Protection of Existing Conditions: Provide, erect, and maintain fencing and barricades, coverings, or other types of protection necessary to prevent damage to existing
SCHAFER STATE PARK
RELOCATE CAMPGROUND

pavements, plants and lawn areas, structures, utilities, or other existing site improvements indicated to remain in place. Restore any improvements damaged by this work to their original condition, as acceptable to the Engineer.

2. Monuments: Carefully maintain benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed at no cost to the Project Representative.

3. Protect at all times existing sensitive areas as shown in the Plans, Critical Areas Report and as directed.

C. Salvageable Improvements: All trees greater than 10-inch in diameter within the clearing limits shall be felled, cut to length and stacked as directed by the Project Representative.

D. Utility Locator Service: The Contractor is responsible for the verification of all utility locations. The Contractor shall meet with location service to locate all known utilities. The Contractor shall coordinate with applicable utility service companies for electrical and water connections. Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. Objectionable Noises: Limit the use of air tools and other noisy equipment as much as possible. Conform with local governing requirements regarding Noise Control.

G. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

1.5 SITE ACCESS

A. Access route shall be from West Schafer Park Road and/or W Satsop Cloquallum Road.

B. Provide a project staging, access, and material storage plan, within ten (10) days of notice to proceed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory On-Site Soil Material: Requirements for satisfactory stripped soil material which may be stockpiled for onsite use are specified in Division 31, Section 312000 "Earth Moving."

SITE CLEARING AND STRIPPING – 311000 - 2
B. Satisfactory On-Site Stripped Topsoil: dark brown to brown, silty sand containing variable organics, gravel and cobble, screened for constituents greater than 2” diameter and as per Section 329000 Landscaping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify with Project Representative that clearing and site improvement, removal and relocation may safely and appropriately begin.

B. Obtain required permits and permission from local governing authorities and Project Representative prior to commencing work.

3.2 PREPARATION

A. Remove trees, roots, and excess soil as required for new construction and as indicated. Removal operation shall be performed in a manner to protect property.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.

C. Protect existing site outside of work areas from damage during construction.

1. Restore damaged areas to their original condition, as acceptable to Owner.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide erosion and sedimentation control as per Section 312500 Erosion and Sedimentation Control and as specified herein.

B. Provide temporary erosion and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

C. Sprinkle water over excavated material and stripped areas as necessary to limit dust to the lowest practical level. Do not use water to the extent of causing flooding, contaminated runoff, or icing.

D. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

E. Keep street, access drive, and site drains open for drainage at all times. Mud and sediment build-up shall be removed as directed by the Project Representative.

F. Open pits and holes caused as a result of demolition work shall be kept free of standing water.
G. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

H. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.4 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01, Section 0156.39 Temporary Tree and Plant Protection.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Project Representative.

3.5 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Project Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Project Representative's written permission.
3. Verify disconnection, if applicable, of all appropriate services. The Contractor shall pay for all fees and costs associated with utility disconnects, capping, line, and meter removal.

3.6 SELECTIVE CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to the limits staked by Project Representative to permit installation of new construction. Designated clear, grub and grade limits for structures shall not exceed the limits shown in the Drawings. Protect existing trees identified for protection, where within the clearing limits, carefully clearing and grubbing understory vegetation as per Project Representative’s direction.

1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
2. Use only hand methods for grubbing within protection zones.
3. All debris generated in performing this item of Work shall be disposed of by the Contractor in a Contractor furnished disposal site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
SCHAFER STATE PARK
RELOCATE CAMPGROUND

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.7 TOPSOIL STRIPPING

A. Remove vegetation before stripping topsoil.

B. Stripping: Topsoil should be stripped from all areas designated for development (i.e. footings, slabs-on-grade, and vehicular pavement sections). Stripped topsoil can be stockpiled and is only suitable for use in landscape areas.

C. Strip topsoil to depth of 12 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

D. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover after 48 hours of no use during dry season and 24 hours of no use in wet season to prevent windblown dust and erosion by water.

E. Obtain Project Representative approval for stockpile locations.

3.8 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. The refuse resulting from clearing shall be disposed of by the Contractor in a manner consistent with all government regulations. Debris hauled off-site shall not be deposited in any stream or body of water, or any street or alley, or upon any private property except by written consent of the private property owner. Maintain hauling routes clean and free of any debris resulting from the work of this Section.

C. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project Work.

3.10 CLEAN UP

A. Clean trucks and other equipment as required before entering access drive and roads. Clean drives and roads daily or as required to avoid dust, unsightly appearance, or water quality impacts.

END OF SECTION
1.1 DESCRIPTION

This Section includes site preparation and demolition work, as indicated on the Drawings. Work includes but is not limited to the following:

A. Save and protect all existing vegetation not specified for removal, clearing or grubbing as per Section 015639 Temporary Tree and Plant Protection.

B. Remove asphalt and concrete paving & slabs, concrete foundation, and other items, as shown on plans.

C. Protect from harm any existing structures, and other objects not designated for removal

D. Abandon existing water line, cut and cap, as per the Plans. Recycle and (approved) disposal of all demolished material from the site.

E. Protection of all utilities

1.2 RELATED SECTIONS

A. Section 312500 – Erosion and Sedimentation Control

B. Section 311100 – Site Clearing and Stripping

1.3 GENERAL

A. The extent and location of demolition are indicated on the Drawings. The work includes removal, wholly or in part, and satisfactory disposal of all objects that are designated for removal and disposal as indicated on the Drawings, or in this Specification. Items that interfere with the work will be removed and disposed of whether indicated for removal or not.

B. The demolition work, as shown on the Drawings, is for guidance only and to indicate typical general construction features. However, such information may not be complete, and Contractors must visit the site to verify the quantity and details of demolition work. Lack of complete details on the contract Drawings will not be considered as grounds for any additional compensation.
1.4 SUBMITTALS

A. Submit: Clearing procedures and operational sequence with stockpile areas and construction access routes identified for review and acceptance by Project Representative. Include:
   1. Permits for transport and approved disposal of debris as required by State and local codes
   2. Daily reports that state quantity of concrete and asphalt removed.

1.5 EXISTING CONDITIONS

A. Protection of Existing Conditions: Provide, erect and maintain fencing and barricades, coverings, or other types of protection necessary to prevent damage to existing pavements, plants and lawn areas, structures, utilities, or other existing site improvements indicated to remain in place. Restore any improvements damaged by this work to their original condition, as acceptable to the Engineer.

B. The Contractor is responsible for the verification of all utility locations. The Contractor shall meet with location service to locate all known utilities. The Contractor shall coordinate with applicable utility service companies for electrical and water connections.

C. Verify disconnection, if applicable, of all appropriate services. The Contractor shall pay for all fees and costs associated with utility disconnects, capping, line, and meter removal.

D. Do not shut off or cap utilities without prior notice. Coordinate work with Division 1 requirements and general conditions. Maintain street and site drains and sewers open for free drainage. Provide catch basin protection.

E. Objectionable Noises: Limit the use of air hammers and other noisy equipment as much as possible. Conform with local governing requirements regarding Noise Control.

F. Maintain vehicular and pedestrian traffic routes:
   1. Ensure minimum interference with paths, streets, parking lots, and adjacent facilities, and walls
   2. Do not close or obstruct streets, paths, easements, or passageways without permission from authorities having jurisdiction
   3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways

G. Protection of Existing Elements:
   1. Protect all existing utilities to remain
   2. Monuments: Carefully maintain benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed at no cost to the Project Representative.
   3. Protect at all times existing sensitive areas as shown in the Plans, Critical Areas Report and as directed.

1.6 SITE ACCESS

A. Access route shall be from West Schafer Park Road.
SCHAFER STATE PARK
RELOCATE CAMPGROUND

B. Provide a project staging, access, and material storage plan, within ten (10) days of notice to proceed.

PART 2 - PRODUCTS (NOT USED) EXECUTION

3.1 EXAMINATION
Verify with Project Representative that clearing and site improvement, removal and relocation may safely and appropriately begin.

B. Obtain required permits and permission from local governing authorities and Project Representative prior to commencing work.

3.2 DEMOLISH STRUCTURES

A. Remove gates, as well as all other items to be demolished, as shown on plans.

B. Remove CXT Building and relocate within Park site as directed by Project Representative.

3.3 ABANDON UTILITIES AND VAULTS

A. Abandon existing outhouse vault per WAC requirements: pump out, destroy lid and fill vault with soil/gravel.

Cut and cap existing water line and abandon in place, as shown on the plans.

3.4 REMOVAL OF CONCRETE AND ASPHALT

A. Break up or saw cut concrete, reinforcing bar, and asphalt paving as shown on the drawings. Demolish and dispose of paving materials. Concrete shall be demolished into pieces no smaller than 8” and no larger than 24”. Some of the demolished concrete and asphalt may be used as base material under proposed asphalt drive, with Project Representative’s approval. If accepted for use as base material, the demolished concrete and/or asphalt must meet base material size and compaction requirements per the Drawings.
3.5 REMOVAL OF GRAVEL ROAD

A. Remove gravel road as shown in the plans. Some gravel may remain under proposed paving, if grades allow, and some may be used as sub-base fill material, if compaction requirements are met. Obtain Project Representative’s approval for any re-use of materials.

3.6 DRAINAGE

A. Keep street, access drive, and site drains open for drainage at all times. Mud and sediment build-up shall be removed as directed by the Project Representative.

B. Open pits and holes caused as a result of demolition work shall be kept free of standing water.

3.7 DISPOSAL OF MATERIALS

A. The refuse resulting from clearing and demolition shall be disposed of by the Contractor in a manner consistent with all government regulations. Debris hauled off-site shall not be deposited in any stream or body of water, or any street or alley, or upon any private property except by written consent of the private property owner. Maintain hauling routes clean and free of any debris resulting from the work of this Section.

3.8 CLEAN UP

A. Clean trucks and other equipment as required before entering access drive and roads. Clean drives and roads daily or as required to avoid dust, unsightly appearance, or water quality impacts.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

Work includes but is not limited to the following:

A. Excavation and Fill

   1. Subgrade Preparation
   2. Excavation

      a. Structural Excavation for Minor Structures

          1) Excavating for site structures

   3. Dewatering
   4. Fill

      a. Compaction

B. Materials

   1. Coarse aggregate materials
   2. Fine aggregate materials
   3. Granular Material
   4. Importing any materials required to complete the work
   5. Removing materials from the site which are in excess of that required

C. Coordinating earthwork operations with other work of the project

D. Review Appendix A: Summary of Geotechnical Engineering Services Technical Memorandum (Geotechnical Memorandum) prior to beginning the work. Coordinate with Project Representative where discrepancies arise between the Geotechnical Engineering Memorandum and these specifications.

1.2 RELATED SECTIONS

A. Section 015000 – Temporary Facilities and Controls

B. Section 310516 – Aggregates for Earthwork (Utilities)

C. Section 312333 - Utility Excavations & Backfill
1.3 REFERENCES

A. Appendix A: Summary of Geotechnical Engineering Services Technical Memorandum

B. Local utility standards when working within 24 inches of utility lines

C. Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction latest edition

D. Local Code and ordinances

E. Local Drainage Manual, Current Edition

F. American Association of State Highway and Transportation Officials:
   1. AASHTO M147 – Standard Specification for Materials for aggregate and soil aggregate subbase, base, and surface courses
   2. AASHTO T180 – Standard Specification for Moisture density relations of soils using a 4.54-kg (10lbs) rammer and a 457-mm (18inch) drop

G. ASTM International:
   1. ASTM C136 – Standard Test Method for sieve analysis of fine and coarse aggregates
   2. ASTM D698 – Standard Test Methods for laboratory compaction characteristics of soil using standard effort (6,000 ft – lbf/ft³ (2,700 kN-m/m³))
   3. ASTM D1557 – Standard Test Method for laboratory compaction characteristics of soil using standard effort (12,400 ft – lbf/ft³ (600 kN-m/m³))
   4. ASTM D2487 – Standard Classification of soils for engineering purposes (Unified Soil Classification System)
   5. ASTM D4318 – Standard Test Method for liquid limit, plastic limit and plasticity index of soils

1.4 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, cable, or vault

1.5 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan, if required.


D. Samples: Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory
E. Materials Source: Submit the name of imported fill materials suppliers

F. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

1.6 JOB CONDITIONS

A. Carefully maintain benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed at the Contractor’s expense.

B. Cobbles were found in all geotechnical test pits and boulders are often found in glacial soils, such as those that underlay the site. Contractor shall be prepared to manage such oversized material.

C. Where soil is encountered that is not in conformance with the density specifications contained herein and must be removed to depths greater than those indicated or specified, such excavating and additional filling, if not as a result of the Contractor’s negligence, will be paid for as extra in accordance with contract conditions relative to changes in work.

D. The Contractor is advised that underground utilities exist in the construction area. The drawings show the general locations. Prior to beginning construction, the Contractor shall check and verify the location and elevation of all known lines. The Contractor shall promptly repair any damage to existing utilities as a result of construction operation at no expense to the Owner.

E. Coordinate all traffic control with the Project Representative to maintain vehicular and pedestrian traffic during construction operations. Use flagmen, barricades, warning signs, and other approved devices to maintain safety and cause the least disruption to traffic.

F. Provide excavation plan and list of proposed equipment and methods within 20 days of contract execution, including a schedule of earthwork activities.

1.7 QUALITY ASSURANCE

A. The Contractor is responsible for checking the quality of work and shall perform compaction and density tests on request of the Project Representative to verify compliance with these specifications. The Contractor shall employ, at their expense, a testing lab acceptable to the Project Representative as identified in the General Conditions, to perform such soil tests as specified herein. Five copies of the test results, signed and sealed by a registered Professional Engineer, shall be submitted to the Project Representative for review.

B. All test results must indicate conformance to this specification before proceeding with related work. If, in the opinion of the Project Representative, subgrade, or fills which have not been placed are below specified density, the Contractor shall provide additional compaction and testing at his expense. The Project Representative shall have the authority to accept or reject any or all testing agencies, testing methods, or locations selected by the Contractor. The Contractor shall provide three (3) days advance notice to the Project Representative when tests are required to be performed.

C. Furnish each aggregate material from a single source throughout the Work.
D. Perform work in accordance with the Drawings, State and County standards, and the most recent edition of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction.

1.8 QUALIFICATIONS

A. Prepare excavation protection plan under the direct supervision of Professional Engineer experienced in the design of this Work and licensed in the State of Washington.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 COORDINATION

A. General Conditions: Coordination and project conditions

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities

PART 2 - PRODUCTS

2.1 FILL MATERIALS:

A. The expectation is that a portion of the fill materials will be brought on-site to achieve park grades. Materials associated with the concrete, asphalt, crushed rock paving, storm drainage and utilities, and landscaping are described in the related sections.

B. Backfill and Granular Structural Fill Materials:

1. Imported backfill and granular structural fill shall conform to WSDOT Specification 9-03.14(1) - Gravel Borrow.

2. Backfill Material: Parking lot, driveway and other structural fill shall be on-site material cut free from organics. On-site mineral soil, if used for structural fill, should be moisture conditioned and screened for constituents greater than 6 inches in diameter. Mineral soil fill shall be capable of compaction to 95%. Use imported granular fill if compaction not possible during wet weather work. See Summary of Geotechnical Engineering Services Tech Memo (Geotechnical Memorandum) for additional site soil use and structural fill requirements.

3. Planting Area Subgrades Material: Satisfactory sandy loam soil materials with less than 7% passing the No. 200 sieve, free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials, vegetable, and other deleterious matter. On site stripped topsoil may be used. Bulk import fill subject to Project Representative approval.
4. Stockpiled topsoil, stripped from on site as per Section 311000 Site Clearing and Stripping, may be used for site preparation in landscape restoration areas, as per Section 329000 Landscaping.

2.2 ALLOWABLE VARIANCE:

A. An accumulated variance on specified sieve analysis of up to 5 percentage points is acceptable provided no single screen varies by more than 1.5 percentage points above or below the range specified above.

2.3 CGEOTEXTILE FABRIC

A. Shall be a non-woven geotextile composed of polypropylene fibers, formed into a stable network such that the fibers retain their relative position.

B. Fabric shall be inert to biological degradation and resists naturally encountered chemical, alkalis and acid.

C. Geotextile fabric shall be Mirafi 160N or approved equal.

PART 3 - EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

A. Utilities: The Contractor shall protect from damage private and public utilities. Verify the locations of underground utilities, call Dial-a-Dig: 1 (800) 424-5555 a minimum of 48 hours prior to excavation.

B. Pavement: The Contractor shall protect from damage all pavement or paved areas, including curbs and walks intended to remain. The Contractor shall be responsible for replacement if damage occurs to pavement or curbs.

C. Access Streets and Roadways: Provide wheel cleaning stations to clean wheels and undercarriage of trucks before leaving the site, as necessary to prevent dirt from being carried onto easement drive and public streets. If streets are fouled, they must be cleaned immediately in conformance with Washington State Parks and all governing requirements and regulations.

D. Repair and/or replacement of damaged facilities will be accomplished at the Contractor’s expense.

3.2 EXCAVATION PREPARATION

A. Call Utilities Underground Location Center at 1-800-424-5555 not less than three working days before performing Work
1. Request underground utilities to be located and marked within and surrounding construction areas

B. Identify required lines, levels, contours, and datum locations

C. Protect utilities indicated to remain from damage

D. Protect existing paving and other surfaces to remain

E. Protect plant life, lawns, and other features remaining as a portion of final landscaping

F. Protect benchmarks, survey control points, well casing, water service, pipe stub-outs, and existing above-ground features to remain from excavating equipment and vehicular traffic

G. Maintain and protect above, and below-grade utilities indicated to remain

H. Establish temporary traffic control and detours when trenching is performed in the public right-of-way. Relocate controls and reroute traffic as required during the progress of Work.

3.3 EXCAVATION

A. General: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Project Representative is not authorized. Unauthorized excavation, as well as remedial work directed by the Project Representative, shall be at the Contractor’s expense. Correct areas over excavated as directed by the Project Representative.

B. Stripping: For topsoil stripping refer to Section 311000 Site Clearing and Stripping.

C. All grades shown on Drawings are finish grades. Over excavate as necessary when backfilling with earthen, rock, or soil materials.

D. Stability of excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides of slopes of excavations in a safe condition until completion of backfilling.

E. Dewatering: Zones of perched groundwater may be encountered during the wet season. Temporary excavations should be dewatered to allow construction to be completed in the dry. Prevent surface and subsurface water from flowing into upland excavations and from flooding project site. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or run-off areas. If required, line ditches and sumps with coarse-grained material that acts as a filter. Do not use trench excavations as temporary drainage ditches. Methods of dewatering must be designed, monitored and maintained by the Contractor and approved by the Project Representative.

F. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
G. Dispose of excess soil material, large cobbles and boulders and waste materials as herein specified.

H. Remove completely any existing “natural” obstructions in areas to be occupied by construction elements or other new work.

I. Remove surficial plant material as per Demolition, Site Preparation and Clearing plan.

J. Layout: Layout of all work shall be surveyed and staked as required. Maintain all benchmarks, control monuments and stakes, whether newly established or previously existing. Protect from damage and dislocation. If necessary, to disturb existing benchmarks, re-establish in a safe place. Notify Project Representative a minimum of three days prior to excavation of work areas. The Project Representative shall inspect the staking and layout of work.

K. Excavation for Concrete and Asphalt: Cut surface under the pavement to comply with cross-section, profile, elevations and grades as indicated. Depth of base material, if any, shall be taken into consideration.

L. Excavate subsoil to accommodate footings, slabs-on-grade, and site structures. Excavation of footing subgrades, compaction, import of base material, and compaction shall be executed as specified in preparation for installation of concrete formwork (Division 03 Concrete).

M. Compact disturbed load-bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with applicable building code(s).

N. Slope banks with a machine to the angle of repose or less until shored.

O. Do not interfere with 45 degree bearing splay of foundations.

P. Grade top perimeter of excavation to prevent surface water from draining into excavation.

Q. Trim excavation. Remove loose matter.

R. Notify Project Representative of unexpected subsurface conditions.

S. Remove and dispose of excess and unsuitable excavated material from the site.

T. Repair or replace items indicated to remain if damaged by excavation.

3.4 BACKFILL AND FILL

A. General: Place specified fill material in 4-inch to 12-inch lifts to required subgrade elevations for each area classification per paragraph 2.1 of this Section.

B. Backfill excavations as promptly as work permits, but not until the completion of the following:

1. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
2. Removal of trash and debris.
C. Placement and Compaction: Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. All compaction shall be by mechanical methods. Do not place backfill for fill material on surfaces that are muddy, frozen, or contain frost.

3.5 COMPACTON

A. Complete the compaction of subgrade soils and crushed surfacing under and around structures in accordance with applicable building code(s) and Drawings and as defined herein.

B. General: Control soil compaction during construction, providing minimum percentage of density specified for area classification.

C. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages for maximum dry density and within 3 percent of optimum moisture content for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D698; and not less than the following percentages of relative density; determined in accordance with ASTM 2049, for soils which will not exhibit a well-defined moisture density relationship (cohesionless soils).

1. Structural Fill - 95%
2. Concrete Paving
   a. Subgrade soil – 95%
   b. Import aggregate base material - 95%
3. Subgrade soils in planting areas:
   a. shrub bed & meadow areas - 65%
4. Import aggregate base material in asphaltic concrete paving areas - 95%.
5. Concrete footing excavations:
   a. subgrade soil - 95%
   b. import aggregate base material - 95%
6. Crushed Rock Trail
   a. Subgrade soils - 92% to a firm and unyielding condition
   b. Crushed rock paving for trails - 95%
7. Granular fill - 95%
8. Base Aggregate for Concrete Footings and Slabs - 95%
9. Mineral Soil Fill - 95%
10. Water Storage Tank Foundation – backfill material and soil bearing pressure as per Geotechnical Memorandum. (See Appendix A)
D. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to the surface of subgrade, or layer of soil material, to prevent free water appearing on the surface during or subsequent to compaction operations. Before compaction, moisten or aerate each layer as necessary to provide optimum content. Compact each layer to required percentages of maximum dry density or relative dry density for each area classification.

3.6 STOCKPILING
A. Stockpile in sufficient quantities to meet Project schedule and requirements
B. Separate different aggregate materials with dividers or stockpile individually to prevent mixing
C. Direct surface water away from the stockpile site to prevent erosion or deterioration of materials

3.7 STOCKPILE CLEANUP
A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent freestanding surface water.

3.8 WET WEATHER WORK
A. The ground surface in and surrounding the construction area shall be sloped as much as possible to promote run-off of precipitation away from work areas, and to prevent ponding of water.
B. Cover work areas or slopes with plastic, execute sloping, ditching, sumps, dewatering, and others as necessary to permit proper completion of the work. Stockpiles of soil shall be covered with plastic sheeting, properly weighted down.
C. Earthwork should be accomplished in small sections to minimize exposure to wet conditions. That is, each section should be small enough so the removal of unsuitable soils and placement and compaction of clean structural fill can be accomplished on the same day. The size of construction equipment may have to be limited to prevent soil disturbance. It may be necessary to excavate soils with a backhoe, or equivalent, located so that equipment does not traffic over the excavated area. Minimize subgrade disturbance caused by equipment traffic.
D. No soil should be left uncompacted and exposed to moisture. A smooth-drum vibratory roller, or equivalent, should roll the surface to seal out as much water as possible.
E. In-place soils or fill soils that are or become wet and unstable, and/or too wet to suitably compact, should be removed and replaced with clean, granular soil.
F. Excavation and placement of structural fill material should be observed by a geotechnical engineer (or representative) experienced in earthwork, to determine that all work is being accomplished in accordance with the project specifications.
G. Grading and earthwork should not be accomplished during periods of heavy, continuous rainfall.
3.9 TRENCHING

A. Remove lumped subsoil, boulders, and rock 4-inch diameter and greater. Remove larger material as directed by the Project Representative.

B. Trenching for utility lines, buried tanks and drainfield systems shall comply with Section 312333 Utility Excavation & Backfill.

C. Stockpile excavated material in the area designated on-site as shown on the drawings, or as approved by the Project Representative.

3.10 SHEETING AND SHORING

A. Sheeting and shoring for trenching and excavation for utility lines, buried tanks and drainfield systems shall comply with Section 312333 Utility Excavation & Backfill.

3.11 TRENCH BACKFILLING

A. Trench backfilling for utility lines, buried tanks and drainfield systems shall comply with Section 312333 Utility Excavation & Backfill.

3.12 TOLERANCES

A. Section 014000 - Quality Requirements.

B. Top Surface of Backfilling: Plus or minus 1 inch from required elevations

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations

3.13 SUBGRADE PREPARATION

A. General: The subgrade shall be shaped to true and even lines to assure a uniform thickness of the base course required under paved areas, as shown on the drawings. The surface of the subgrade shall not be more than three-fourths inch (3/4”) above or below the subgrade elevation shown on drawings. See Summary of Geotechnical Engineering Services Tech Memo for additional subgrade preparation requirements.

B. Control soil compaction during subgrade preparation and construction, providing a minimum percentage of density specified for area classification.

C. Backfill areas of unsuitable excavation and/or over excavation with material as directed by the Project Representative and compact to density requirements for subsequent fill material.

D. Refer to 3.5 COMPACTION for subgrade compaction requirements.
3.14 SUBGRADE CERTIFICATION

A. The Contractor shall coordinate all testing of subgrade conditions for embankment, utility, and structure installation with the Project Representative as necessary to obtain certification from the geotechnical testing service of conformance of subgrade to contract requirements. As described in the General Conditions, Contractor shall confirm with the Project Representative that subgrade certification requirements have been met prior to placement of embankment or construction of utility systems.

B. If subgrade certification requirements have not been met prior to placing materials over subgrade, the Contractor shall remove all such materials as necessary to meet subgrade certification requirements.

3.15 BACKFILLING

A. All trench backfill per Trenching specification

B. General: Place specified fill material in 4 inch to 12-inch lifts to required subgrade elevations, for each area classification per paragraph 3.01 of this section

C. Backfill excavations as promptly as work permits, but not until the completion of the following:
   1. Removal of shoring and bracing, and backfilling of voids with satisfactory materials
   2. Removal of trash and debris

D. Placement and Compaction: Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. All compaction shall be by mechanical methods. Do not place backfill for fill material on surfaces that are muddy, frozen, or contain frost.

E. Make gradual grade changes. Blend slope into level areas.

F. If structural fill is required, specified fill material shall be placed in six-inch lifts and compacted to a minimum density of ninety percent (95%) at optimum moisture content

3.16 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Finish surfaces free from irregular surfaces changes.

B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density or relative density for each area classification. All fills placed at a slope steeper than three to one shall be compacted to 90% of the maximum, except where greater compaction is required by area classification.
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3.17 FILTER FABRIC PLACEMENT
A. Filter fabric shall not be visible after the placement of materials

3.18 FIELD QUALITY CONTROL
A. Section 014000 - Quality Requirements
B. Request inspection of bearing surfaces by Project Representative before installing subsequent work
C. Section 017700 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing
D. Perform laboratory material tests in accordance with ASTM D1557
E. Perform in-place compaction tests in accordance with the following:
   1. Density Tests: ASTM D2922
F. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

3.19 PROTECTION OF FINISHED WORK
A. Prevent displacement or loose soil from falling into excavation; maintain soil stability
B. Protect the bottom of excavations and soil adjacent to and beneath foundation from freezing
C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations
D. Reshape, and re-compact fills subjected to vehicular traffic during construction.

3.20 MAINTENANCE
A. Protection of graded areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.
B. Reconditioned compacted areas: Where completed areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
3.21 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove from the Owner’s property all waste material, including unacceptable excavated material, trash, and debris, and dispose of it off-site in a legal manner. Provide dump receipts from an approved dumpsite.

END OF SECTION
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SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, provide, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1.2 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, discharge lines, piezometers, and flow-measuring devices; and means of discharge, control of sediment, and disposal of water.

B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Pre-installation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

A. Construction Season: Construction of this Project will take place during the winter months. The coastal weather in the Project vicinity likely will make dewatering for trenching activities needed.

B. During dewatering, regularly resurvey benchmarks, maintaining and accurate log of surveyed elevations for comparison with original elevations. Promptly notify the Project Representative if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.
PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide temporary grading to facilitate dewatering and control of surface water.

B. Monitor dewatering systems continuously.

C. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 015000 “Temporary Facilities and Controls” and Section 311000 "Site Clearing and Stripping" during dewatering operations.

D. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

   1. Space well points or wells at intervals required to provide sufficient dewatering.
   2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

E. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

F. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

   1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

G. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

H. Maintain piezometric water level a minimum of 24 inches (600 mm) below surface of excavation.

I. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any Part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

   1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.

END OF SECTION
PART 1 – GENERAL

1.1 DESCRIPTION

A. The work of this section includes trenching, excavation and backfill for the construction and installation of utility lines, buried tanks and drainfield systems. All utility line installation shall be open cut.

1.2 REFERENCES

A. Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction (Latest Edition)


E. ASTM D1556-90e1 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

F. ASTM D2922-96e1 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

G. ASTM D3017-96e1 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

H. ASTM D4253-93 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.


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N. 29 CFR 1910 - OSHA, Occupational Safety and Health Standards.

O. 29 CFR 1926 - OSHA, Safety and Health Regulations for Construction.

1.3 SUBMITTALS

A. As specified in Submittal Procedures - Section 013300.

B. Written procedure for trench/excavation dewatering and disposal of fluidized materials removed.

C. Written description of barricading, shoring, cribbing, bracing, and sloping precautions.

D. Provide results of analysis for bedding and select backfill gradation and plasticity index prior to use of these materials on the project. This initial submittal will not preclude requirement for in-place tests.

1.4 PROJECT CONDITIONS

A. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to the public, and to minimize the possibility of trench collapse.

1.5 EXCAVATION CLASSIFICATION

A. Regardless of the nature of material excavated, all excavation will be considered unclassified.

1.6 PRESERVATION OF NATURAL FEATURES

A. Temporary Tree and Plant Protection - Section 015639

1.7 HAND EXCAVATION

A. Project Representative will direct the performance of hand excavation if any, within areas that are considered as sensitive by State Parks.

1.8 GROUNDWATER

A. Based on site soil excavation/observations, groundwater may be encountered on this project. The Contractor shall be responsible for the control, removal, and disposal of any groundwater that may be encountered in the course of excavating and backfilling trenches, placing pipe, or constructing any other improvements associated with this project, in accordance with Section 312319 Dewatering.

PART 2 - PRODUCTS
2.1 GENERAL

A. All backfill material shall be approved and certified weed free, before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items. Trench excavation materials may be used as approved.

2.2 BACKFILL MATERIAL

A. Bedding material shall comply with Section 310516 - Aggregates for Earthwork.

B. Excavated trench material may be used as trench backfill when approved by Project Representative. Where native material is deemed unsuitable, import backfill material shall comply with Section 310516 - Aggregates for Earthwork. In areas where the utility trench is located within the existing roadway corridor, final trench restoration shall be completed in accordance with the project plans.

C. Furnish required bedding and backfill materials as indicated in the Drawings and provided in other sub-sections to which this work relates.

2.3 UTILITY LINE MARKING

A. All utilities shall be marked for location and identified by marking tapes, as specified in Section 330526 - Utility Line Identification Marking.

PART 3 - EXECUTION

3.1 EXISTING UTILITIES

A. Care is to be taken while excavating adjacent to existing utilities. Hand excavation work is required for making connections to existing utilities.

3.2 FIELD QUALITY CONTROL

A. Testing required to determine compliance for the work of this section shall be the responsibility of the Contractor, at no additional expense to the Government.

B. ASTM D698-91 shall be used to determine maximum density and ASTM D1556-90 or ASTM D2922-96 shall be used to determine in-place density.

C. The Contractor shall perform at least two (2) tests on placed backfill material. Additional testing may be required at the discretion of the Contracting Officer.

3.3 TRENCH EXCAVATION

A. Excavation for pipe shall be in open cut. The trench shall be as wide as necessary for sheeting and bracing and the proper performance of the work up to the maximum width permitted by the
typical cross-sections shown on the Drawings. The sides of the trenches shall be near vertical. The bottom of the trench shall be constructed to the grades and shapes indicated on the Drawings. Should the Contractor desire to use other equivalent methods, he shall submit his method of construction to the Contracting Officer for approval prior to its use.

B. Take care not to overexcavate. Accurately grade the bottom of the trenches to provide uniform bearing and support for each section of the pipe at every point along its entire length, except for the portion of the pipe sections where it is necessary to excavate for bell holes and for the proper sealing of pipe joints, and as hereinafter specified. Dig bell holes and depressions for joints after the trench bottom has been graded, and, in order that the pipe rest on the bedding for as nearly its full length as practicable, bell holes and depressions shall be only of such length, depth and width as required for properly making the joint. Remove stones as necessary to avoid point bearing.

1. Rocky Trench Bottom: Where ledge rock, hard pan, boulders, or sharp-edged materials are encountered, over-excavate a minimum depth of six (6) inches below the bottom of the utility exterior wall to permit adequate bedding preparation. The installed utility shall have at least 6 inches of clearance from any rock protrusion.

C. Backfill and compact over excavations to ninety-five (95) percent relative compaction with bedding material. There shall be no additional payment to the Contractor for over excavations not directed by the Project Representative. Remove unsatisfactory material encountered below the grades shown as directed by the Project Representative and replace with bedding material. Payment for removal and replacement of such unsatisfactory material directed by the Project Representative shall be made in accordance with the provisions of the General Conditions.

D. Grade trenches so that they are uniformly sloped between the pipe elevations shown on the Drawings. Comply with the minimum and maximum trench widths shown on the Drawings. Notify the Project Representative if the trench width exceeds the maximum allowable width for any reason.

E. Open Trench Limitations: The Project Representative shall have the authority to limit the amount of trench to be opened or left open at any one time. An open trench shall be defined as any trench which has not been completely backfilled and satisfactorily compacted.

F. Provide ladders for access to the trench by construction and inspection personnel.

3.4 SHORING AND SHEETING

A. Construct and maintain all shoring, sheeting, and slope lay-back necessary to protect the excavation, as needed for the safety of the employees and as required by applicable State and Federal laws.

B. For trenches over five (5) feet deep, provide suitable barricades for worker protection. When work area is left open and unattended by Contractor, provide suitable barricades for public safety, regardless of trench depth.

C. For trenches over four (4) feet deep, provide suitable exit means in accordance with applicable provisions of OSHA.
D. Do not remove timber or sheeting if it is in a compacted zone. Instead, trim it off at a safe level above that zone.

E. As directed, remove all other sheeting and shoring when safe to do so.

3.5 BACKFILLING

A. Compaction:
   1. Use vibratory compactors for sand and gravel (non-cohesive soils).
   2. Use mechanical tampers for sand and gravel containing a significant portion of fine-grained material, such as silt and clay (cohesive soils).
   3. Hand tamp around pipe or cable to protect the lines until adequate cushion is attained.
   4. Puddling or water flooding for consolidation of backfill or compaction by wheel rolling with construction equipment will not be permitted.

B. Bedding: Compact the Bedding material to ninety-five (95) percent of maximum density, at a moisture content determined to be suitable for such density. See part D below for additional details.

C. Utility Installation: Shape the trench bottom to ensure uniform contact with the full length of the installed line and remove any sharp-edged materials that might damage the line. Compaction shall be maintained beneath the line.

D. Trench Backfill: Fill by hand placement around the utility to just over half depth and compact in a manner to ensure against lateral or vertical displacement. Place backfill to six (6) inches above the utility line by hand placement in not more than six (6) inch layers. Compact each layer to ninety-five (95) percent of maximum density, at a moisture content determined to be suitable for such density.

E. Backfill: Place and compact the specified material as follows:
   1. Vehicular Traffic Areas: Fill and compact in six (6) inch maximum loose layers to ninety-five (95) percent of maximum density, at moisture content determined to be suitable for such density.
   2. Pedestrian Natural Terrain Areas: Fill and compact in six (6) inch maximum layers to ninety-five (95) percent of maximum density, at moisture content determined to be suitable for such density.
   3. If the Project Representative determines that the nature of the ground in which the trench lies precludes compaction of the backfill to the specified density, the backfill shall be compacted to the maximum practicable density.

3.6 SURFACE FINISH WORK

A. Open and Seeded Areas: Grade all disturbed areas to a finish ordinarily obtained from a blade grader, with no abrupt changes in grade or irregularities that will hold water.

B. Drainage Ditches: Restore drainage ditches to appropriate line and grade, using approved surface erosion prevention techniques.
C. Concrete, Pavement and Gravel Areas: Restore areas to as good or better condition. Provide cutback for trenches.

D. Clean-Up: Prior to final inspection and acceptance, remove all rubbish and excess material for disposal as approved, and leave area in a neat, satisfactory condition.

END OF SECTION
PART 1 – GENERAL

1.1 DESCRIPTION

A. The work in this Section includes those items necessary for erosion and sedimentation control on the project site.

1.2 REFERENCES

A. Refer to and comply with the applicable permits for the project work. Copies of applicable permits to be obtained shall be the responsibility of the Contractor.


1.3 EROSION AND SEDIMENT CONTROL PRACTICES

A. Erosion and sedimentation control measures shall be utilized throughout the construction site to prevent erosion during construction and after construction until vegetation is established.

B. Erosion and sedimentation control measures shall be appropriate to the site. The following general practices shall be used where applicable:

C. Uncover the smallest practical area of land.

   1. Use of temporary vegetation, mulch or other cover to protect areas during construction will require approval by the Project Representative.

   2. Utilize coir logs to trap sediment. Any seed, or temporary vegetation used on site will require approval by the Project Representative.

   3. Reduce volume and velocity of water crossing disturbed areas by utilizing diversion dams, berms, or other facilities approved by the Project Representative.

1.4 SUBMITTALS

A. Quality Assurance/Control – Contractor shall prepare an erosion and sediment control plan for all project areas.
PART 2 - PRODUCTS

2.1 COIR LOGS
   A. Coir Logs shall comply with the requirement of the WSDOT Standard Specifications Section 9-14.6(7)

2.2 HIGH VISIBILITY FENCING
   A. High Visibility Fencing shall comply with the requirement of the WSDOT Standard Specifications Section 9-14.6(8)

PART 3 - EXECUTION

3.1 GENERAL
   A. The coir logs, high visibility fencing, and other erosion control measures shall be established prior to exposing any erodible material. Site grading and drainage operations are to be conducted in a manner to prevent or lessen excessive soil erosion of the construction site work area. Appropriate soil control measures shall be implemented down slope from each drainage area where excavation is to occur.

3.2 TEMPORARY PROTECTION OF THE SOIL
   A. Temporary soil protection shall be provided and maintained by the Contractor over the winter after the initial growing season.
   B. The following methods shall be used at the locations shown on the plans unless directed to otherwise by the Project Representative.
      1. Coir Logs
      2. High Visibility Fencing
   C. After project work is completed, the Coir Logs and High Visibility Fencing shall be removed.
   D. The temporary erosion control system installed shall be properly maintained as directed by the Project Representative to control siltation at all times during the life of the contract. If the Contractor fails to maintain the temporary erosion control systems as directed by the Project Representative, the Project Representative may at the expiration of the period of forty eight (48) hours, after having given written notice, proceed to maintain the system as deemed necessary, and the cost thereof shall be deducted from any compensation due, or which may become due the Contractor under this contract. The Contractor is responsible for compliance with all requirements of the permits related to the project.
3.3 ADDITIONAL CONTROL MEASURES

A. Any soil loss control measures, in addition to those outlined in these documents and deemed necessary by the Governing Authority shall be implemented immediately. The Contractor shall notify the Project Representative immediately upon notification from the Governing Authority that additional control measures will be required.

END OF SECTION
SECTION 320000 – EXTERIOR IMPROVEMENTS GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide and install all exterior improvements shown on Drawings and specified herein.

B. Coordinate Work with other trades to avoid interferences, ensure proper grades and to provide for utility connections. Coordinate with State Parks staff to minimize disruption to park activities and to maintain access to facilities during hours of operation.

C. Refer to other Divisions of these Specifications for earthwork and site utilities.

1.2 SUBMITTALS

A. Submit for review by Architect manufacturer’s and supplier’s literature and specifications including cut sheets, mix proportions, plant descriptions and data on manufactured products and related accessories.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION
SECTION 321000 — BASES, BALLASTS, AND ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all material, labor, services and related items required to complete work indicated on Drawings and specified herein. The items of work to be performed shall include but may not be limited to:

1. Preparatory Coats
2. Asphalt Paving
3. Asphalt Paving Wearing Courses
4. Flexible Paving Surface Treatments
5. Seal Coats
6. Asphalt Paving Joint Sealants
7. Asphalt patching
8. Installation of tack coat and fabric, and the import, placement and compaction of asphaltic concrete pavement

1.2 SUMMARY

A. Section includes:

1. Asphalt concrete paving, wearing, binder and base course
2. Surface sealer

1.3 REFERENCES

A. This Section references the current edition of the following documents. They are a part of this Section as specified and modified. In the case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

3. WSDOT Standard Specifications for Road, Bridge, and Municipal Construction (Latest Edition)
4. Asphalt Institute:
   a. AI MS-2 Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types
   b. AI MS-19 Basic Asphalt Emulsion Manual
5. ASTM International:
SCHAFFER STATE PARK
RELOCATE CAMPGROUND

a. ASTM D946 Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction

6. AASHTO M17 Mineral Filler for Bituminous Paving Mixtures

1.4 SUBMITTALS

A. The Contractor shall submit to the Engineer written materials containing the following information:

1. Section 013300 - Submittal Procedures: Requirements for submittals
2. Product Data: Submit product information and job mix design for asphalt paving
3. Materials to be used and the proposed method of application and procedures
4. Sterilant: Submit to the Engineer three (3) copies of the manufacturers Material Safety Data Sheet (MSDS) for polybochlorate, for approval prior to delivery to the project site(s).
5. Fabrics: Submit manufacturers product specifications and recommended installation procedures to the Engineer for approval prior to delivery to the project site.
6. Fine Aggregate for Class B Paving Asphalt: The Contractor shall submit to the Engineer for approval prior to delivery to the project site(s), a single ½ cubic foot sample in a secure container. Affix to the container the supplier name, address, and telephone number, batch number (if applicable), date, and sieve analysis.
7. Document that products are on the WSDOT Qualified Products List

1.5 QUALITY ASSURANCE

A. Perform work in accordance with WSDOT Standard Specifications
B. Mixing Plant: Conform to WSDOT Standard Specifications
C. Obtain materials from the same source throughout.
D. Maintain one copy of each document on site.
E. Test Reports

1. Testing shall be done under the supervision of the Contractor and in accordance with the General and Supplementary Conditions of the Contract. A certified testing agency or licensed laboratory must perform the tests. The Engineer may require the execution of tests described below at the Contractors expense. Two copies of the results of each test shall be submitted to the Engineer for approval prior to the continuation of the work to be tested unless otherwise directed.
SCHAFER STATE PARK
RELOCATE CAMPGROUND

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>TEST</th>
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</thead>
<tbody>
<tr>
<td>ASTM C131</td>
<td>Test Method for Resistance to Degradation of Small-Size Coarse Aggregate</td>
</tr>
<tr>
<td>ASTM D155</td>
<td>Test Method for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) Rammer and 18-in (457 mm) Drop</td>
</tr>
<tr>
<td>WSDOT Test</td>
<td>Method of Test for Determination of Method 705 Degradation Value</td>
</tr>
<tr>
<td>WSDOT Test</td>
<td>Maximum Specific Gravity of Bituminous Paving Mixtures Method 113</td>
</tr>
</tbody>
</table>

Other tests as may be referenced elsewhere in this Section

1.6 QUALIFICATIONS

A. The Contractor must be experienced in work of the highest professional quality and have facilities and personnel adequate for the work specified. Contractor must acquaint themselves with all other work related to site improvements and other work.

B. Installer: Company specializing in performing work of this Section with a minimum of five years documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Refer to General Conditions

B. Place materials in accordance with the weather limitations in WSDOT Standard Specifications Section 5-04.3(16).

PART 2 - PRODUCTS

2.1 STERILANT

A. Polybochlorate, produced by U.S. Borax

2.2 CRUSHED BASE

A. Aggregate for base for all Base Bid asphalt paving: Crushed Base Course (CSBC) conforming to WSDOT Standard Specifications Section 9-03.9(3)

B. Aggregate for base for all Add Alternate asphalt paving for all Asphalt Pedestrian Paths/Trails:

BASES, BALLASTS AND ASPHALT PAVING — 321000 - 3
SCHAFER STATE PARK
RELOCATE CAMPGROUND

5/8” Minus Crushed Rock, fractured all sides. Gradation shall be:

<table>
<thead>
<tr>
<th>SIEVE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8” square sieve</td>
<td>100%</td>
</tr>
<tr>
<td>1/2” square sieve</td>
<td>90-100%</td>
</tr>
<tr>
<td>1/4” square sieve</td>
<td>45-66%</td>
</tr>
<tr>
<td>US No. 40 sieve</td>
<td>10-25%</td>
</tr>
<tr>
<td>US No. 200 sieve</td>
<td>7% maximum</td>
</tr>
</tbody>
</table>

C. All materials shall meet the material requirements specified in Section 5-04.2 of the WSDOT Standard Specifications.

2.3 ASPHALT PAVING MIX

A. Use dry material to avoid foaming. Mix uniformly.

B. Binder Course: Asphalt Treated Base (ATB) in accordance with WSDOT Standard Specifications Section 4-06.

C. Wearing Course: Asphalt mix shall be HMA Class 1/2-inch in accordance with WSDOT Standard Specifications. Asphalt binder shall be PG 64-22 in accordance with WSDOT Standard Specifications.

D. Mix Temperature: In accordance with WSDOT Standard Specifications.

2.4 SURFACE SEALER – SEAL COATS

A. Cationic emulsified asphalt shall meet the requirements of ASTM D8099/D8099B-17. Seal coat products shall meet the requirements of WSDOT Standard Specifications Section 9-02.1(6)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work

B. Verify compacted subgrade is dry and ready to support paving and imposed loads

C. Verify gradients and elevations of the base are correct
3.2 BARRIERS

A. The Contractor shall erect and maintain barricades, canopies, guards, and warning signs to the extent required by law and as is prudent for the protection of the public and protection of the work.

3.3 BASE

A. Prepare aggregate base in accordance with Section 4-04.3 of the WSDOT Standard Specifications.

B. In areas used for vehicular access during phased construction, maintain and restore aggregate base as required to meet specified requirements.

3.4 NEW ASPHALTIC CONCRETE PAVEMENT (INCLUDING PATCHING)

A. In areas of new paving, or where existing paving has been removed during the demolition phase of work, new asphaltic concrete paving shall be placed over compacted base aggregate.

B. Place base aggregate as required to attain a total depth of 6 inches (or 4 inches, where indicated in Drawings) and compact to 95 percent density.

1. Patching: If existing base material does not meet requirements for density, the Contractor shall remove the existing base material in the areas to be patched and install new base aggregate to a depth of 6 inches and compact to 95 percent density.

2. New asphaltic concrete pavement: Place 6 inches (or 4 inches, where indicated in Drawings) of base aggregate and compact to 95% density.

C. Install new Class B asphalt per paragraph 3.07. The minimum asphalt thickness (for vehicular paving) shall be 2 1/2 inches. The maximum thickness shall be 3 1/2 inches. See the Drawings for asphalt thicknesses depending on design application.

1. New asphalt patching shall meet the grade of adjacent existing asphaltic concrete paving (to remain). Edges of new and existing pavement shall be flush without ridges or gaps.

2. New walkway pavement edges shall be tapered to meet the existing or proposed grade.

3.5 SURFACE PREPARATION AND STERILANT

A. All new areas to be paved shall be sterilized with a minimum of twenty (20) pounds polybromchlorate per 1,000 square feet of surface, mixed with water and applied with sprayer after installation of the base aggregate material is completed.

3.6 PREPARATION - TACK COAT

A. Apply tack coat in accordance with WSDOT Standard Specifications.

B. All new asphaltic concrete pavement patching shall be allowed sufficient time to cure before
applying the tack coat. All pavement shall be cleaned prior to beginning tack coat application.

C. The asphalt tack coat shall be installed uniformly in controlled amounts throughout the area to receive paving fabric. Apply tack coat at the rate of 0.20 - 0.30 gallons per square yard (optimum application rate is 0.25 gallons per square yard) using a mechanical distributor meeting the requirements of WSDOT Standard Specifications Section 5-04.3(5)A. Tack coat application rates may be monitored by the Engineer to verify compliance with this paragraph.

D. The allowable temperature range for tack coat material is 290 - 325 degrees Fahrenheit.

E. Where the new asphaltic concrete abuts a curb or gutter, cold pavement joint, trimmed meet line, or any metal surface, a thin tack coat of asphalt shall be applied on the vertical face of the abutting surface by hand painting prior to paving. The application on the contact surfaces shall be thin and uniform to avoid an accumulation of excess asphalt in puddles. The Contractor shall not apply the tack coat on vertical contact surfaces above the finished height of the asphalt concrete being placed. Tack coat to extend three inches beyond the edge of the fabric area.

3.7 PREPARATION – SEAL COAT

A. Pavements surfaces shall be prepared for application of a seal coat in accordance with WSDOT Standard Specifications Section 5-02.3(2)B and 5-02.3(2)C.

B. Prior to application of seal coats, all cracks shall be repaired in accordance with WSDOT Standard Specifications Section 5-02.3(2)E.

C. Application of the emulsified asphalt seal coat shall be performed in accordance with WSDOT Standard Specifications Section 5-02.3(3).

3.8 PLACING ASPHALTIC PAVEMENT

A. Placement:

1. A course of asphaltic concrete shall be installed to the lines and grades as indicated on the drawings.
2. The hot plant mix shall have an installation temperature of 275-300 degrees.
3. Compaction thickness shall be as shown on Drawings but in no case shall the compacted thickness be less than two inches (2").
4. Compaction shall be by rolling with a powered steel wheel tandem roller weighing not less than three (3), and not more than five (5) tons; the finish roller weighing not less than one (1) ton.
5. The hot plant mix shall be spread by methods and in a manner to produce a uniform density and thickness to meet a tolerance of one-fourth inch (1/4") in ten feet (10') measured in any direction.
6. If binder course specified, place to compacted thickness as indicated in Drawings. Place asphalt binder course within 24 hours of applying primer or tack coat.
7. Place asphalt within 24 hours of applying primer or tack coat, or within 24 hours of placing and compacting binder course.
8. Compact each course by rolling to specified density in accordance with WSDOT Standard Specification 5-04.3(10) Compaction. Do not displace or extrude pavement from position.
9. Hand compact in areas inaccessible to rolling equipment.
10. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

B. Curing and Cleaning:

1. New asphalt pavement must be completely cured (minimum of seven days of warm, dry weather, longer if cold or damp), prior to application of any materials.
2. Pavement needs to be clean and free of all foreign matter.
3. A high-pressure washer, air broom or hand sweeper shall be used; removal of grease and oil requires the use of a strong detergent. After using detergents, the surface must be thoroughly flushed with water.

3.9 TOLERANCES

A. Flatness: In accordance with WSDOT Standard Specifications Section 5-04.3(13) Surface Smoothness.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from Indicated Elevation: Within 1/4 inch.

3.10 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Take samples and perform tests in accordance with WSDOT Standard Specifications Section 5-04.3(10) B Control.

3.11 PROTECTION OF FINISHED WORK

A. Immediately after placement, protect pavement from mechanical injury and do not permit vehicular traffic until the surface temperature is less than 140 degrees F, and in no case sooner than six hours after placing or per WSDOT Standard Specifications, whichever is more stringent.

END OF SECTION
SECTION 321300 - CONCRETE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish all material, labor, services, and related items required to complete concrete paving work indicated on drawings and/or specifications. The items of work to be performed shall include but are not necessarily limited to:

1. Concrete Paving
2. Concrete Paving Joint Sealants
3. Aggregate base course
4. Sitework: Including concrete pads, walkways, curbs, ramps, and associated work

1.02 REFERENCES

A. This Section references the latest revisions of the following documents. They are a part of this Section as specified and modified. In the case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

2. American Concrete Institute (ACI) Specifications for Structural Concrete for Buildings, ACI 301, or latest edition
3. ACI Recommended Practice for Selecting Proportions for Concrete, or latest edition
4. ACI Recommended Practice for Cold Weather Concreting, ACI 306, or latest edition
5. ACI Recommended Practice for Hot Weather Concreting, ACI 605, or latest edition
6. ACI Recommended Practice for Concrete Formwork, ACI 347, or latest edition.

1.03 SUBMITTALS

A. The Contractor shall submit to the Project Representative materials containing the following information:

1. Procedures to be used in the construction regarding the responsibility of the Contractor and all sub-contractors involved
2. Furnish samples, manufacturer’s product data, test reports, and materials certifications as required in reference sections for concrete products, expansion joints, fillers, sealants, etc.
1.04 QUALITY ASSURANCE

A. Concrete mix, design, and testing shall comply with requirements of applicable Division 3 for concrete mix design sampling and testing, and quality control, and as herein specified.

B. Notify Project Representative a minimum of 48 hours prior to concrete pour, for inspection of forms, etc.

PART 2 - PRODUCTS

2.01 AGGREGATE BASE COURSE

A. Aggregate for base for all Base Bid asphalt paving: Crushed Surfacing Base Course (CSBC) conforming to WSDOT Standard Specifications Section 9-03.9(3)

2.02 DRAIN ROCK

A. Sizes as follows: 1/2”-1-1/4” mix, or as noted on plans.

2.03 FORMS

A. Steel, wood, or other suitable material of size and strength to resist movement during concrete placement. Use straight forms, free of defects. Use flexible spring steel forms or laminated boards to form curved edges.

B. For footings and concrete slabs: Fabricate forms of MDO plywood, metal or plastic as judged best suited for shapes. Construct with a minimum of joints, sufficiently tight to prevent leakage.

2.04 FORM RELEASE AGENT

A. Release agent with non-staining and non-interference characteristic with bonding capabilities of paints, plasters, adhesives, other surface coatings or materials. Contractor shall guarantee proper bonding of such subsequent coatings or materials applied over concrete.

2.05 STEEL REINFORCEMENT

A. Reinforcing bars to be deformed steel bars, ASTM A 615, Grade 40

2.06 EPOXY COATED STEEL REINFORCING BAR

A. Coating of epoxy-coated rebar must be per AASHTO M284

B. Steel reinforcing bar
SCHAFER STATE PARK
CAMPGROUND RELOCATION

2.07 EPOXY GROUT

A. Epoxy grout shall be a 2-component epoxy resin-based system, per ASTM C881

B. Shall be a Type I or Type IV bonding agent used for bonding hardened concrete to hardened concrete and other materials

2.08 EXPANSION JOINT MATERIALS

A. Joint Filler: Preformed non-extruding resilient material; ASTM D1752, Type I, ¼-inch wide by depth required to bring top surface within ¾ inch of slab surface or as noted on the plans.


2.09 EXPANSION JOINT AND COLD JOINT DOWELS

A. Construct Speed Dowel joints at modules not larger than 20’ -0” x 20’ -0”

B. Dowel schedule to match rebar schedule and at a minimum spacing of 18” OC. Dowels shall be steel smooth and free of dirt, grease, and oils. Size per the drawings. Encase 50 percent of each dowel in a speed dowel plastic sleeve to allow the parallel movement of each dowel. Verify steel dowel to speed dowel tolerance to ensure a snug fit.

1. Provide and install Greenstreek speed dowel or approved equal. Contact Greenstreek at (800) 325-9504 or http://www.greenstreek.com

2.10 CONCRETE MATERIALS

A. Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

B. Concrete shall be 2500 PSI minimum compressive strength at 28 days.

C. See structural notes on drawings

2.11 CONCRETE SEALER

A. Clear non-glossy sealer for concrete flatwork. Protectosil Aqua-Trete SG or approved equal
PART 3 - EXECUTION

3.01  BARRIERS

A. The Contractor shall erect and maintain barricades, canopies, guards, lights, and warning signs to the extent required by law and as is prudent for the protection of the public and protection of the work.

3.02  SURFACE PREPARATION

A. Establish subgrade at elevations required to achieve the slopes and finish grade elevations designated on the drawings. The Contractor shall schedule the Project Representative for a subgrade inspection prior to the installation of the concrete.

B. Compact subbase to 95 percent compaction using a mechanical roller or compactor. Remove loose material from the compacted subbase surface immediately before placing concrete. Proof roll prepared sub base to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.03  FORM CONSTRUCTION

A. Set forms to required grades and lines, rigidly braced and secured. Install a sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8 inch in 10 feet
2. Vertical face on the longitudinal axis, not more than 1/4” in 10 feet

C. Apply adequate release agent to form to ensure clean ease of removal from cured concrete

D. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage. Release agents must be approved in writing by the manufacturer of concrete sealers specified herein.

3.04  REINFORCEMENT

A. Locate, place, and support reinforcement as specified in Division 3 sections, unless otherwise indicated

3.05  CONCRETE PLACEMENT

A. Comply with requirements of Division 3 sections for mixing and placing concrete and as specified herein
B. Do not place concrete until checking the subbase and forms for line and grade. Moisten sub-base, if required to provide a uniform dampened condition at time concrete is placed.

C. Give notice of intention to place concrete to the Project Representative at least 48 hours before an intended pour.

3.06 FORMWORK REMOVAL

A. Remove all formwork after proper curing of concrete. Protect surfaces of concrete during removal operations.

B. Formwork not supporting the weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete. The concrete must be sufficiently hard so as not to be damaged by form removal operations and provided curing and protection operations are maintained.

3.07 REUSE OF FORMWORK

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing materials will not be acceptable for reuse. Apply new form-coating material as necessary, as specified for new formwork.

3.08 REPAIR OF SURFACE DEFECTS

A. General: Conform to ACI 301, Chapters 9 and 13. After removal of forms, repair or patch concrete not formed as shown, out of alignment or level beyond required tolerances or that shows surface defects, to condition as verified by Project Representative. Immediately after form removal, patch all tie holes and repairable defective areas.

B. Remove honeycombed areas to sound concrete, but not less than 1” minimum depth. Dampen area and to 6” width around same; let evaporate only to loss of sheen. Provide a bond of neat cement and water slurry well brushed into the area to be patched. Provide patching mixture of 1:2 (cement:sand) or verified proprietary patching mixture or color to match adjacent surfaces; use water quantity only as required for mixing and placing. Leave patched surface slightly high; after one hour, float to level with the adjacent surface. Keep patched areas damp for seven days.

3.09 JOINTS

A. Refer to ACI 302 “Guide for Concrete Floor and Slab Construction,” most recent edition, for work under this Section.

B. Construct expansion, control, and cold joints true to line with face perpendicular to the surface of the concrete

C. Cold and Contraction Joints

1. Provide cold and control joints, dividing the concrete areas as indicated on the Drawings.
2. Form control joints and cold joints in fresh concrete by grooving the top portion with a recommended cutting tool and finishing edges with a jointer. Place a tooled joint first.

3. Form control joints and cold joints in hardened concrete using powered saws equipped with shatterproof abrasive or diamond rimmed blades. Cut joints into curing concrete as soon as the surface will not be torn, abraded, or otherwise damaged by cutting action.

4. Construction (cold) and sawcut contraction (control) joints in locations indicated on the plans.

5. Perform jointing with a new diamond tip circular saw.


7. Depth of sawcuts: 1/4 depth of slab.

8. Sawcut joints in a straight line or as noted on the plans with no overcutting, and with face perpendicular to the concrete surface.

9. Use a hand tool to sawcut up to vertical edges such as walls, steps, curbs, and columns. No cutting into vertical surfaces will be allowed.

D. Expansion Joints:

1. Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.

2. Locate expansion joints, as noted on drawings.

3. Groove top portion with a recommended cutting tool and finishing edges with a jointer.

4. Extend joint fillers full width and depth of joint and not less than ½ inch or more than 1 inch below finished surface where the joint sealer is indicated. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect the top edge of joint filler during concrete placement with a metal or plastic temporary strip. Remove protection after the concrete has been placed on both sides of the joint before sealant is applied.

5. Joint Sealer: Install sealer per manufacturer recommendation. Seed sealer with sand to cover the surface.

3.10 CONCRETE FINISHING

A. After striking off and consolidating concrete, smooth surface by screening and floating, use hand methods only where mechanical floating is not possible. Adjust floating to compact surface irregularities and refloat repaired area to provide a continuous smooth finish.

B. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete finishing as follows:

1. Install tool grid as indicated on the plan

2. Do not remove forms for 24 hours after concrete placement. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by the Project Representative.

3. Light broom finish after the concrete has reached 75% strength or after the concrete has reached a minimum 2000 psi. The Project Representative shall approve the sample broom finish area.

4. Provide specified finish after the concrete has reached 75% strength or after the concrete has reached a minimum 2000 psi. The Engineer shall approve the sample finish area. Once
the time of finishing is determined through testing, all subsequent finish shall be done at the same concrete age for uniformity of appearance.

3.11 CURING

A. Protect and cure finished concrete paving, complying with applicable requirements of Division 3 sections. Use curing and sealing compound or approved moisture curing method.

B. Sealer: After the flatwork is completely dry, apply a clear, non-yellowing acrylic sealer to the surface uniformly according to the manufacturer’s recommendation. Submit sealer for approval by the Project Representative.

3.12 PROTECTION

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperature. Maintain without drying at a relatively constant temperature for the time necessary for hydration of cement and proper hardening. Protect from vandalism.

B. Protect all concrete during the curing period from all damaging mechanical disturbances, especially load stresses, heavy shock, and excessive vibration. Protect finishes from all damage.

3.13 TOLERANCES

A. The surface elevation, in the finished condition, shall not deviate more than 1/8” from specified elevations. Trueness measurement to be taken from 10’ long straight edge placed in all directions.

3.14 CLEAN-UP

A. Repair and replace broken or defective concrete as directed by the Project Representative.

B. Protect concrete from damage until acceptance of work. Exclude traffic from the pavement for at least fourteen (14) days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

C. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

END OF SECTION
SCHAFER STATE PARK
RELOCATE CAMPGROUND

SECTION 321500 – PATHS AND CRUSHED ROCK PADS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all material, labor, services, and related items required to complete trail and crushed rock pad construction work indicated on drawings and/or specifications. The items of work to be performed shall include but are not necessarily limited to:

1. Trail/path/pad sub-grade preparation
2. Crushed Rock paving, ramps and associated work
3. Crushed rock tent pads and fire ring pads

1.2 REFERENCES

A. This Section references the latest revisions of the following documents. They are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

B. WSDOT Standard Specifications for Road, Bridge and Municipal Construction

1.3 SUBMITTALS

A. The Contractor shall submit to the Project Representative materials containing the following information:

1. Procedures to be used in the construction in regard to the responsibility of the Contractor and all sub-contractors involved.
2. Furnish samples, manufacturer’s product data, test reports, and materials certifications as required in reference sections for crushed rock, geotextile, etc.

1.4 QUALITY ASSURANCE

A. The Contractor is responsible for checking the quality of work and shall perform compaction and density tests on request of the owner to check compliance with these specifications. The Contractor shall employ, at their expense, a testing lab acceptable to the Project Representative to perform such soil tests as specified herein. Five copies of the test results, signed and sealed by a registered professional engineer, shall be submitted to the Project Representative for review.

B. All test results must indicate conformance to this specification before proceeding with related work. If, in the opinion of the Project Representative, crushed rock paved areas which have been placed are below specified density, the Contractor shall provide additional compaction and testing at his expense. The Project Representative shall have the authority to accept or reject any or all testing agencies, testing methods, or locations selected by the Contractor. The Contractor shall
provide three (3) days advance notice to the Project Representative when tests are required to be performed.

C. Submit the following to the Project Representative:

1. Field density - AASHTO T191-61. One field density test in three areas of compacted crushed rock paving as designated by the Project Representative.
2. Submit a sample of crushed rock material naming supplier.

D. The area to be cleared shall be to the dimensions shown on drawings or 1 foot beyond fill or backslope catch points.

E. Grades, Lines and Levels

1. Known benchmarks, monuments, physical characteristics, legal limits, property lines, and approximate utilities locations are as shown on drawings. The work is laid out in relation to existing trees and established facilities as indicated on drawings.
2. Employ a licensed civil engineer or land surveyor to lay out the work and establish all points, lines, grades, and levels from such points, reference lines, and datum as indicated on the drawings. The Contractor will be held responsible for the accuracy of his work.
3. Provide all such stakes, spikes, steel pins, templates, platforms, equipment, instruments, men, rodmen, chainmen, etc., as may be required in laying out any part of the work.
4. Provide all stake out and locations of the various portions of the work and provide such lines and grades as are necessary, in their opinion, for the proper construction and drainage of the Project as required on drawings. Verify stakeout on-site with Project Representative prior to starting trail construction.
5. Submit all layout data to Project Representative for approval prior to beginning work.
6. Maintain and preserve all stakes and other marks established until authorized to remove them; if the Contractor destroys such marks through his negligence before their authorized removal, and if required by the Project Representative, they shall be replaced by the Contractor at his expense.

F. All debris, trees, logs, limbs, branches, brush, plants, and other protruding obstructions within the clearing limits shall be removed and appropriately disposed of.

PART 2 - PRODUCTS

2.1 CRUSHED ROCK PAVING

1. 5/8” Minus Crushed Rock, fractured all sides. Gradation shall be:

<table>
<thead>
<tr>
<th>SIEVE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8” square sieve</td>
<td>100%</td>
</tr>
<tr>
<td>1/2” square sieve</td>
<td>90-100%</td>
</tr>
<tr>
<td>1/4” square sieve</td>
<td>45-66%</td>
</tr>
<tr>
<td>US No. 40 sieve</td>
<td>10-25%</td>
</tr>
<tr>
<td>US No. 200 sieve</td>
<td>7% maximum</td>
</tr>
</tbody>
</table>
2. Crushed Rock Surfacing for tent pads and fire ring pads shall be manufactured from ledge rock, talus, or gravel in accordance with the provisions of WSDOT Standard Specifications Sections 3-01 and 9-03 for Crushed Surfacing Top Course except that it shall meet the following specifications for grading:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4 (1/4&quot;)</td>
<td>98-100</td>
</tr>
<tr>
<td>#10</td>
<td>55-60</td>
</tr>
<tr>
<td>#40</td>
<td>18-20</td>
</tr>
<tr>
<td>#200</td>
<td>4-6</td>
</tr>
</tbody>
</table>

The above material is available from a variety of local sources and is generally referred to as “#4 to dust.”

PART 3 - EXECUTION

3.1 BARRIERS

A. The Contractor shall erect and maintain barricades, canopies, guards, lights and warning signs to the extent required by law and as is prudent for the protection of the public and protection of the work.

3.2 SURFACE PREPARATION

A. Compact subgrade to 92 percent compaction using mechanical roller or compactor. Remove loose material from the compacted subbase surface. Proof roll prepared subgrade to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.3 CONSTRUCTION

A. Granular fill shall be used in the construction of pathway embankments and backfill for structures and other purposes shown on the drawings. Compaction per Section 312000 – Earth Moving.

B. Before placing embankment, all duff and litter shall, unless otherwise shown on the drawings, be removed from within pathway limits and uniformly spread outside of clearing limits, not more than 4 inches in depth and so placed as not to obstruct drainage.

C. Excess and unsuitable excavation shall be removed from the site.
PATHWAY/TRAIL/PAD EXCAVATION AND EMBANKMENT/BACKFILL

A. Excavation and embankment/backfill shall be accomplished to meet the lines and grades shown on the drawings and designated on the ground.

B. The pathway, tent pad and fire ring pad cross-section shall be constructed in accordance with the drawings.

C. All embankment/backfill beneath trail tread/pad shall be constructed of imported compacted granular fill material or suitable on-site material. All disturbed soil within the trail bed/pad area shall be re-compact per specifications.

CLEAN-UP

A. Keep paths and all crushed rock surfacing clean and free of stains, discolorations, dirt and other foreign material and rake clean just prior to final inspection.

END OF SECTION
SECTION 321713 – PARKING BUMPERS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. This section consists of parking bumpers and anchorage.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Parking bumpers

1. Parking bumpers shall be precast concrete, conforming to the following:

a. Nominal size

1) 5 inches high, 9 inches wide, 6 feet long

b. Cement

1) ASTM C150, Portland Type I, normal, white color

c. Concrete materials

1) ASTM C33 aggregate, water, and sand

d. Reinforcing steel

1) ASTM A615/A615M, deformed steel bars, unfinished finish, strength and size commensurate with precast unit design

e. Air entrainment admixture

1) ASTM C260

f. Concrete mix

1) Minimum 5,000 psi, 28-day strength, air entrained to 5 percent to 7 percent.

g. Use rigid molds, constructed to maintain precast units uniform in shape, size, and finish. Maintain consistent quality during manufacture.

h. Embed reinforcing steel, and drill or sleeve for 2 dowels.
i. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

j. Minor patching in plant is acceptable, providing appearance of units is not impaired.

B. Dowels shall be hot dip galvanized 5/8 inch bolts with mushroom heads, 18 inches long.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install units without damage to shape or finish. Replace or repair damaged units.

B. Install units in alignment with adjacent work.

C. Fasten units in place with 2 dowels per unit.

END OF SECTION
SECTION 321723 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work includes constructing pavement markings and traffic control signage for the parking areas as indicated on the drawings.

1.2 STANDARD SPECIFICATIONS

A. All work shall conform with the current edition of Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation (WSDOT), unless otherwise indicated herein.

B. The Contractor shall have one copy of the Standard Specifications and Standard Plans at the job site.

C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

PART 2 - PRODUCTS

2.1 PAINT

A. Paint for pavement markings shall comply with Section 9-34 of the WSDOT Standard Specifications. The paint shall be factory mixed, quick drying and nonbleeding. Colors shall be as indicated on the drawings.

2.2 PLASTIC

A. Plastic for pavement markings shall be one of the following:
   1. Plastic - Pressure Sensitive Marking Material

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>NAME BRAND</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prismo Universal Co.</td>
<td>Prismo Brand</td>
<td>60 mil</td>
</tr>
<tr>
<td>Prismo Universal Co.</td>
<td>Prismo Brand</td>
<td>90 mil</td>
</tr>
<tr>
<td>3M Company</td>
<td>Stamark 5730 Series</td>
<td>60 mil</td>
</tr>
<tr>
<td>3M Company</td>
<td>Stamark 350 Series</td>
<td>60 mil</td>
</tr>
</tbody>
</table>
SCHAFER STATE PARK
RELOCATE CAMPGROUND

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Identification</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lafrentz Road Service Ltd.</td>
<td>Lafrentz Thermoplastic</td>
<td>125 mil</td>
</tr>
<tr>
<td>Pave-Mark Corporation</td>
<td>Pave-Mark Hydrocarbon</td>
<td>125 mil</td>
</tr>
<tr>
<td>Pave-Mark Corporation</td>
<td>Pave-Mark Alkyd</td>
<td>125 mil</td>
</tr>
<tr>
<td>* Swedish A.B. Cleanosol</td>
<td>Cleanosol IT</td>
<td>125 mil</td>
</tr>
</tbody>
</table>

* Approved for installation in Western Washington only

B. Colors shall be white or as indicated on the drawings.

2.3 SIGNS

A. Washington State Disabled Parking signs shall be as specified in 104320 Exterior Signs and Signposts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pavement markings installation shall conform with Section 8-22.3 of the WSDOT Standard Specifications, except that the Contractor shall be responsible for all layout and control points, striping shall not deviate more than 1/4-inch in 10 feet from a straight line and striping shall not be more than 1-inch from the specified locations. Paint striping shall only be applied after the pavement has been allowed to cure 14 days minimum, when the pavement is clean and dry and when the temperature is above 50 degrees F.

B. Signs shall be located and installed as shown on the plans. All signposts shall be plumb and all signs shall be level, as specified in 104320 Exterior Signs and Signposts.
SECTION 323100 – FENCES AND GATES

PART 1 – GENERAL

1.1 DESCRIPTION:

A. Furnish all labor, materials, and equipment required to install fencing and gates as indicated on the Drawings and/or specified herein. Said work shall include any incidentals required to provide a finished job.

B. Work includes the following:

1. Metal Gates
2. Wood Fences and Gates

1.2 EXISTING CONDITIONS:

Examine the site to determine existing conditions, extent of work and clearing operations required. Failure of the Contractor to visit the site and familiarize themselves with the existing conditions shall in no way relieve them from obligations with respect to their bid or contract.

1.3 QUALITY ASSURANCE:

A. The installer must be experienced in fence installations. Contractor shall provide three representative fence projects for Project Representative's review.

B. Thoroughly inspects site, related work, and Owner-supplied materials (where applicable). Notify Project Representative before bidding of any conditions adversely affecting the performance of fencing.

C. Contractor shall provide warranty stating that the fencing is secure and stable, tight, corrosion-free (for metal components), in proper alignment, complete in detail and finish, and free of hazardous conditions. Any defects that develop within one year from the date of Physical Completion shall be replaced at the expense of the Contractor.

D. Standard Specifications:

1. All work shall conform to all applicable requirements of the following Standard Specifications, whether specifically referred to or not, except as specifically modified herein.

   a. ASTM Committee F-14 Standards on Fences (latest edition)
   b. Perform all shop and field welding in accordance with the pertinent recommendations of the American Welding Society
   c. Pipe ASTM A-53
   d. Installation ASTM F-567
1.4 SUBMITTALS:

A. Contractor to provide certified letters from manufacturers indicating conformance with specifications, manufacturing date and lot number for all materials used on the site.

B. Contractor to provide shop drawings for cedar split rail gate for Project Representative approval.

1.5 SUBSTITUTIONS AND PRODUCT OPTIONS

(Note: Comply with this paragraph unless specified otherwise in the General conditions of Project manual.)

A. During bidding all bidders shall bid on the specified products

B. When, in the judgment of the Project Representative, a substitution would be in the Project Representative's interest, in terms of cost, time, or other consideration, and the Project Representative concurs a substitution may be proposed for Project Representative consideration.

1.6 PRODUCT HANDLING:

A. All materials are to be new and delivered to the site in an undamaged condition. Store materials off the ground and protect from damage. In the event of damage, immediately make repairs and/or replace as necessary to the approval of the Project Representative and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.1 GENERAL

A. All piping gates shall be Schedule 40 hot-dipped galvanized steel or approved equal for size, finish, material composition, strength, appearance, performance and ease of maintainability.

B. All gate fittings shall comply with ASTM F626-89a

C. All gate piping and fittings shall be galvanized and powder coated, color: black

2.2 SWING GATE

A. Swing Gate shall consist of galvanized steel pipe welded fabrication in compliance with ASTM F900. Gate frame member 1.900 in. OD ASTM F 1083 sch.40 galvanized steel pipe or as indicated in the Drawings. Welded joints protected by applying zinc-rich paint in accordance...
with ASTM practice A780. Galvanized malleable iron or heavy gauge pressed steel post and frame hinges. Provide lockable drop bar and gate holdbacks with double gates. Gateposts per ASTM F1083 sch.40 galvanized steel pipe. Gatepost as called out on the Drawings.

B. Gate Hardware: fork type latch with gravity drop; center gate stop and drop rod; and as called out on the Drawings.

C. Provide and install sleeving to receive drop rod.

D. Provide the Project Representative with 3 sets of heavy duty padlock and keys, for each lockable gate. Master Lock or approved equal. Submit sample for approval.

E. Submit Shop Drawings of vehicular access (single & double) gates, for Project Representative Approval.

2.3 CEDAR RAIL FENCE

A. Provide cedar split rail fence and gate components and all materials needed to securely install fence per Drawings.

2.4 WOOD FENCE AND GATE

A. Wood Fence: facing and rails shall be Premium grade, tight-knot cedar. Pressure-treated Hem Fir shall be used for all posts, top rails and stringers.

2.5 Miscellaneous Materials and Accessories

A. Concrete Footings:

1. Refer to the Drawings for dimensions of all concrete post footings. Concrete for post footings shall be Class “C” concrete, conforming to Division 03 Concrete. Concrete footings shall be neatly and evenly crowned slightly above finished grades and all concrete shall be cleaned from all posts.

PART 3 – EXECUTION

3.1 SITE PREPARATION:

A. On-site Conference: Do not work until a site meeting with the Project Representative is held to confirm site preparation.

B. Contractor is responsible providing temporary barricades and enclosures, and protection of adjacent property and existing work. Barricades are to be in place before construction operations are started. Coordinate this work with other on-site work and trades. Complete clearing and site preparation work is required prior to excavation.
C. Contractor shall not allow fence materials to become scratched, gouged or damaged in any way during the storing or construction of the fence.

D. Approval of stakeout will be required by Project Representative prior to construction of fence.

3.2 FENCE CONSTRUCTION

A. Swing Gates

1. Installation of swing gates and gateposts shall be in compliance with ASTM F 567. Direction of swing shall be (inward or outward, as directed by Project Representative). Gates shall be plumb in the closed position having a bottom clearance of 3 in., grade permitting. Hinge and latch offset opening space shall be no greater than 3 in. in the closed position. Double gate drop rod sleeving to receive rod shall be set in a concrete footing minimum 10 in. diameter 24 in. deep.

B. Cedar Rail and Wood Fence and Gates:

1. Install cedar split rail fence and gate and wood fence and gate per Drawings. Rails shall be securely fastened to posts.
2. Auger holes for post footings in firm, undisturbed or compacted soil. Holes for new post footings shall be sized as shown on plans and standard details.
3. Over excavate hole depths to 6 inches deeper than post bottoms
4. Place concrete or crushed rock as specified on plans around posts in a continuous placement, tamp for consolidation, checking each post for vertical and top alignment. Support posts plumb until concrete has cured. Set and secure other accessories into concrete as required.
5. Tops of post footings shall be flush with finished grade, troweled (if concrete) and sloped outward to drain. Top of footing shall appear true and circular in shape with post at center of circle.

3.3 CLEANUP:

A. Job site shall be cleared of all excess materials. All areas impacted by construction shall be leveled with planting soil, be free of all debris and rocks, and be restored to proposed grades and condition, as approved by the Project Representative.

END OF SECTION
SECTION 329000 – LANDSCAPING

PART 1 - GENERAL

1.1 WORK DESCRIPTION

A. Provide trees, shrubs, and ground cover, as shown and specified. Work includes the following:

   1. Planting Preparation
      a. Soil Preparation
         1) Store salvaged topsoil
         2) Install salvaged topsoil
         3) Establish plants
         4) Mulch

   2. Turf and Grasses
      a. Hydro-Seeding

   3. Plants
      a. Plants
      b. Ground Covers
      c. Shrubs
      d. Trees

1.2 REFERENCED STANDARDS

A. General: Any material specified by reference to the number, symbol, or title of a specific standard, such as commercial, federal specification, a trade association standard or other similar standards, shall comply with the requirements in the latest revision thereof and any amendment with supplement thereto in effect on the date of invitation for bids, except as limited to type, class or grade, when modified in such reference.

B. Plant Materials: All plant material shall meet the American Association of Nurserymen Standard ANSI Z60.1 latest edition. Plant names shall conform to the most recent edition of “Standardized Plant Names” as adopted by the American Joint Committee of Horticulture Nomenclature.

C. Agricultural Chemist: Qualified, experienced public or private soils testing laboratory, capable of providing test results as specified and approved by the Owner.
1.3 TIME

A. Place seed during periods that are normal for such work as determined by the season, weather conditions, and accepted practice.

B. Critical Planting Dates:
   1. All planting to be completed fall. Planting can take place between September 15th through November 15th if the ground in not frozen.
   2. All seeding to be completed between September 20th through October 15th.

1.4 PROJECT CONDITIONS

A. Work notification: Notify Project Representative at least seven (7) working days prior to the installation of plant material.

B. Protect existing utilities, paving, and other facilities from damage caused by planting operations. Confine work to designated areas.

C. Prepare soil and place seed during periods that are normal for such work as determined by the season, weather conditions, and accepted procedures.

D. Plant trees, shrubs, and groundcovers, only during acceptable periods. See 1.3.

E. Coordinate planting work with soil preparation.

F. Existing conditions:
   1. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, the conformation of the ground, the nature of subsurface condition, the character of equipment and facilities needed prior to and during the execution of the Work.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil
   1. Acceptable Sources:
      a. Use on-site stockpile
2.2 SOIL AND SOIL AMENDMENTS

A. Stripped On-Site Soil: Strip and stockpile clean on-site soil from designated areas as directed by Project Representative. Remove all vegetation, including roots prior to stripping. Remove all excess topsoil from the site as required.

2.3 BACKFILL SOIL MIX

A. Backfill soil mix for plantings shall be “Topsoil” as indicated above.

2.4 WOOD FIBER MULCH

A. “Conwed Fibers Hydromulch 1000 with Triflo” as manufactured by PROFILE PRODUCTS LLC, or an approved equal.

2.5 MULCH (HOG FUEL)

A. Mulch shall be ground wood, brush and/or stumps of Fir, Hemlock, Pine, and Alder chips ranging in size 3” – 5” long by ½ inch by 1 inch in diameter. Mulch shall not be shavings and contain ground leaves.

B. Mulch shall be processed to reduce weed seed, pathogens, and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides, or other chemical residues that would be detrimental to animal/plant life. There shall zero presence of deleterious material such as, not but limited to, plastic, glass, metal, or rocks.

2.6 SEED MIX

A. Seed shall be labeled in accordance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect on the date of the bids. Seed shall be furnished in sealed standard containers unless exception is granted in writing by the Project Representative. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be acceptable. The minimum percentage by weight of germination and percent purity in each lot of seed shall be the highest available.

B. The seed mix shall be “DOT Multipurpose” as produced by SUNMARK SEEDS or equal.

2.7 PLANT MATERIALS

A. Genera, species, and variety, quantity, size, and conditions shall be as indicated on the Drawings and Plant Material Listing.

B. All grafts or budding on trees shall be at ground level except higher grafts of budding with compatible trunk, and the Project Representative may approve branch growth characteristics.
2.8 LANDSCAPE ROCK/BOULDERS

A. Reuse of on-site boulders. Save and protect on-site boulders for installation into site features as shown on the drawings. Intermix on-site boulders placement with imported boulders. See plans for location and installation.

PART 3 - EXECUTION

3.1 TREE PROTECTION

A. Refer to 015639 – Temporary Tree and Plant Protection

3.2 INSPECTION

A. Finish grading shall be inspected and approved by the Project Representative prior to planting. Verify that planting bed grades and layout are in accordance with those indicated on the Project Grading and Drainage, and Layout Drawings before proceeding with Work.

B. Soil conditions:
   1. Source from existing stockpile topsoil and place in the areas of new plantings, see 3.5
   2. Planting work shall not begin until soil and planting conditions are satisfactory and have been approved by the Project Representative
   3. Verify that rough finish grades, slopes of planting areas are acceptable to the Project Representative prior to commencing work of this Section
   4. Work required under this Section will not begin until conditions are satisfactory

C. Locate all utilities prior to the commencement of work. Take all necessary precautions to avoid disturbing or damaging sub-surface elements. If subsurface elements are uncovered, promptly notify the Owner.

3.3 LANDSCAPE ROCK/ BOULDER INSTALLATION

A. Handling: Rocks to be handled with care and caution to prevent scraping and other disfigurements

B. Placement: Place rocks per Drawings and under the supervision of Owner. All large rocks to be buried a minimum of one third its diameter or as directed by Owner. Subgrade below rocks to be compacted to 90% of original density.

3.4 PLANT LAYOUT

A. Contractor shall locate plants by staking with stakes and flags as indicated on the drawings or as approved by the layout of plants in the field. If obstructions are encountered that are not shown on the drawings, do not proceed until alternate locations have been selected by the Project
3.5 PLANTING OF TREES, SHRUBS, AND GROUNDCOVERS

A. Plant trees and shrubs upright
B. Excavate all planting holes twice the spread of the tree, shrub, or groundcover root ball or root system
C. Place 8” minimum lightly compacted layer of backfill soil mix under root system of each tree and shrub. Loosen planting hole subsurface to a depth of 4-6 inches prior to placement.
D. Loosen and remove burlap from around at least upper 1/2 of root ball, remove excess burlap.
E. Cut off cleanly all broken or frayed roots
F. Place and compact backfill of stockpile soil carefully to avoid injury to roots; fill all voids. When hole is nearly filled, completely fill with water and allow water to soak away. Fill holes to finish grade and prepare for other work indicated.
G. Mulch after planting is completed. See 3.6

3.6 MULCHING

A. Mulch shrub and groundcover planting beds with a 4-inch layer of mulch material within two days after planting. Cover entire bed areas, apply evenly and rake out smooth. Where individual trees are planted greater than 4 feet from another plant, provide a mulch circle, minimum 3 feet in diameter, around each tree. Plants located less than 4 feet apart shall be considered to be in planting beds.

3.7 SEEDED AREAS

A. Seed all areas as indicated on the plans.
B. Preparation: Use recycle stockpile topsoil to depth of 4”, remove stones over 1”, all sticks, roots, rubbish, and extraneous matter. All areas to be seeded shall be graded to a smooth even surface. Roll, rake, remove ridges, and fill depressions as required to drain.
C. Perform seeding operations when the soil is dry and when winds do not exceed 5 miles per hour velocity.
D. Apply seed by hydroseeding or with a rotary or drop type distributor. Install seed evenly by sowing equal quantities in 2 directions, at right angles to each other.
3.8 INSTALLATION

A. Excavate circular plant pits with scarified vertical sides, except for plants specifically indicated to be planted in beds. Provide planting pits at least twice the diameter of the root system or container. Depth of pit shall accommodate the entire root system. Scarify the bottom and sides of the pit to a depth of four inches.

B. Place specified planting soil for use around the balls and roots of the plants.

C. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb. Set crown of plant material at the finish grade. No filling will be permitted around trunks or stems or above grafts on grafted trees. Backfill the pit with specified soil. Do not use frozen or muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water.

D. After balled and burlapped plants are set, water the soil mixture around bases of balls and fill all voids.
   1. Remove all burlap, or plastic wrapping materials, twine, and wires, and wire baskets from root balls, or to lower ½ of the root ball as directed by Project Representative.
   2. If burlap has been chemically treated (having a green color), remove from the planting pit, if possible, without disturbing or breaking up rootball.

E. Space ground cover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting beds with the indicated quantity of plants.

F. Spread and arrange the roots of bare-rooted plants in their natural position. Work in specified planting soil. Do not mat roots together. Cut all broken and frayed roots before backfilling with remaining specified planting soil.

G. Bark Mulch: Cover shrub and groundcover planting beds with a 4-inch layer of bark mulch within two days after planting. Provide continuous coverage for the entire tree and shrub bed areas. Apply evenly, keeping all plant material free from coverage. Provide a minimum of 36” diameter mulch ring around each tree and shrub.

3.9 SEED INSTALLATION

A. All seeded areas shall be hydro seeded (or hand seeded, if re-seeding is necessary), as specified at rates indicated under materials. Verify the extent and location of seeded areas with Project Representative.

B. All seeded areas that do not show a prompt catch of grass, within 7 to 10 days after seeding, shall be re-seeded (as originally specified) at ten-day intervals until an acceptable stand of grass is assured.

C. Seed areas shall be hydro seeded with hydro-mulch, fertilizer, tacking agent, and moisture retention agent applied at rates specified in this section.

D. If required for re-seeding, hand seeded areas shall be top dressed after seeding with 1/4” to 1/2”
SCHAFER STATE PARK
RELOCATE CAMPGROUND

Growco for mulch.

3.10 MAINTENANCE

A. Keep premises free of weeds during the Contract period. Grub out weeds, including roots and crown, and remove from site.

B. Maintenance shall include:
   1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
   2. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.
   3. Water trees, plants, and ground cover beds within the first twenty-four (24) hours of initial planting.

3.11 ACCEPTANCE

A. Inspection to determine acceptance of planted areas will be made by the Project Representative, Contractor’s request. Provide notification at least ten (10) working days before the requested inspection date.

   1. Planted areas will be accepted, provided that all requirements, including the maintenance period, have been complied with, and plant materials are alive and in a healthy, vigorous condition.

B. Upon acceptance of maintenance period State Parks will assume plant maintenance.

3.12 CLEAN UP AND MAINTENANCE

A. Perform cleaning during the installation of the work and upon completion of the work. Remove from the site all excess materials, soil, debris, and equipment. Repair damage resulting from planting operations.

B. Keep premises reasonably free from accumulation of debris.

C. At completion of each area of work, remove all debris, equipment and surplus material.

D. Furnish temporary equipment such as tools, hose or other water equipment, and other equipment required for performance of maintenance work.

E. Maintenance of trees, shrubs, and ground cover plantings:

   1. Contractor shall assume full responsibility for the maintenance of all landscaping until such time as Contractor receives notice from the Owner that such landscaping has reached physical completion.
SCHAFER STATE PARK
RELOCATE CAMPGROUND

2. Irrigate when necessary to avoid drying out of plant materials and as required to promote healthy growth during the contract period

F. Maintenance of seeded areas:

1. Protect and maintain by watering, reseeding, weeding and repairing as required to establish thick, weed free, uniform stand of grass for 21 calendar days beginning after installation of seeded areas
2. No mowing of wet meadow mix is required

END OF SECTION
SECTION 330000 – UTILITIES GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Provide all site utilities shown on Drawings and specified herein.
B. Coordinate Work with utilities providing service and State Parks staff to complete all required connections and to minimize periods of service interruptions.
C. Refer to other Divisions of these Specifications for utility work within building.
D. Refer to Earthwork Division of these Specifications for trenching requirements.
E. Refer to civil and electrical drawings for description of utility Work and materials not included in this Division of Specifications.

1.2 SUBMITTALS

A. Submit for review by Architect manufacturer’s literature, cut sheets and data on utility products, piping and related accessories.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION
PART 1 - GENERAL

1.1 DESCRIPTION

   A. The work in this Section includes utility piping systems, plumbing piping systems, pipe pressure testing, and pipe cleaning.

1.2 REFERENCES

   A. American National Standards Institute (ANSI)
      1. B16.5, Pipe Flanges and Flanged Fittings

   B. American Society for Testing and Materials (ASTM)
      1. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
      5. A234, Standard Specification for Pipe Fittings of Wrought Carbon Steel Alloy Steel for Moderate and Elevated Temperatures
      7. A518, Corrosion – Resistant High – Silicon Iron Castings
      8. A774, As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures
      9. A778, Welded, Unannealed Austenitic Stainless Steel Tubular Products
     12. B306, Copper Drainage Tube CDWV
     14. C361, Standard Specification for Reinforced Concrete Low Head Pressure Pipe
     15. C443, Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
     16. C564, Rubber Gaskets for Cast Iron Soil Pipe and Fittings
     17. C924, Standard Practice for Testing Concrete Sewer Lines by Low Air Pressure Test Methods
     18. C1103, Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
     19. D1248, Polyethylene Plastics Molding and Extension Materials
     20. D1785, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
22. D2466, Socket Type PVC Plastic Pipe Fittings, Schedule 40
23. D2467, Standard Specification for Socket-Type Poly (Vinyl Chloride)
25. D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
26. D3350–Continuous Outdoor Use (UV)
27. D4101, Polypropylene Plastic Injection and Extrusion Materials
28. F1417, Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air
32. F679, Standard Specifications for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
33. F794, Standard Specification for Poly (Vinyl Chloride) (PVC) Rubber Gravity Sewer Pipe and Fittings based on Controlled Inside Diameter
34. F1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air

C. American Water Works Association (AWWA)

1. C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
2. C110, Ductile Iron and Gray Iron Fittings, three (3) inch through forty-eight (48) inch for Water and Other Liquids.
3. C111, Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fitting
4. C115, Flanged Ductile Iron Pipe with Threaded Flanges
5. C151, Ductile Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Water or Other Liquids
6. C153/A21.53 -- American National Standard for Ductile-Iron Compact Fittings, three (3) inch through twenty-four (24) inch and fifty-four (54) inch through sixty-four (64) inch, for Water Service.
7. C200, Steel Water Pipe 6 inch and Larger
9. C205, Cement Mortar Lining and Coating for Steel Water Pipe four (4) inch and Larger, Shop Applied
10. C207, Steel Pipe Flanges for Waterworks Service – Sizes four (4) inch through one hundred forty-four (144) inch
11. C208, Dimensions for Fabricated Steel Water Pipe Fittings
12. C210, Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
13. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines
15. C605-94, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
16. C606, Grooved and Shouldered Joints
17. C651, Disinfection of Water Mains
18. C900, Polyvinyl Chloride (PVC) Pressure Pipe four (4) inch through twelve (12) inch for Water
19. C905, Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters fourteen (14) inch through thirty-six (36) inch
20. C906 – Polyethylene (PE) Pressure Pipes and Fitting (Revised to Incorporate PE4710)
22. Cast Iron Soil Pipe Institute (CISPI)
23. CISPI301, Hubless Cast Iron Sanitary System with No Hub Pipe and Fittings
24. CISPI310, Coupling for Use in Connection with Hubless Cast Iron and Fittings for Sanitary and Stormdrain, Waste, and Vent Piping Applications

   1. To include Technical Reports and Technical Notes (http://www.plasticpipe.org/publications/pe_handbook.html)

E. National Electric Manufacturer’s Association (NEMA)
   1. ICS6, Enclosures for Industrial Controls and Systems

F. National Fire Protection Association (NFPA)
   1. 54, National Fuel Gas Code

1.3 SUBMITTALS

A. Shop Drawings consistent with Submittal Procedures – Section 013300 and including:
   1. Schedule showing pipe type, size, schedule of pipe, appurtenances, type of linings and coatings, cathodic protection.
   2. Copies of any manufacturer’s written directions regarding material handling, delivery, storage and installation
   3. Technical product data on piping appurtenances

B. Certifications and Testing consistent with Quality Requirements – Section 014000 and including:
   1. Certification that products used meet standards referenced
   2. Notification of time and date of piping pressure tests
   3. Copies of pressure test results on all piping systems
PART 2 - PRODUCTS

2.1 MATERIALS
   A. Furnish piping, fittings and appurtenances in accordance with the Contract Documents.
   B. Pipe sizes indicated are nominal inside diameter.
   C. Use straight, round pipe.
   D. For temporary piping not specifically addressed, utilize materials, joints and fittings equal to those specified for similar applications of permanent construction.

2.2 COMPONENTS AND ACCESSORIES
   A. Couplings Restraint
      1. Provide mechanical restraint for all couplings.
      2. Assure couplings and restraint match test pressure rating of piping system.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Prior to installation, inspect and verify condition of piping and appurtenances. Installation constitutes installer’s acceptance of product condition for satisfactory installation.

3.2 PREPARATION
   A. Correct defects or conditions which may interfere with or prevent a satisfactory installation.

3.3 DELIVERY, STORAGE, AND HANDLING
   A. Protect pipe coating during handling using methods recommended by manufacturer. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
   B. Prevent damage to pipe during transit. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

3.4 EXTERIOR PIPING ERECTION/INSTALLATION/APPLICATION
   A. Unless otherwise shown on the Drawings, provide a minimum of thirty (30) inches earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.
B. Laying Pipe in Trench

1. Excavate and backfill trench in accordance with Utility Excavation & Backfill – Section 312333.
2. Clean each pipe length thoroughly and inspect for compliance to Specifications.
3. Grade trench bottom and excavate for pipe bell and lay pipe on trench bottom or bedding material.
4. Provide gasket or joint material according to manufacturer’s directions after joints have been thoroughly cleaned and examined.
5. Except for first two (2) joints, before making final connections of joints, two (2) full sections of pipe shall have been previously installed with earth tamped alongside of pipe of final bedding material placed.
6. Lay pipe in only suitable weather with good trench conditions. Never lay pipe in water except where approved by Project Representative.

C. Lining-up Push-on Joint Piping

1. Lay piping on route lines shown on Drawings.
2. Deflect from straight alignments or grades by vertical or horizontal curves.
3. Maximum offset between extended centerlines of any two (2) adjacent pipe lengths is in strict accordance with the pipe manufacturers published literature on deflections and offsets.
4. Provide special bends when specified or where required alignment exceeds allowable deflections stipulated.
5. Provide shorter lengths of pipe in such length and number that angular deflection of any joint, as represented by specified maximum deflection, is not exceeded.

D. Anchorage and Blocking

1. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces at buried or exposed piping tees, wye branches, plugs, or bends.
2. Size thrust block as detailed on the Drawings.
3. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall. Concrete blocks shall not cover pipe joints.
4. Provide bearing area of concrete in accordance with details on Drawings.
5. Provide insulating components where dissimilar metals are joined together.

3.5 INTERIOR PIPING INSTALLATION

A. Lining-up Push-on Joint Piping

1. Lay piping as shown on Drawings.
2. Install pipe in straight alignments and parallel or pedicular to walls and surrounding pipe to the greatest extent possible.

B. Anchorage and Blocking

1. Provide hangers to properly support pipe.
2. Provide anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces at piping tees, plugs, or bends.
3. Provide insulating components where dissimilar metals are joined together.

3.6 CONNECTIONS WITH EXISTING PIPING

A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
B. Perform connections with existing piping at time and under conditions which will least interfere with service to those affected by such operation.
C. Undertake connections in fashion which will disturb existing system as little as possible.
D. Utilize suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.

3.7 FIELD QUALITY CONTROL

A. General
1. Utilize pressures, media, and pressure test durations as specified on Piping Schedules and provided under project specifications for applicable pipe material.
2. Isolate equipment which may be damaged by the specified pressure test conditions.
3. Perform pressure test using calibrated pressure gauges and calibrated volumetric measuring equipment to determine leakage rates. Select each gauge so that the specified test pressure falls within the upper half of the gauge’s range. Notify Project Representative twenty-four (24) hours prior to each test.
4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
5. Acknowledge satisfactory performance of test and inspections in writing to Project Representative prior to final acceptance.
6. Provide all necessary equipment and perform all work required in connection with the test and inspections.
7. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and reexamination.

3.8 CLEANING AND DISINFECTION

A. Cleaning
1. Clean interior of piping systems thoroughly before installing.
2. Maintain pipe in clean condition during installation.
3. Before joining piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.

5. At completion of work and prior to final acceptance, thoroughly clean work installed under these specifications. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes. Repair any stoppage of discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to the Government.

B. Disinfection

1. Flush and disinfect system in accordance with Disinfecting Water Utility Distribution - Section 331300.

END OF SECTION
SECTION 331100 – WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work covered in this Section includes furnishing, installing and cleaning piping systems and fittings for project water lines, to include water service lines, valves, miscellaneous products, accessories and appurtenant items.

1.2 SUBMITTALS

A. See Submittal Procedures – Section 013300 for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, expansion joint fittings, flex fittings, valves, and all other accessory products needed for complete installation. Provide manufacturer’s catalog information and manufacturer’s certification. Indicate valve and data ratings.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities. Contractor records and drawings shall be submitted with as-built submittals. Contractor to maintain as-built throughout the project duration during construction on-site.

PART 2 - PRODUCTS

2.1 PIPE

A. Polyvinyl Chloride (PVC) Pipe:

1. PVC Pipe (4 Inches and Over): PVC pipe for water mains shall meet the requirements of ANSI/AWWA C900 or C905. PVC pipe shall have the same outside dimensions as ductile iron pipe. PVC pipe for distribution pipelines shall be a minimum of SDR 18. Pipe shall be listed by Underwriters’ Laboratories, Inc.

   PVC pipe shall be considered flexible conduit. Joints shall meet the requirements of ASTM D3139 using a restrained rubber gasket conforming to ASTM F477. Solvent welded pipe joints are not permitted.

B. Polyethylene (PE) Pipe:

1. PE Pipe (4 inches and Over): PE pressure pipe for water mains shall meet the requirements of ANSI/AWWA C906. Pipe materials shall be high-density polyethylene PE3408
conforming to a minimum cell class 345464 C, D or E per ASTM D3350. Pipe diameter shall be either iron pipe size per Table 3 and Table 5 of ANSI/AWWA C906. Pipe pressure class shall be as listed in Table 9 of ANSI/AWWA C906 for DR 9 PE3408 material.

2. PE Tubing: PE tubing shall meet the requirements of AWWA C901. Tubing shall be high molecular mass with a 200 psi rating. Tubing used for ¾ and 1 inch shall be either SDR 7 (iron pipe size) or SDR 9 (copper tube size). Tubing used for 1-1/2 and 2 inches shall be SDR 9 (copper tube size).

C. Galvanized Steel Pipe (4 inches and Under):

1. Steel pipe less than 4 inches in diameter must conform to ASTM A 53, schedule 40 and must be hot dip galvanized inside and out, including the couplings. The pipe sections must be coupled by malleable iron screw coupling per ANSI Specification B16.3.

D. Ductile Iron Pipe:

1. Ductile iron pipe shall meet the requirements of AWWA C151. Ductile iron pipe shall have a cement mortar lining and a 1-mil thick seal coat meeting the requirements of AWWA C104. Ductile iron pipe to be joined using bolted flanged joints shall be Special Thickness Class 53. All other ductile iron pipe shall be Special Thickness Class 50, minimum Pressure Class 350.

2. Nonrestrained joints shall be either rubber gasket type, push on type, or mechanical type

3. Joints: rubber gasket, push-on type, or mechanical conforming to AWWA C111

2.2 FITTINGS, BOLTS, & GASKETS

A. Ductile Iron Pipe and Polyvinyl Chloride (PVC) Pipe (4 inches and Over): Fittings for ductile iron and PVC pipe shall meet the requirements of AWWA C110 or AWWA C153. Joints shall meet the requirements of AWWA C111. Fittings shall be cement mortar lined, meeting the requirements of AWWA C104. Gaskets for flat faced or raised faced flanges shall be 1/8-inch-thick neoprene having a durometer of 60 plus or minus 5 or 1/16 cloth inserted. The type, material, and identification mark for bolts and nuts shall be provided.

B. Polyethylene (PE) Pipe (4 inches and Over): Fittings for PE pipe shall meet the requirements of ANSI/AWWA C906. Pipe material shall be high-density polyethylene PE3408 conforming to minimum cell class 345464 C, D or E per ASTM D3350. Pipe diameter shall be either iron pipe size per Table 3 and 5 of ANSI/AWWA C906 or ductile iron pipe size per Table 7 and Table 8 of ANSI/AWWA C 906. Pipe pressure class shall be as listed in Table 9 of ANSI/AWWA C 906 for DR 9 PE3408 material.

C. Galvanized Steel Pipe (4 inches and Under): Fittings for steel pipe 4 inches and under shall be malleable iron threaded type with a pressure rating of 150 psi. Dimensions shall meet the requirements of ANSI B16.3. Threading shall meet the requirements of ANSI B2.1. Material shall meet requirements of ASTM A47M, Grade 32510. Fittings shall be banded and hot-dip galvanized inside and out.

D. Service Fittings:
1. Saddles: Saddles shall be ductile iron, bronze, or stainless steel. Saddles shall be single strap and may be either AWWA tapered thread or female iron pipe thread outlet. Saddles used on PVC pipe shall be formed for PVC pipe and have flat, stainless steel straps.

2. Corporation Stops: Corporation stops shall be made of bronze or brass alloy. Corporation stops shall have either AWWA tapered thread or male iron pipe thread inlet and outlet connections compatible with either copper or polyethylene tubing. Thread patterns for the saddle outlet and corporation stop inlet shall be the same.

3. Fittings used for service connections shall be made of bronze or brass alloy. Fittings used for polyethylene tubing shall be either compression or stab type. Stab type fittings shall utilize an internal grip ring and O ring seal. Stainless steel liners shall be used when utilizing compression fittings on polyethylene tubing.

E. Bolts, Nuts and Washers:

1. Bolts, nuts and washers used for securing fittings shall be of similar materials. Steel bolts shall meet the requirements of ASTM A 307 or ASTM 568 for carbon steel or ASTM F 593 or ASTM F 738 for stainless steel. Nuts shall meet the requirements of ASTM A 563 for carbon steel or ASTM F 594 or ASTM F 836 for stainless steel. Iron bolts and nuts shall meet the requirements of ASTM A 536, grade 65-45-12.

2.3 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Three (3) Inches and Over: Refer to Section 331216

2.4 HOSE BIBS (RV CONNECTIONS)

A. Hose Bib: Arrowhead 365LF with integral vacuum breaker or approved equivalent.

B. Water Shroud: Millbank or approved equivalent


D. Adapter: Galvanized steel to polyethylene pipe.

2.5 BEDDING AND COVER MATERIALS

A. Bedding and Backfill: As specified in Utility Excavation & Backfill – Section 312333.

2.6 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Cast-In-Place Concrete – Section 033000.

B. Joint Restraint:
1. The restraining of ductile iron pipe, fittings, and valves shall be accomplished by the use of either a bolted or boltless system. Any device utilizing round point set screws shall not be permitted.

2. Restraint Devices for PVC Pipe shall incorporate a series of serrations on the inside diameter to provide positive restraint, exact fit, 360 degree contact and support of the pipe wall.

3. Restraint Devices shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12 or ASTM A36 structural steel.

4. Bolts and connecting hardware shall be of high strength low alloy material in accordance with ANSI/AWWA C111/A21.11

5. Restraint Devices for PVC Pipe shall have a water working pressure rating equivalent to the full rated pressure of the PVC Pipe on which they are installed, with a minimum two to one (2:1) safety factor in any nominal pipe size.

6. Notarized certification from the manufacturer of the restraint device shall be provided with submittals.

7. Restrain Devices for mechanical Joint or Push-On fittings shall be Uni-Flange 1300 (series) or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that water main and main line tee size, location, and invert are as indicated.

B. The contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe. Pipe damage prior to completion of the project shall be repaired or replaced by the Contractor.

C. Handling: Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.

D. Storage: Pipe should be stored, if possible, at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of the pipe. Pipe should be stored in such a way as to prevent sagging or bending and protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

E. Assure exposed piping is sufficiently supported to bear weight of valve when it is installed.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe 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 mechanical joints.

3.3 TRENCHING

A. See Utility Excavation & Backfill – Section 312333 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required square foot of thrust restraint bearing on subsoil as indicated on the drawings.

D. Backfill around sides and to top of pipe with backfill material, tamp in place and compact, then complete backfilling.

3.4 DELIVERY, STORAGE, PROTECTION AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Deliver and store piping covered to protect piping from ultraviolet (UV) exposure.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of the completed system.

3.5 INSTALLATION - PIPE

A. Maintain separation of non-potable water main from potable water sources in accordance with State code.

B. Establish elevations of buried piping to ensure not less than three (3) feet of cover over pipe; or as indicated on the drawings and as directed by the Project Representative.

C. Install pipe to indicated elevation to within tolerance of one (1) inch.

D. Install HDPE pipe and fittings to AWWA C906, ASTM F2206 and PPI Handbook of PE Pipe 2nd edition including Technical Reports and Notes.

E. Install ductile iron piping and fittings to AWWA C600.

F. Install PVC pressure piping and fittings to ASTM D2774.

G. Install pipe lines to line and grade indicated.
H. Install pipe to allow for expansion and contraction without stressing pipe or joints.

I. Install trace wire above top of pipe.

J. All ductile iron sleeves, fittings, and valves with mechanical joints shall be restrained with an approved Restraining Device (Joint Restraint).

K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

L. Install bell and spigot pipe with bell end upstream.

M. Install valves with stems upright or horizontal, not inverted.

N. Install above ground water piping to the most current version of ASME B31.9, ASME B31.3, and ASME 31.4.

O. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers or supporting posts from reinforced concrete slabs and sides of reinforced concrete structures.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over four (4) inches.

P. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.996.
   2. Support horizontal piping as scheduled.
   3. Wall and Footing Support for Pipe Sizes four (4) inches and over: Welded steel bracket and wrought steel clamp and/or sleeve.

3.6 INSTALLATION - VALVES

A. Set valves on concrete block or other acceptable solid bearing.

B. Center and plumb valve box, where required, over valve operating nut. Set box cover flush with finished grade.

3.7 CONNECTIONS TO EXISTING WATER LINES

A. Connection to existing water lines shall be made where and as indicated on the drawings and as directed by the Project Representative. The sizes of pipe, fittings, valves and appurtenant items required to make connection shall correspond to the sizes of existing pipe and of project pipe.

B. Excavate to existing pipe line at point of connection; determine actual conditions of existing pipe and all fittings and appurtenant items required to make the connection; and have all materials needed on site prior to any shut down or cutting into existing pipe lines.

C. Connections which involve cutting into existing pipe lines include: cutting and removing sections of existing pipe and fittings as required; cleaning and preparing ends of existing pipe as required
for connection; furnishing and installing all new pipe, fittings and valves required to make the
connection of project pipe to the existing pipe as indicated; and all appurtenant work required to
complete the connection.

D. Connection to existing pipe line shall be made at such times and within the time limits and
according to the directions as agreed upon between the Contractor and the Project Representative.

E. Cut and plug existing pipe lines where indicated and as directed by the Project Representative.

1. Existing pipe locations on plans are approximate and shall be verified by Contractor.
2. Existing pipe to be abandoned shall be:
   a. Cut with a neat, straight edge.
   b. Drained of water or residue. De-chlorination of treated water may be necessary if
      chlorine residual exceeds acceptable limits, prior to discharging to drains or natural
      drainage ways.
   c. Capped with similar material in accordance with manufacturer specifications or cap
      shall be glued or sealed.
   d. In instances where pipe dimensions/material is not common, or corroded beyond a
      visible level, pipe shall be plugged a minimum of twelve (12) inches with approved
      non-shrink grout.
   e. Excavation shall be backfilled, compacted, and the surface shall be restored.

3. In some instances, to avoid conflicts with new construction, a small section of pipe to be
   abandoned may need to be removed. Contractor shall dispose of pipe in an approved
   manner. Broken pipes and cut ends shall not be buried in backfill.

3.8 APPLICATION
A. Install gate valves for shut-off and to isolate tanks, or part of system.

3.9 CLEANING
A. Clean interior of piping systems thoroughly before installing.
B. Maintain pipe in clean condition during installation.
C. Before joining piping, thoroughly clean and wipe joint contact surfaces and then properly dress
   and make joint.
D. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other
   foreign materials which may have entered the system.
E. At completion of work and prior to final acceptance, thoroughly clean work installed under these
   specifications. Clean fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge
   which may have accumulated by operation of system, from testing, or from other causes.
3.10 FIELD QUALITY CONTROL

A. Piping Test: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests:

1. Water main appurtenances and service connections shall be tested in sections of convenient length under a hydrostatic pressure equal to 150 psi in excess of that under which they will operate or in no case shall the test pressure be less than 225 psi. Pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished and operated by the Contractor.

2. Sections to be tested shall normally be limited to 1,500 feet. The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. Thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing.

3. The mains shall be filled with water and allowed to stand under pressure a sufficient length of time to allow the escape of air and allow the lining of the pipe to absorb water. The Contracting Agency will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation. The test shall be accomplished by pumping the main up to the required pressure, stopping the pump for 15 minutes, and then pumping the main up to the test pressure again. During the test, the section being tested shall be observed to detect any visible leakage.

4. A clean container shall be used for holding water for pumping up pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l. The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter. The meter shall be approved by the Engineer. Acceptability of the test will be determined as follows:

   a. \[ L = \frac{SD\sqrt{P}}{266,400} \]
      
      \( L \) = allowable leakage (gallons/hour)
      
      \( D \) = nominal diameter of the pipe (inches)
      
      \( P \) = test pressure during the leakage test (psi)
      
      \( S \) = gross length of pipe tested (feet)

     a. The quantity of water lost from main shall not exceed the number of gallons per hour as determined by the above formula.

     b. There shall not be an appreciable or abrupt loss in pressure during the 15-minute test period

5. Any visible leakage detected shall be corrected by the Contractor regardless of the allowable leakage specified above. Should the tested section fail to meet the pressure test successfully as specified, the Contractor shall, at no additional expense to the Contracting Agency, locate and repair the defects and then retest the pipeline.

6. Defective materials or workmanship, discovered as a result of hydrostatic field test, shall be replaced by the Contractor at no additional expense to the Contracting Agency. Whenever it is necessary to replace defective material or correct the workmanship, the
hydrostatic test shall be re-run at the Contractor’s expense until a satisfactory test is obtained.

3.11 DISINFECTION OF WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Disinfecting Water Utility Distribution - Section 331300.

END OF SECTION
SECTION 331216 – WATER UTILITY DISTRIBUTION VALVES

PART 1 - GENERAL

1.1 DESCRIPTION
A. The work in this Section includes water distribution valves and valve boxes.

1.2 REFERENCES
A. American Water Works Association:
   1. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
   2. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
B. National Sanitation Foundation (NSF International):
   1. NSF 61 - Drinking Water System Components - Health Effects

1.3 SUBMITTALS
A. Section 013300 - Submittal Procedures: Requirements for submittals.
B. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories.
C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS
A. Section 017700 - Closeout Procedures
B. Project Record Documents: Record actual locations of valves.
C. Provide Operation and Maintenance Data for valves; include illustrations, installation instructions, maintenance instructions and parts lists.
D. Manufacturer’s Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

1.5 QUALITY ASSURANCE
A. Perform work in accordance with the project plans, AWWA, State Park, State, and County standards.
1.6 QUALIFICATIONS

A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years of experience.

B. Installer: Company specializing in performing work of this section with minimum three years of experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 – Product Requirements.

B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in adjacent areas.

PART 2 - PRODUCTS

2.1 RESILIENT WEDGE GATE VALVES

A. Manufacturers:

1. Mueller Company
2. Kennedy Valve Co.
3. M&H Valve Co.
4. Clow Eddy - Iowa
5. American Flow Control

B. Furnish materials in accordance with the project plans, AWWA, State Parks, State, and County standards.

C. Resilient Wedge Gate Valves: AWWA C509; iron body, bronze or ductile iron.

1. Resilient seats.
2. Stem: Non-rising bronze stem.
3. Operating Nut: Square; open counterclockwise unless otherwise indicated.
4. Ends: Flanged, mechanical joint or bell end connections.

2.2 VALVE BOXES

A. 12 inch diameter valves and smaller: Domestic cast iron, two-piece, screw type, as manufactured by Tyler Union or approved equivalent.

B. Cast iron lid, marked "Water".

C. Valve boxes and lids shall be traffic (H-20) rated.
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2.3 COMBINATION AIR RELEASE / AIR VACUUM VALVES
A. Valves must comply with ANSI / AWWA C512. Install in accordance with contract Drawings unless otherwise approved.

2.4 ACCESSORIES
A. Concrete for Thrust Restraints: Concrete thrust blocks to be installed as specified in Drawings.

2.5 MAINTENANCE MATERIALS
A. Section 017700 - Closeout Procedures: Requirements for maintenance materials.
B. Furnish two (2) tee wrenches (valve keys) to Owner; required length.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verification of existing conditions before starting work.
B. Determine exact location and size of valves from Drawings; obtain clarification and directions from Project Representative prior to execution of work.
C. Verify invert elevations of existing work prior to excavation and installation of valves.

3.2 PREPARATION
A. Identify required lines, levels, contours and datum locations.
B. Locate, identify, and protect utilities to remain from damage.
C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
   1. Notify Project Representative not less than 3 days in advance of proposed utility interruption.
   2. Do not proceed without written permission from the Project Representative.
D. Perform trench excavation, backfilling and compaction in accordance with Section 312333 - Utility Excavation and Backfill.

3.3 INSTALLATION
A. Install valves in conjunction with pipe laying; set valves plumb.
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B. Provide buried valves with valve boxes installed flush with finished grade.

C. Install Work in accordance with the project plans, AWWA, State Parks, State, and County standards.

3.4 DELIVERY, STORAGE AND HANDLING

A. Section 016000 – Product Requirements: Requirements for transporting, handling, storing and protecting products.

B. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.

C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Section 331300 – Disinfecting Water Utility Distribution.

3.6 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements

B. Section 017700 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing.

C. Perform pressure test on site water distribution system in accordance with Section 331100 - Water Utility Distribution Piping.

END OF SECTION
SECTION 331219 – WATER YARD HYDRANTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work of this Section includes but is not limited to the furnishing and installation of non-freeze yard hydrants and accessories, the excavation and backfill necessary for said installation, and installation of all associated piping and adaptors required to connect the yard hydrants to the water utility distribution system.

1.2 SUBMITTALS

A. As specified in Submittal Procedures - Section 013300.

B. Product Data: Submit data on yard hydrant materials, accessories, and pipe fittings. To include illustrations, installation instructions, maintenance instructions, and parts lists.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

PART 2 – PRODUCTS

2.1 NON-FREEZE YARD HYDRANT

A. Yard Hydrant: Woodford S4H-3 Freezeless Sanitary Yard Hydrant or approved equal.

B. Mounting Post: 4” x 4” x 6’ plastic with stainless steel mounting clips and stainless steel vandal resistant screws.

C. Drain Pad: 24” (diameter) x 36” (long) reinforced concrete pipe filled to surface with 1-1/2” pea gravel.

D. Service Pipe: Per plan.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verification of existing conditions before starting work.

B. Determine exact location and size of yard hydrants from Drawings; obtain clarification and directions from Project Representative prior to execution of work.
C. Verify invert elevations of existing work prior to excavation and installation of yard hydrants.

3.2 PREPARATION

A. Locate, identify, and protect utilities to remain from damage.

B. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
   1. Notify Project Representative not less than 3 days in advance of proposed utility interruption.
   2. Do not proceed without written permission from the Project Representative.

C. Perform trench excavation, backfilling, and compaction in accordance with Utility Excavation & Backfill - Section 312333.

3.3 INSTALLATION

A. Install yard hydrants in conjunction with laying new pipe as necessary.

B. Install Work in accordance with the project plans, AWWA, State Parks, State, and County standards.

3.4 DISINFECTION OF WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Disinfecting Water Utility Distribution - Section 331300.

3.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements and Section 017700 - Closeout Procedures.

B. Perform pressure test on site water distribution system in accordance with Water Utility Distribution Piping - Section 331100.

END OF SECTION
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SECTION 331300 – DISINFECTING WATER UTILITY DISTRIBUTION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Section includes disinfection of potable water distribution and transmission system; and testing and reporting results.

1.2 REFERENCES

A. Washington State Department of Health.

B. American Water Works Association:

1. AWWA B300 – Hypochlorites.
2. AWWA B301 - Liquid Chlorine.
3. AWWA B302 - Ammonium Sulfate.
4. AWWA B303 - Sodium Chlorite.
5. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
6. AWWA C651 - Disinfecting Water Mains.

1.3 CLOSEOUT SUBMITTALS

A. Section 017700 - Closeout Procedures

B. Disinfection Report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Name of person collecting samples.
5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
6. Date and time of flushing start and completion.
7. Disinfectant residual after flushing in ppm for each outlet tested.

C. Bacteriological Report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Coliform bacteria test results for each outlet tested.
1.4 QUALITY ASSURANCE
   A. Perform Work in accordance with AWWA C651.
   B. Perform Work in accordance with the project plans, State Parks, State, and County standards.

1.5 QUALIFICATIONS
   A. Water Treatment: Company specializing in disinfecting potable water systems specified in this section with minimum three years of experience.

PART 2 – PRODUCTS

2.1 DISINFECTION CHEMICALS
   A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, or AWWA B303, Sodium Chlorite.

PART 3 – EXECUTION

3.1 EXAMINATION
   A. Verification of existing conditions before starting work.
   B. Verify piping system has been cleaned, inspected, and pressure tested.
   C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.2 INSTALLATION
   A. Provide and attach required equipment to perform the Work of this section.
   B. Perform disinfection of water distribution system and installation of system and pressure testing. Refer to Section 331100 Water Utility Distribution Piping.
   C. Introduce treatment into piping system.
   D. Maintain disinfectant in system for 24 hours.
   E. Flush, circulate, and clean until required cleanliness is achieved.
   F. Replace permanent system devices removed for disinfection.
3.3 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements.

B. Section 017700 - Closeout Procedures.

C. Disinfection, Flushing, and Sampling:

1. Disinfect pipeline installation in accordance with AWWA C651.
2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally acceptable for domestic use.
3. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
4. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

END OF SECTION
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SECTION 331313 – WATER RESERVOIR DISINFECTION

PART 1 - GENERAL

1.1 DESCRIPTION
A. Section includes:
   1. Water tank disinfection.
   2. Bacteriological testing.

1.2 REFERENCES
A. American Water Works Association:
   1. AWWA C652 - Disinfection of Water Storage Facilities.

1.3 SUBMITTALS
A. Section 013300 - Submittal Procedures: Requirements for submittals.
B. Disinfection Procedure: Submit procedure description including type of disinfectant to and calculations indicating quantities of disinfectants required to produce specified chlorine concentration in accordance with Section 3 and 4 of AWWA C652.
C. Test Reports: Indicate results of bacteriological and residual chlorine laboratory test reports.
D. Manufacturer’s Certificate:
   1. Certify disinfectants meet or exceed AWWA Standards requirements.

1.4 CLOSEOUT SUBMITTALS
A. Section 017700 - Closeout Procedures: Requirements for submittals.
B. Project Record Documents: Record actual location.

1.5 QUALITY ASSURANCE
A. Perform Work in accordance with project plans, State Parks, State, and County standards.
B. Perform Work in accordance with AWWA C652.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Store disinfectants in cool, dry place away from combustibles such as wood, rags, oils and grease.

C. Handle disinfectants with caution; protect skin and eyes from contact; avoid breathing vapors; wear gloves, aprons, goggles, and vapor masks.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Furnish personnel working inside tank during disinfection with equipment to comply with Federal and State regulations for work conducted in hazardous atmosphere.

B. Neutralize disinfectant solution before disposal.

C. Legally dispose of disinfection solution.

D. Repair damage caused by disinfectant solution and disinfection procedures.

PART 2 - PRODUCTS

2.1 DISINFECTANTS

A. Chlorine Forms: In accordance with AWWA C652, Section 3.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of existing conditions before starting work.

B. Conduct inspection of tank interior before beginning disinfection.

1. Verify tank is clean and free of polluting materials.
2. Verify tank pipe and vent connections are properly made and clear of obstructions.
3. Verify paint is thoroughly cured in accordance with paint manufacturer's instructions.

3.2 PREPARATION

A. Protect aquatic life and vegetation from damage from disinfectant solution purged from tank.
3.3 APPLICATION

A. Use any one or a combination of the three methods for disinfecting tank specified in Section 4 of AWWA C652:

   2. Chlorination Method 2.

3.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements, 017700 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing.

B. Collect samples of water from filled tank for bacteriological analysis in accordance with Section 4.4 of AWWA C652; take inlet and outlet water samples.

C. Test water samples per State of Washington Department of Health including but not limited to bacterial contamination and residual chlorine.

D. When water samples fail to meet State of Washington Department of Health standards for potable water perform the following corrective measures until water quality conforms to State Health Standards:

   1. Inlet and Outlet Water Sample Failure: Eliminate source of contamination in water supply, repeat disinfection, and retest water quality.
   2. Outlet Water Sample Failure: Repeat disinfection, and retest water quality.

END OF SECTION
PART 1 - GENERAL

1.1 DESCRIPTION

A. Section includes:

2. Tank appurtenances
3. Piping connections

B. Contractor shall furnish all labor, materials, equipment, and incidentals required to design, fabricate, deliver, erect, and test each tank. Each tank structure shall include a foundation and other accessory components as shown on the Contract Drawings and described herein.

1.2 REFERENCES


B. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
3. ACI 305R - Hot Weather Concreting.
5. ACI 309R - Standard Guide for Consolidation of Concrete.
6. ACI 318 - Building Code Requirements for Structural Concrete.
7. ACI 347 - Guide to Formwork for Concrete.
8. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures
9. ACI 350. 3 - Seismic Design of Liquid-Containing Concrete Structures

C. American Society for Civil Engineers:


D. ASTM International:

1. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
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4. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
5. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
8. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
9. ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
15. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

E. American Water Works Association:

1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
5. AWWA D110 - Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks
6. AWWA D115 - Circular Prestressed Concrete Water Tanks With Circumferential Tendons

F. American Welding Society:

1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

G. Concrete Reinforcing Steel Institute:


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H. Corps of Engineers:
   1. CRD C572 - Corps of Engineers Specification for Waterstops and Other Preformed Joint Materials for Civil Works Structures.

I. Federal Specifications (FS):

J. Society for Protective Coatings:
   1. SSPC SP 10 - Near-White Blast Cleaning.

K. National Sanitation Foundation:
   1. NSF 61 - Drinking Water System Components - Health Effects


1.3 DESIGN REQUIREMENTS

A. The reservoir contractor shall be responsible for the reservoir design and the design shall meet all State, Federal, and local requirements for domestic water storage. The reservoir contractor shall be responsible for obtaining the required building permit from the Mason County Building Department.

B. Design Criteria:
   1. Soil Bearing: Refer to the Geotechnical Investigation Report. This information should be made available to the engineer performing the site/soils analysis for his use in making a determination regarding site suitability and reservoir design.
   2. Engineer: The reservoir design shall be fully developed and provided by the contractor and all drawings and design data shall be stamped and certified by a registered engineer currently licensed in the State of Washington.
   4. Design Loads:
      a. Seismic – The reservoir, including the foundation slab, shall be designed to resist seismic forces per IBC & ASCE 7, with seismic criteria per Zip Code, I=1.5, and W=weight of concrete plus full contents. The reservoir base shall be sized to not exceed the soil bearing capacities determined for the site.
      b. Wind – The reservoir shall be designed for a basic wind speed of 115 mph (exposure D) per IBC & ASCE 7 current edition. Empty, the reservoir shall have a minimum factor of safety of 4 against overturning and 3 against sliding (coefficient of friction assumed at 0.35 or as provided by the soil analysis).
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c. Snow Load – The roof shall be designed for a minimum snow load of 45 psf, or per IBC, or local code; whichever is higher.
d. Hydraulic Load – Hoop steel stresses shall not exceed an average of 12,000 psi at full volume, and all bars shall be at the smallest practical diameter in order to maintain maximum bonding areas.
e. Soil Bearing Pressure – Reservoir static loading shall be uniformly distributed by the base. Seismic soil loading may be distributed as a triangular wedge under a circular base or an octagonal base of equal section modules.

5. Hand Railings: Withstand 200 pounds applied in any direction on top rail with no permanent set, cracking or failure of welds.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings and Product Data: Signed and sealed by professional engineer.
   1. Include details of all tank components (see Product Data).
   2. Include details of reinforcing steel, joint design, concrete mix design.
   3. Include details of all penetrations and waterstop measures of the penetrations.

C. Product Data: Submit manufacturer's product literature including catalog information, dimensions, materials, instructions for installation and use, and application rates for:
   1. Waterstops.
   2. Joint Filler.
   3. Bond Breaker.
   4. Curing Compound.
   5. Vibration Equipment.
   8. Roof Hatch.
   9. Roof Ventilator.
  10. Ladders and Railings.
  11. Piping.
  12. Couplings.
  13. Inlets, outlets, drains, and overflows.

D. Design Data: Submit structural calculations for tank and tank foundation, signed and sealed by professional engineer.

E. Building Permit: Submit a copy of the approved Building Permit obtained from Mason County.

F. Test Reports:
   1. Submit reports of slump tests, air content tests, and strength tests.

G. Manufacturer's Certificate: Certify products meet or exceed State, Federal, and local requirements for the following:

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1. Non-prestressed reinforcing steel.
3. Concrete mix design.
4. Concrete mix ingredients, including admixtures.
5. Concrete batch tickets in accordance with ASTM C94/C94M with the following additional information:
   a. Type, name, and quantity of admixtures.
   b. Type, brand, and quantity of cement.
   c. Total water content by producer.
   d. Maximum size of aggregate.
   e. Weights of fine and coarse aggregate.
   f. Indicate ingredients are as previously certified.
6. Pipe, pipe fittings, joints, joint gaskets, lubricants, and coatings.

1.5 CLOSEOUT SUBMITTALS
A. Section 017000 – Closeout Procedures: Requirements for submittals.
B. Building Permit Final Inspection/Approval: Provide approved final inspection report for the reservoir installation.
C. Project Record Documents: Record actual location layout and final configuration of water storage tank.

1.6 QUALITY ASSURANCE
A. Design and construct concrete tank in accordance with AWWA D110 and AWWA D115.
B. Perform Work in accordance with the Mason County Building Department, International Building Code, Washington State Department of Health, Mason County Health Department, and Owner standards.

1.7 QUALIFICATIONS
A. Manufacturer/Installer: Company specializing in performing work of this section shall be required to prove experience in having installed a minimum of ten similar water reservoirs within the previous five years.
B. Design concrete water storage tank under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Washington.
C. Installation shall be executed by a qualified and experienced erection crew, trained and certified by the tank manufacturer.
1.8 PRE-INSTALLATION MEETINGS
   A. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING
   A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
   B. Reinforcing Steel:
      1. For reinforcing steel fabricated on-site, ship from mill in bundles, limited to one size and length, tagged with waterproof tag showing name of mill, heat number, grade and size of bars, and identifying number.
      2. For reinforcing steel fabricated off-site, deliver in bundles identified as to structure and shop drawing number; identify each individual bar with waterproof tag showing grade, size and bar mark from shop drawings.
      3. Protect reinforcing steel and wire fabric from damage and from dirt, oil, grease, other foreign matter, and rust-causing conditions.
      4. Do not store reinforcement in direct contact with ground.
   C. Concrete Ingredients:
      1. Handle, control and store concrete materials in accordance with ACI 304.

1.10 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.11 COORDINATION
   A. Coordinate work, including connection to existing water system, with Project Representative.

1.12 MAINTENANCE MATERIALS
   A. Section 017700 - Closeout Procedures: Requirements for maintenance materials.

PART 2 - PRODUCTS

2.1 GENERAL
   A. All materials inside the tank that can come in contact with potable water shall be NSF-61 approved.
   B. All required tank materials and principal appurtenances shall be supplied by the tank manufacturer.

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2.2 CONCRETE WATER STORAGE TANK

A. Manufacturers:
   1. Baker Silo, LLC. or approved equivalent.

2.3 CONCRETE

A. Materials:
   1. Portland Cement: Cement used shall be standard Portland Cement, Type 1. It shall contain a minimum of 6 sacks cement per cubic yard and shall have a 28 day minimum compressive strength of 4,500 psi.
   2. Aggregate:
      a. Maximum aggregate size shall be 1 ½” for the base unless otherwise noted.
      b. Maximum aggregate size on all formed surfaces 6” or less in thickness shall be ¾”. In the event that ¾” rock is not available, the closest available size approximating ¾” shall be used.
   3. Slump: Maximum slump shall generally be 6 to 6 ½”. If additives, such as air entrainment, water reducing agents, super plasticizers are used, the allowable slump may be correspondingly higher. Not to exceed 9”.
   4. Air Entrainment: – 4 ½ - 7 1/2 %
   6. Admixtures:
      b. Other Admixtures: ASTM C94/C94M.
      c. Admixtures containing calcium chloride or soluble chlorides are not permitted.
      d. Maximum Free Chloride Ions: 0.06 percent of weight of cement in concrete mix.
   7. Curing: After placement, the concrete shall be sprayed with an approved curing compound.
   8. Testing: A minimum of 6 test cylinders shall be cast for each pour. The cylinders shall be tested by a certified testing lab and each set of cylinders shall be tested per the following:
      a. One Cylinder at 7 days
      b. Three Cylinders at 28 days
      c. Two Cylinders on hold if needed

2.4 REINFORCEMENT

A. General:
   1. All reinforcing steel shall conform with ASTM specification A615, Grade 60, having a minimum yield stress of 60,000 psi.
   2. Bars shall be free from loose scale, dirt, grease, or any other substance which will impair the bond between the concrete and reinforcing bars.
SCHAFER STATE PARK
RELOCATE CAMPGROUND

3.  Tie Wire – Tie wire shall be steel, black annealed, 16 gauge minimum.

2.5  WATER STOP

A.  General:
   1.  Waterstop shall be installed in all construction joints below water level.
   2.  Waterstop shall be spliced per manufacturer’s recommendations or lapped a minimum of 12”.
   3.  Waterstop shall be 3/16” x 4” for reservoirs under 30’ in height and shall be 3’16” x 6” for reservoirs 30’ and over in height.
   4.  Waterstop shall be “Greenstreak” #703, or approved equal, for base to wall connection.
   5.  Waterstop RX 101 (Bentonite Swellstop) shall be used in wall cold joints.

2.6  ACCESSORIES

A.  All accessories shall comply with “Recommended Standards for Water Works”, latest edition, by Great Lakes Upper Mississippi Board of State Public Health and Environmental Managers.

B.  Access Hatch: All hatches shall be installed in the roof, shall be constructed from a minimum of 14 gauge, galvanized metal, shall include provisions for a padlock and shall have weather stripping where the hatch cover meets the hatch. Roof hatch size shall be 2’-6” x 3’.

C.  Air Vent: All vents shall be a minimum of 8”, screened with non-corrosive screen (24 mesh) and installed in the center of the roof. The vent shall be designed to prevent the entrance of surface and rain water, birds, animals, insects and dust as much as is feasible and still vent properly.

D.  Overflow: All overflows shall be 4” unless otherwise noted, screened with non-corrodible screen and installed in the sidewall immediately under the roof. Overflows shall be provided with a pipe thread at the exterior wall surface and piped to ground level with PVC pipe and fittings. An air gap shall be provided on the overflow to prevent back siphoning into the reservoir. The end of the pipe at the air gap shall be covered with 24 mesh screen to prevent the entrance of birds, animals, and insects as much as feasible. Galvanized steel brackets fabricated from ¼” x 1 1/2” flat bar mounted to the reservoir wall with 3/8” x 3 ¾” anchor bolts shall be provided at such intervals as will adequately stabilize the overflow pipe, approximately every 7’.

E.  Ladders: The ladders shall be hot dip galvanized after fabrication. A minor amount of welding may be necessary after galvanizing. Welds shall then be painted with a cold galvanizing compound. Interior ladders shall extend the full height of the reservoir. Any ladder over 20’ in length shall be equipped with a “Lad-Saf” Flexible Cable Safety System (Galvanized) or equal per State of Washington General and Health Standards, WAC 296-24-81009, Special Requirements.(5).

F.  Handrail on Roof: Aluminum or galvanized three feet high or as indicated on Drawings; conform to OSHA Standards.

G.  Water Level Indicator: Half travel indicators shall consist of a nominal 1” x 6” white PVC indicator board with black numerals and gradation markings, rubber float, weatherproof pulleys and 1/16” stainless steel cable.

ABOVE GROUND CONCRETE WATER RESERVOIR - 331613 - 8
SCHAFER STATE PARK
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H. Control Wire Blockouts: Unless otherwise shown on the plans, (2) 2” galvanized pipes shall be cast into the roof adjacent to the access hatch for mounting the water system controls onto the reservoir.

I. Davit Arm Mounting Base: Install davit arm mounting base on roof of reservoir in accordance with project Drawings to accept existing Park davit arm assembly. Mounting base to be 3M DBI-SALA Confined Space Floor Mount Sleeve Davit Base #8516190, or approved equal.

2.7 CURE SPRAY, FORM RELEASE AGENTS, AND COATINGS

A. General:
   1. All cure sprays, form release agents and coatings used on surfaces that will come into contact with the water to be stored in the reservoir must have NSF approval for use with potable water.

2.8 FLEXIBLE PIPE COUPLINGS

A. Factory pre-assembled couplings for plain-end pipe; double-ring, wedge-gasketed, flared-sleeve type mechanical joint, AWWA C111.

2.9 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.

   B. Concrete Testing:
      1. Perform compressive strength, slump, and air content tests for each day of pouring concrete; cast 6 cylindrical strength test specimens for each test set.
      2. Test one cylinder at 7 days; test three cylinders at 28 days; hold remaining cylinders for testing when other cylinders are damaged prior to testing.
      3. Determine concrete strength from standard test specimens made and cured according to ASTM C31/C31M and ASTM C172, and tested in accordance with ASTM C39/C39M.
      4. Determine air content in accordance with ASTM C231 or C173/C173M, as applicable.
      5. Determine slump in accordance with ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

   A. Verification of existing conditions before starting work.
   B. Verify elevations and grading for water storage tank and location of water storage tank.
   C. Verify compacted subgrade is dry and is ready to support imposed loads.
D. Verify drainage structure frames, manhole frames, and any other utility access frame/lids are installed in correct position and elevation.

3.2 PIPING

A. General:

1. All pipes extending into the reservoir shall be installed prior to the start of reservoir construction and shall be stubbed up out of the ground so that the reservoir base slab can be poured around the pipes. Pipes 4” and larger shall be ductile iron pipe with mechanical joint fittings. Pipes smaller than 4” shall be galvanized with threaded fittings. Retainer glands, such as “Megalugs” shall be used for joint restraints in lieu of thrust blocks where applicable.

3.3 CONCRETE

A. Unless otherwise specified, conform to ACI 304, ACI 305, and ACI 306R for concrete installation requirements such as preparation, mixing, conveying, depositing, curing, and cold and hot weather requirements.

B. Concrete shall generally be placed within 90 minutes of batching. However, in extreme cases where this is not physically possible because of the distance between the job site and the ready mix plant, an approved retarding agent may be used.

C. Unless otherwise shown on the Drawings, the base shall slope to a specific drain pipe at a minimum of ¼” per foot of radius, assuming the drain pipe is near the center of the tank. Otherwise, the base should be flat. The roof shall slope from the center to the outside edge at a minimum of ¼” per foot of radius.

3.4 REINFORCEMENT

A. Non-Prestressed:

1. Cleaning and Bending: Clean metal reinforcement free of loose rust, mill scale, or other coatings capable of reducing bond.

2. Cutting and Bending:
   a. Perform cutting and bending in the shop.
   b. Bend and cut steel cold; do not bend or straighten bars in manner capable of injuring material.

3. Placement:
   a. Arrange and place reinforcement in accordance with shop drawings.
   b. Secure in position with chairs, spacers, and ties. Concrete brick may be used to support reinforcement for slabs on grade when approved by Engineer.
   c. Bending and placing shall be in accordance with “Specifications for Structural Concrete for Buildings” (ACI 318-latest edition). Laps and splices shall be staggered and all reinforcing steel shall be accurately placed as shown on the plans. All reinforcing steel shall be firmly secured to prevent movement during the placing of
the concrete. The only exception to this shall be where dowel bars are used at the connection of the base and wall. These dowels may be installed after the concrete is placed (“wet set”) as long as the depth of embedment and the location are accurately controlled and installation is done prior to the initial setting of the concrete.

4. Splicing:
   a. Furnish reinforcing bars in full lengths as indicated on Drawings and shop drawings.
   b. Do not splice bars unless indicated on Drawings.
   c. Make splices in accordance with ACI 318; perform welding in accordance with AWS D1.4.
   d. Lap mesh reinforcement a minimum of one mesh space plus 3”, and tie.

5. Concrete Cover:
   a. Provide clearance and spacing indicated on Drawings.
   b. Where no clearances are indicated, provide minimum concrete cover over reinforcement as required by IBC.

3.5 FORMWORK

A. Responsibility: Design and construction of formwork is sole responsibility of Contractor.

B. Design Criteria:
   1. Design formwork system with adequate bracing, strength, and stability to ensure finished concrete within tolerances specified in ACI 347.
   2. Provide formwork sufficiently tight to prevent leakage of mortar.

C. Coating Forms:
   1. Coat forms with bond breaker before placing reinforcing steel.
   2. Do not allow excess form coating material to stand in puddles in forms or to come in contact with concrete against which fresh concrete is to be placed.
   3. Clean reinforcing steel contaminated with bond breaker before placing concrete.

D. Embedded Items:
   1. Clean items to be embedded in concrete free from oil or foreign matter capable of reducing bond of concrete to these items.
   2. Install inserts, anchors, sleeves, and other items specified under other sections of these specifications.
   3. Close ends of conduits, piping, and sleeves embedded in concrete with caps or plugs.

E. Waterstops:
   1. Install waterstops in accordance with manufacturer's instructions.
   2. Support and protect portion of waterstop extending beyond bulkhead during placing of concrete and subsequent removal of forms.
3. Make watertight field splices by heat-sealing. Maintain continuity of ribs and bulbs. Allow splice to cool before stressing reinforcement.
4. Repair damaged waterstops before placing concrete.

3.6 MIXING
A. Mix and deliver ready-mixed concrete in accordance with ASTM C94/C94M.
B. Do not over-mix or use concrete which is retained in mixers so long as to require additional water in excess of design mix water to permit satisfactory placing.
C. Use preparation methods capable of producing concrete with temperature not more than 90 degrees F, and not less than 50 degrees F, when placed.
D. Do not heat concrete ingredients to temperature higher than necessary to keep temperature of mixed concrete, as placed, within specified temperatures.
E. Do not heat water in excess of 90 degrees F.

3.7 CONVEYING
A. Convey concrete from mixer to final deposit by methods preventing segregation or loss of materials.

3.8 CONCRETE PLACEMENT
A. Before each wall pour, the existing concrete shall be thoroughly cleaned by pressurized water or whatever means may be necessary to remove all loose scale, oil and any foreign material that may prevent a good bond with the existing concrete.
B. In the pouring process, concrete shall not be allowed to free-fall more than 5 feet. The concrete shall be deposited in horizontal layers not to exceed 18” in depth and shall be placed as closely as possible to its final position to avoid segregation.
C. Deposit concrete as nearly as practical in its final position to avoid segregation due to rehandling or flowing; do not use vibrators to move concrete horizontally with forms.
D. Do not use retempered concrete or concrete contaminated by foreign material.
E. Plan and conduct concrete placement to ensure concrete is kept plastic and free of cold joints.
F. When continuous installation is delayed more than 45 minutes between adjacent concrete placements, install bulkhead construction joint, complete with waterstops where required.
G. Remove temporary spreaders in forms when concrete has reached elevation making spreaders unnecessary.
H. Do not commence placing when sun, heat, wind or limitations of facilities provided prevent proper finishing or curing.
I. Discontinue concreting when descending ambient air temperature falls lower than 50 degrees F unless preparations are made and in place to heat or insulate concrete in accordance with cold weather concreting requirements.

3.9 CONSOLIDATION

A. Consolidate concrete thoroughly as concrete is placed to secure dense mass; work concrete well around reinforcement and embedded items and into corners of forms.

B. Use internal vibrators inserted vertically over entire area.

C. Vibrate all concrete with high frequency internal vibrators as it is placed. Penetrate the concrete with a sufficient number of vibrations to thoroughly work the concrete around reinforcement and embedded fixtures without separation of aggregate.

D. Vibrate until voids are eliminated, coarse aggregate is suspended in mortar, and entrapped air bubbles begin to rise to surface; concrete should move back into space vacated by vibrator.

E. Space vibrator insertions so area visibly affected by vibrator overlaps adjacent just-vibrated area by several inches.

F. Penetrate at least 6 inches into previously placed layers to bond between layers and avoid cold joints.

G. Do not use form vibrators.

H. Take care not to over-vibrate air entrained concrete; place vibrator to eliminate honeycombing but avoid excess vibrating that bleeds entrapped air from mix.

I. Do not use vibrators to transport concrete.

3.10 CONCRETE FINISHES

A. Base and Roof:

1. All slab finishes shall be a “wood float” finish only, to prevent slippery surfaces. The concrete shall be worked no more than is necessary to produce a “wood float” finish that is uniform in texture and relatively free from screed/float marks. The underside of the roof shall be a rough form finish as results for the use plywood forms.

B. Walls:

1. Steel forms shall be used on all wall pours. Forms may be built with a minimum of refinement but as a minimum must not leak excessive amounts of mortar or yield beyond specific tolerances when the concrete is vibrated. Rock pockets, honeycombed areas, form tie holes and any holes over ½” deep will be repaired. However, no grinding/repairing will be done on “fins”, projections and minor form misalignments (especially at construction joints) as long as they do not exceed the specified tolerances. No sacking or hand-rubbing will be performed on any concrete finishes.
3.11 CONCRETE PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperature and mechanical injury.

B. Maintain concrete with minimum moisture loss and relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. After concrete has hardened, loosen forms as soon as possible without damage to concrete, and run curing water continuously down inside form.

3.12 REMOVAL OF FORMS

A. Do not remove forms until members have acquired sufficient strength to support their own weight and imposed loads safely.

B. Normal elapsed time on wall form removal shall be approximately 16 hours unless low temperatures or poor weather conditions dictate otherwise. The normal elapsed time for roof form removal shall be 7 to 10 days.

C. Notify Engineer before forms are removed so examination of newly stripped surfaces may be made prior to patching.

3.13 REPAIR OF TIE HOLES AND MINOR DEFECTS

A. Allowable tolerances for concrete surfaces shall be classified as “abrupt” and “gradual”. Offsets caused by displaced or misplaced forms and form alignment shall be considered as abrupt irregularities. All other are classed as gradual irregularities. Allowable tolerances are the same for both slabs and walls and are as follows:
   1. Abrupt – ½”
   2. Gradual – 1”

B. Repair concrete immediately after form removal.

C. Honeycombs and small defective areas:
   1. Remove to sound concrete.
   2. Wet affected area.
   3. Brush on bonding grout consisting of 1 part cement, 1 part fine sand and water to produce consistency of thick cream.
   4. Apply patching mortar consisting of 1 part cement, 2-1/2 parts sand and enough water to produce stiff consistency.
   5. Consolidate patching mortar and strike off to leave patch slightly higher than surrounding surface.
   6. Finish repaired area flush with surrounding area after mortar has been in place for 1 hour.

D. Tie Holes:
   1. Thoroughly clean and dampen.
2. Fill solid with patching mortar.

E. Perform patching before curing compound is applied.

F. Cure patched areas the same as adjacent concrete.

G. Make repairs uniform in color and finish with surrounding concrete.

3.14 CURING

A. Keep concrete moist for at least 7 curing days after placement.

B. Water curing is preferred method of protection.
   1. Cover exposed surfaces with saturated burlap or cotton mats and keep wet continuously with soil soaker hose for 7 days.
   2. Leave covering in place, without wetting, for additional 3 days.

C. Use of curing compound is permissible provided it meets NSF approval.
   1. Do not use curing compounds on surfaces to which mortar, concrete or paint is applied.
   2. Keep surfaces moist after forms are removed, and form tie holes repaired.
   3. After surfaces are finished, apply curing compound according to manufacturer's instructions.

D. Slabs: Immediately following slab finishing, apply liquid membrane forming curing compound or begin water curing before surface becomes dry.

3.15 FLOOR AND WALL FOOTINGS

A. Construct floor and wall footings to dimensions indicated on Drawings.

B. Place vapor retarder over subbase; overlap joints minimum of 12 inches or the minimum specified in the IBC; whichever is larger.

C. Install inlet, outlet, drain and overflow pipes, and other penetrations through floor and encased in concrete.

D. Install and support vertical waterstop so bottom of center bulb is at elevation of top of footing.
   1. Support waterstop without puncturing water stop.
   2. Splice waterstop using thermostatically controlled sealing iron.
   3. Spark test each splice before encasement in concrete.

E. Install floor and wall footings monolithically. Construction joints in floor or between floor and footings are not permitted.

F. Cure floor by flooding with water and maintaining saturated for 7 days.

G. Finish floor slab with mechanical steel float.
3.16 HOT WEATHER REQUIREMENTS
A. Conform to ACI 305 when concreting during hot weather.

3.17 COLD WEATHER REQUIREMENTS
A. Conform to ACI 306.1 when concreting during cold weather.

3.18 TANK ACCESSORIES
A. Coordinate placement of tank accessories. Set items level, plumb, and in alignment with adjoining work.
B. Provide anchors and inserts in sufficient number for proper fastening of items. Embed anchors in concrete to accurately align metal work at proper level.
C. Drill holes as required for bolts and screws in supports and in metal work. Conceal fasteners where possible.
D. Provide joint sealant as required to set, seal and secure metal items.

3.19 MANUFACTURER'S FIELD SERVICES
A. Section 014000 - Quality Requirements: Requirements for manufacturer’s field services.
B. Furnish field representative experienced in installation of tank to supervise installation.
   1. Furnish Installation Certificate attesting foundation and tank are properly installed.

3.20 CLEANING, DISINFECTION AND TESTING
A. Cleaning: Tank installer shall clean and pressure wash the interior of the reservoir after it is constructed.
B. Leak Testing:
   1. Testing of the reservoir consists of filling the reservoir to check for water tightness no sooner than 28 days after all concrete pouring is completed and no later than 60 days after completed. The testing of the water can be done from this initial filling and if there are no obvious problems with the reservoir, it can be put on line without emptying and refilling.
   2. To test the reservoir, fill to full, close all valves and let set for 24 hours. Note the height of the water. Check the water height after 3 consecutive 24 hour periods. Allowing for evaporation, the water level shouldn’t drop more that 1 tenth of one percent in any 24 hour period.
C. Disinfecting: Disinfect tank in accordance with Section 331313 Water Reservoir Disinfection.
D. Purities Testing: This testing typically consists of taking samples of the water to a certified lab for bacteria testing prior to placing the reservoir in service. Special attention must be given to ensure that the water source has been tested and is clear of bacteria and contaminants that could affect the samples taken from the reservoir.

END OF SECTION
SECTION 333100 – SANITARY SEWER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Work under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing sanitary sewer pipe, in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Project Representative.

B. This Work includes furnishing and installing connecting bands, branch connections, elbows or other fittings, and all appurtenances required to complete the sanitary sewer.

1.2 SUBMITTALS

A. Sanitary Sewer Pipe: Material certifications stating conformance with the requirements of this Section.

PART 2 - PRODUCTS

2.1 PIPE (PRESSURIZED)

A. Polyvinyl Chloride (PVC) Schedule 40 and 80 Pipe: All PVC Schedule 40 and 80 pipe shall be manufactured from Type I, Grade I Polyvinyl Chloride compound with Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785 and D2665 (where applicable), consistently meeting and/or exceeding the Quality Assurance test requirements with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications.

B. Polyethylene (PE) Pipe: PE pipe shall meet the requirements of AWWA C901. Tubing shall be high molecular mass. Pipe used shall be SDR 11.

2.2 PIPE (GRAVITY)

A. Polyvinyl Chloride (PVC) PIPE: PVC gravity sewer pipe shall be solid wall conforming to ASTM D3034 SDR35. Joints shall conform to ASTM D3212 using elastomeric gaskets conforming to ASTM F477.
2.3 COMBO AIR-VAC STATION

A. Sewage rated air-vacuum release valve. Orenco Model ARV21, ARV40, or approved equal. Install in accordance with contract Drawings.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Bedding and backfill shall conform to the requirements of Section 312333 - Utility Excavation and Backfill.

B. Sheeting and bracing required for trenches shall meet OSHA requirements.

C. Before lowering into the trench, the pipe shall be inspected for defects. All cracked, chipped, or broken pipe shall be discarded. The ends and interior of the pipe shall be clean. Belled ends shall be laid upgrade. Handling of the pipe shall be accomplished in a manner that will not damage the pipe. The joint shall be made in the manner recommended by the manufacturer. Care shall be taken not to buckle or disturb previously laid pipe.

D. Pipe shall be laid accurately to the line and grade.

E. Pipe shall be cleaned of all foreign matter, and water shall be kept out of trenches until joints have been completed. When Work is not in progress, open ends of pipe and fittings shall be securely closed to keep foreign matter and animals from entering.

F. Each joint shall be inspected to ensure that it is properly made before backfilling is done. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe. Where it is necessary to cut pipe, such cuts shall be neatly made in an approved manner. The laid pipe shall be true to line and grade and, when completed, the sewer shall have a smooth and uniform invert. No section of gravity sewer, including service connections shall have an adverse grade which would pond water in the invert of the sewer.

G. Pressure test gravity pipe using a low-pressure air test in accordance with ASTM F1417.

H. Pressure test pressure rated pipe to 200 psi. Repair leaks and re-test

1. Coordinate all pipe installation and testing with State Parks to ensure all inspection and testing requirements are met.
2. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct hydrostatic pressure and leakage test in accordance with AWWA C600.
3. Provide equipment required to perform leakage and hydrostatic pressure tests.
4. No pipeline will be approved when pressure test varies by more than 5 psi at completion of hydrostatic pressure test.
5. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air...
has been expelled, close corporation cocks and apply test pressure. At conclusion of tests, remove corporation cocks and plug resulting piping openings.

6. No pipeline installation will be approved when leakage is greater than that determined by the following formula:

\[ L = \frac{(SD\sqrt{P})}{133,200} \]

where:
- \( L \) = Allowable leakage in gallons per hour
- \( S \) = Length of pipe tested in inches
- \( D \) = Nominal diameter of pipe in inches
- \( P \) = Average test pressure in pounds per square inch (gauge)

I. Connections to existing sewer mains shall be made so that no projections or rough surfaces occur within the pipe.

J. All sewer mains shall be installed to the criteria for the separation of water mains and sanitary sewers set forth in the Washington Administrative Code (WAC) and the Department of Ecology’s Criteria for Sewage Works Design (Orange Book – latest edition). Any deviations from such requirements must be approved by the State Parks.

END OF SECTION
SECTION 333216 - PACKAGED WASTEWATER PUMP

PART 1 – GENERAL

1.1 DESCRIPTION

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing the proposed wastewater tankage and submersible effluent pump systems, including accessories, to provide wastewater service to the proposed Welcome Center and campground host site in accordance with the project plan and as directed by the Project Representative.

1.2 RELATED SECTIONS

A. Section 310516 - Aggregates for Earthwork (Utilities)

B. Section 312333 - Utility Excavation & Backfill.

C. Section 330000 – Utilities General Requirements.

D. Section 333100 - Sanitary Sewer Piping.

1.3 SUBMITTALS

A. Section 0133 00 – Submittal Procedures.

B. Product Data: Submit data on tank, submersible sewage pump, float switch assembly, and accessories

C. Manufacturer’s Installation Instructions: Submit special procedures for pumping station installation.

D. Section 017700 – Closeout Procedures.

E. Project As-Built Documents: Accurately record actual locations and inverts of piping and sump pump basin.
SCHAFER STATE PARK
RELOCATE CAMPGROUND

PART 2 - PRODUCTS

2.1 SEPTIC TANK
A. Reinforced precast concrete construction, 4000 psi 28 day minimum strength, concrete partitioned chambers, concrete lid with lift rings, vent, inlet inspection hole, inlet turned down minimum of 12 inches below effluent level.

2.2 SUBMERSIBLE EFFLENT PUMP
A. Orenco Systems®, Inc., Model PF200511 or approved equal. ½ Hp, 115 VAC, single phase, 60 Hz, two-wire motor, with 10 - 30 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be UL and CSA listed as an effluent pump.

2.3 ACCESSORIES
A. Control Panel: Orenco Systems®, Inc., Model S1IRROHT, or approved equal. 3/4 Hp, 120 VAC, single phase, 14 amps, 60 Hz.
B. Pump Vault:
   1. Polyethylene vault, Orenco Model PVU57-1819 or equal.
   2. Schedule 80 PVC Support pipe.
   3. Polyethylene/PVC filter cartridge.
   4. Schedule 40 PVC float stem.
   5. Polypropylene drain valve ball.
C. Discharge Assembly:
   1. Orenco Model HV100BC-L.
   2. Ball valves, check valves, pipe, and fittings shall consist of SCH 40 PVC.
   3. Flexible hose and external flex hose shall consist of PVC.
   4. unions shall consist of SCH 80 PVC.
   5. Piping shall be 1” SCH 40 PVC.
D. Conduit Seal:
   1. Conduit shall be 1” PVC.
   2. Seal fitting shall consist of Almag 35 aluminum.
   3. Sealant shall be fiber and water-soluble cement.
E. Internal Splice Box:
   1. Shall conform to UL 514C, CSA C22.2 No. 85 1968, and meet UL Type 4X rating.
   2. Cord grips shall be capable of withstanding temperatures of up to 212° F (100° C).
   3. Splice box shall consist of PVC per ASTM D-1784.

2.4 BEDDING AND BACKFILL MATERIAL

PACKAGED WASTEWATER PUMP - 333216 - 2
A. Aggregate bedding and backfill material shall be as specified in Section 310516 Aggregates for Earthwork (Utilities).

PART 3- EXECUTION

3.1 EXAMINATION

A. Verification of existing conditions before starting work.
B. Verify upstream and downstream sanitary sewer connections, size, location and depth.

3.2 PREPARATION

A. Ream pipe ends and remove burrs.
B. Remove scale and dirt from components before assembly.
C. Establish invert elevations for each component in the system.
D. Hand trim excavation to suit sump pump basin and pipe connections.

3.3 TANK INSTALLATION

A. Excavate in accordance with plans and actual field conditions.
B. Place bedding material level in one continuous layer not exceeding 6 inches compacted depth. Compact to 95%.
C. Install septic tank and backfill in accordance with manufacturer’s recommendations.
D. Inspect septic tank in accordance with Washington Administrative Code 246-272A and per manufacturer’s recommendations to verify water tightness.

3.4 CONNECTING PIPING

A. Install piping connections between tank/pump system and upstream and downstream conveyance systems in accordance with Section 333100 Sanitary Sewer Piping.

END OF SECTION
SECTION 333400 – ONSITE WASTEWATER DISPOSAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Work under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing the proposed wastewater drainfield system in accordance with the Drawings. This includes all associated system components, pump and control systems, interconnecting piping and valving, and the complete drainfield system in accordance with the Drawings, these Specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Project Representative.

1.2 REFERENCES

A. Mason County Public Health On-Site Standards.
B. ASTM D 1784: Rigid Vinyl Compounds
C. ASTM D 2564: Solvent Cement for PVC Pipe and Fittings
D. ASTM F 1668: Procedures for Buried Plastic Pipe

1.3 SUBMITTALS

A. Product Data: Submit data on wastewater system including piping and valving, pumps and controls and drainfield components.
B. Project Record Documents: Accurately record actual locations and inverts of distribution boxes, buried pipe and drainfield components.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect all tanks/basins, interconnecting piping and valves and drainfield components during handling using methods recommended by manufacturer.
B. Prevent damage to pipe and all other system components during transit. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.
1.5 QUALIFICATIONS

A. Installation shall meet all conditions outlined in the On-Site Sewage System Permit issued by the County. Per the permit conditions, the system "must be installed by a Mason County Certified Installer unless prior written authorization from Mason County is obtained”

PART 2 - PRODUCTS

2.1 SEPTIC TANKS

A. Septic tanks shall conform to the requirements of Section 333413 – Septic Tanks.

2.2 BEDDING, BACKFILL AND DRAINFIELD MATERIAL

A. Bedding, backfill and drainfield material shall conform to the requirements of Section 310516 - Aggregates for Earthwork or, in the case of the septic tanks, shall be installed per the tank manufacturers recommendations.

2.3 PVC GRAVITY PIPE AND FITTINGS

A. Pipe and fittings shall meet the requirement of Section 333100 - Sanitary Sewer Pipe.

2.4 SUBMERSIBLE EFFLUENT PUMP

A. Orenco Systems®, Inc., Model PF500511 (duplex configuration) or approved equal. ½ Hp, 115 VAC, single phase, 60 Hz, two-wire motor, with 10 – 30 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be UL and CSA listed as an effluent pump.

2.5 ACCESSORIES

A. Control Panel: Orenco Systems®, Inc., Model DAX2IRPTROETMCTHTSAPRLPL, or approved equal. 3 Hp, 240 VAC, single phase, 16 amps, 60 Hz.

B. Pump Vault:

1. Polyethylene vault, Orenco Model PVU68-1819 or equal.
2. Schedule 80 PVC Support pipe.
3. Polyethylene/PVC filter cartridge.
4. Schedule 40 PVC float stem.
5. Polypropylene drain valve ball.

C. Discharge Assembly:

1. Orenco Model HV200BC-L
2. Ball valves, check valves, pipe, and fittings shall consist of SCH 40 PVC.
3. Flexible hose and external flex hose shall consist of PVC.
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4. unions shall consist of SCH 80 PVC.
5. Piping shall be 1” SCH 40 PVC.

D. Conduit Seal:
   1. Conduit shall be 1” PVC.
   2. Seal fitting shall consist of Almag 35 aluminum
   3. Sealant shall be fiber and water-soluble cement.

E. Internal Splice Box:
   1. Shall conform to UL 514C, CSA C22.2 No. 85 1968, and meet UL Type 4X rating.
   2. Cord grips shall be capable of withstanding temperatures of up to 212° F (100˚ C).
   3. Splice box shall consist of PVC per ASTM D-1784.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Before lowering into the drainfield bed; the pipe shall be inspected for defects. All cracked, chipped, or broken pipe shall be discarded. The ends and interior of the pipe shall be clean. Bellend ends shall be laid upgrade. Handling of the pipe shall be accomplished in a manner that will not damage the pipe. The joint shall be made in the manner recommended by the manufacturer. Care shall be taken not to buckle or disturb previously laid pipe.

B. Pipe shall be laid accurately to the line and grade.

C. Pipe shall be cleaned of all foreign matter, and water shall be kept out of drainfield bed until joints have been completed. When Work is not in progress, open ends of pipe and fittings shall be securely closed to keep foreign matter and animals from entering.

D. Each joint shall be inspected to ensure that it is properly made before backfilling is done. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe. Where it is necessary to cut pipe, such cuts shall be neatly made in an approved manner. The laid pipe shall be true to line and grade and, when completed, the sewer shall have a smooth and uniform invert. No section of gravity sewer shall have an adverse grade which would pond water in the invert of the sewer.

E. Drainfield Bed
   1. Stake out location of drainfield beds. Set the elevation of the bed bottom.
   2. Install sedimentation and erosion control measures as necessary.
   3. Excavate and level the designated area.
   4. Remove any debris from the bed walls. Rake the bottom and sides if smearing has occurred while excavating. Verify the bottom of the bed is level using a transit, laser or level.
   5. Install and backfill the piping in accordance with the Drawings.

END OF SECTION
PART 1 - GENERAL

1.1 DESCRIPTION
A. The Work under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing the proposed comfort station septic tank and drainfield dosing tank as depicted in the project plans and in reasonably close conformity with the lines and grades shown or established by the Project Representative.

B. The Contractor shall provide single-wall fiberglass wastewater storage tanks as shown on the Drawings and as depicted in the project detailing. The onsite wastewater tanks shall be manufactured according to applicable American National Standards Institute (ANSI) and American Water Works Association (AWWA) standards. The tank size, fittings and accessories shall be as shown on the Drawings.

C. The tanks shall be designed for underground installation and shall be constructed in compliance with Washington Administrative Code (WAC) chapter 246-272.

1.2 REFERENCES
A. Washington Administrative Code Chapter 246-272.

B. ANSI/AWWA D120-09; Thermosetting fiberglass-reinforced plastic tanks.

1.3 SUBMITTALS
A. Section 013300 – Submittal Procedures: Requirements for Submittals.

B. Product Data: Submit data on tank(s), including scaled drawings, piping, effluent filter and tank accessories.

C. Manufacturer’s Installation Instructions: Submit special procedures for septic tank installation.

D. Section 017700 – Closeout Procedures: Requirements for Submittals

E. Project Record Documents: Accurately record actual locations and inverts of piping and septic tank.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Protect existing wastewater facilities from damage while delivering, storing and handling the tank(s).
B. Prevent damage to septic tank during transit to the site. Handle and store the tank in accordance with manufacturers recommendations. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 SINGLE-WALL FIBERGLASS UNDERGROUND ONSITE WASTEWATER TANKS

A. Product Storage Requirements:
   1. All primary tanks must be vented. Tanks are designed for operation at atmospheric pressure only.
   2. Tanks shall be capable of storing non-potable water not to exceed 100°F at the tank interior surface.
   3. Tank shall be capable of storing products identified in the manufacturer’s current limited warranty.

B. Loading Conditions – Tanks shall meet the following design criteria:
   1. External hydrostatic pressure: Buried in ground with 7’ of over burden over the top of the tank, the hole fully flooded and a safety factor of 5:1 against general buckling.
   2. Surface Loads: When installed according to manufacturer’s current installation instructions, tanks shall withstand surface HS-20 axle loads (32,000 lbs/axle).
   3. Internal Load: Tanks shall withstand 5 psig (3 psig for 12’ tank) air pressure test with 5:1 safety factor.
   4. Tanks shall be designed to support accessory equipment such as submersible pumps, ladders, drop/fill tubes, etc. when installed according to manufacturer’s recommendations and limitations.

C. Materials:
   1. The tank shall be manufactured as a matrix of premium resin, glass fibers and silane-treated silica that together result in a composite providing improved corrosion protection.
   2. Tank inner wall shall be fabricated against a mold to produce a non-air inhibited and high gloss laminate to provide fully cured inner surface without the need of wax coats, a low coefficient of friction and a natural resistance to the build-up of algae or other contamination on the surface. Wax and wax resin coatings cannot be used to achieve full surface cure on tank shells and endcaps.

D. Tank Dimensions and Capacity:
   1. Septic Tank:
      a. Inside tank diameter shall be 8-ft, or approved equivalent.
      b. Tank length shall be 19'-5”, or approved equivalent.
      c. Nominal tank capacity shall be 6,000 gallons.
   2. Drainfield Dosing Tank:
2.2 ACCESSORIES

A. Access Openings:
   1. The standard access collar is 24”, which is supplied by the manufacturer. (30” and 36” collars are optional)
   2. All access collars shall be furnished complete with exterior adhesive channel.
   3. Manufacturer supplied adhesive kit (Model Kit-AD) shall be used for watertight collar/riser connection.
   4. Location(s) shall be indicated on tank drawings.
   5. Optional access riser shall be FRP with lockable composite lid.

B. Pipe and Fittings:
   1. All standard threaded fittings shall be carbon steel NPT half couplings. Reducers can be used for smaller sizes where specified and provided by the contractor.
   2. All standard threaded fittings to the primary tank shall be 4” in diameter.
   3. All optional inlet/outlet stub outs shall be FRP or PVC.
   4. Flexible connectors must be used on all piping connections. Piping must be free to move independent of the tank.

C. Access Collar:
   1. The standard access collar is 24”, which is supplied by the manufacturer. (30” and 36” collars are optional)
   2. All access collars shall be furnished complete with exterior adhesive channel.
   3. Manufacturer supplied adhesive kit (Model Kit-AD) shall be used for watertight collar/riser connection.
   4. Location(s) shall be indicated on tank drawings.
   5. Optional access riser shall be FRP with lockable composite lid.

D. Anchoring:
   1. Precast deadman and anchoring straps shall be standard as supplied by tank manufacturer.
   2. Provide glass fiber reinforced plastic anchor straps for each tank shown.
   3. Number and location of straps shall be as specified by manufacturer.

2.3 BEDDING AND BACKFILL MATERIAL

A. Aggregate bedding and backfill material shall be as specified in Section 310516 Aggregates for Earthwork or as specifically recommended by the tank manufacturer.

B. Do not mix approved backfill with sand or native soil.
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C. Replace all excavated native soil with approved backfill of proper size and gradation. Use backfill which meets ASTM C-33 for quality and soundness.

D. Keep backfill dry and free of ice in freezing conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 010000 – General Requirements: Verification of existing conditions before starting Work.

B. Verify upstream and downstream sanitary sewer connections, size, location and depth.

3.2 PREPARATION

A. Ream pipe ends and remove burrs.

B. Remove scale and dirt from components before assembly.

C. Establish invert elevations for each component in the system.

D. Hand trim excavation to suit septic tank and pipe connections.

3.3 TANK AND TANK BEDDING

A. Excavate in accordance with plans and actual field conditions.

B. Place bedding material level in on continuous layer not exceeding 6 inches compacted depth. Compact to 95%.

C. Install septic tank and backfill in accordance with manufacturer’s recommendations.

D. Test tanks in accordance with manufacturer’s recommendations and in accordance with WAC 246-272B-05200 to verify water tightness. Coordinate all testing/inspection activity with Mason County and Project Representative prior to commencement.

3.4 CONNECTING PIPING

A. Install piping connections between new septic tank and upstream conveyance system in accordance with Section 333100 Sanitary Sewer Piping.

END OF SECTION
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SECTION 334600 – STORMWATER MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION
A. The Work of this Section includes installation of downspout splashblocks and the protection of native soil and vegetation conditions in areas proposed for downspout vegetated flow paths and pavement sheet flow management.
B. Contractor is required to manage runoff during construction per Section 015000: Temporary Facilities and Controls.

1.2 REFERENCES

1.3 SUBMITTALS
A. As specified in Submittal Procedures - Section 013300.
B. Provide data and a material sample for the splashblock.

PART 2 – PRODUCTS

2.1 SPLASHBLOCK
A. Provide and install splashblocks as shown on the Drawings.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Verification of existing conditions before starting work.

3.2 PREPARATION
A. For proposed areas of downspout vegetated flow paths and pavement sheet flow management, as shown on the Drawings, protect native soil and vegetation from all construction disturbance.
B. Areas dedicated for stormwater management shall be protected from silt-laden stormwater runoff.

3.3 INSTALLATION
A. Install splashblocks at discharge point of downspouts as shown on the Drawings.

3.4 FIELD QUALITY CONTROL
A. Maximum tolerances for splashblock placement:
   1. Vertical: 1 inch.
   2. Horizontal: 6 inches.
SECTION 337000 – ELECTRICAL UTILITIES

PART 1 - GENERAL

1.1 WORK IN THIS SECTION

A. Work in this Section involves providing the electrical utility system to the Comfort Station, Welcome Center, and RV campsites from existing transformer. It includes installation of underground electrical conduit, fittings, and adapters to include all related trenching, backfill and compaction; testing; and surface restoration. Construction of electrical utility will require open trenching.

1.2 WORK IN OTHER SECTIONS

A. Section 014000 - Quality Requirements.

B. Division 31 - Earthwork.

PART 2 - PRODUCTS

2.1 RIGID METALIC CONDUIT (RMC)

A. All steel conduits shall be hot dipped galvanized steel conduit, threaded and coupled. Conduit shall meet the current requirements of NFPA 70. All conduit fittings and factory elbows shall be standard threaded galvanized malleable iron and listed for such use by an approved testing company, as stated in the NFPA 70.

2.2 PVC CONDUIT AND FITTINGS

A. All rigid nonmetallic conduit and fittings shall be Polyvinyl Chloride (PVC) Schedule 40, conforming NFPA 70, and shall be listed and approved for the use by an approved testing company, as stated in the NFPA 70.

2.3 HDPE CONDUIT AND FITTINGS

A. All HDPE conduit for electrical installation shall meet the requirements of the NFPA 70 and be listed for such use by and approved testing company, as stated in the NFPA 70

B. All fittings shall be approved by HDPE conduit manufacturer as suitable for use with approved electrical HDPE conduit.
2.4 WARNING TAPE/TRACER WIRE (UTILITIES)

A. The Contractor shall provide 6 inches wide plastic with a metalized foil core warning tape for all underground utilities. This tape shall run continuous from terminal to terminal without splices. The tape shall be capable of being located by a conduit finder and carry a signal of a conduit locating device. This tape shall be similar to the TERRA TAPE "D" or equal. Printing on the warning tape shall note the type of line buried below and shall also have the word "Caution" prominently shown. Color coding shall be red for electrical utility.

B. The Contractor shall provide solid #12 insulated copper tracer wire for all underground utilities. The wire shall run continuous from terminal to terminal without splices.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION

A. All conduits shall be installed in conformance with the manufacturer's recommended procedures and the NFPA 70, for the particular conduit being installed.

B. Conduit shall be well bedded throughout its length, true to line and grade and not supported by the joints. No conduit shall be laid when the temperature drops below freezing, unless specifically authorized by the Project Representative.

C. All trenches containing conduit shall remain open until inspected by the Project Representative and the electrical inspection authority having jurisdiction. No conduit shall be partially backfilled between joints only prior to an inspection.

D. PVC conduit ends shall be squarely cut, all burrs removed, and reamed inside to provide a smooth flow line. Prior to joining PVC conduit and fittings, the outside of the conduit and the inside of the fittings shall be cleaned with an approved PVC conduit cleaner, and then be doped with welding solvent. All joints shall be chemically welded with Solvent Cement immediately following doping operation. Cement both conduit pieces to be joined and then join them quickly. If joint cannot be made up to full depth of socket, cut out and discard. Wipe off excessive cement.

E. All bends shall be RMC, threaded and joined to PVC conduit by adaptor. All conduits shall be well-reamed and burrs removed before assembly.

3.2 TRANSFORMER CONNECTION

A. The primary power system and transformer is owned by the park. The Contractor shall provide buildings secondary power connection to the existing transformer.

B. All connections to the existing transformer shall be made per National Electrical Code and/or NFPA 70, depending on which jurisdiction may apply.