

CLEAN WATER SERVICES

INVITATION TO BID

ROCK CREEK CLARIFIERS NO. 1 – 3 CONCRETE LAUNDER REPAIRS PROJECT NO. 7297

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SECTION 01012

PARTNERING

PART 1 GENERAL

1.01 GENERAL

- A. Owner intends to encourage the foundation of a cohesive partnership between the Owner, Contractor, and Engineer. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals.
- B. Project partnering recognizes that Owner, Contractor, and Engineer all hold in common the goal of successful completion of this project, including the following specific goals:
 - 1. Construction that meets the project performance standards as defined in the Drawing and Specifications of the Contract.
 - 2. Completion of the project on schedule.
 - 3. Conformance to budgetary requirements and limitations.
- C. It is recognized that safety, liability limitations, avoidance of litigation, reputation, good will, and other factors are of significant importance to all parties involved.
- D. Through partnering, it is the Owner's intent that the parties will develop an open, communicative relationship such that agreement can be reached on the primary goals of the Project and the methods that will be used to accomplish them. The parties will mutually develop a communication framework and a conflict resolution system to be used throughout the Project.
- E. The establishment of a partnering relationship shall not change or modify the Terms and Conditions of the Contract and will not relieve the parties of the requirements of the Contract.

1.02 SCHEDULING

- A. Initial Workshop:
 - 1. An initial 1/2-day workshop will be scheduled by the Owner within 30 days after the Notice to Proceed, but prior to beginning Work onsite.
 - 2. The workshop will be held at an agreed on location.
- B. Additional Sessions: Additional 2-hour partnering sessions shall be held every 3 months throughout the Project in order to confirm the relationship and assure the partnering effort continues to be successful. These sessions may take the form of a formal evaluation measuring success towards meeting the established goals and objectives.

1.03 ATTENDEES

- A. The following persons will be expected to attend all partnering sessions, at a minimum:
 - 1. CONTRACTOR:
 - a. Project Sponsor (Principal-in-Charge).
 - b. Project Manager.
 - c. Project Superintendent.
 - 2. OWNER:
 - a. Division Manager.
 - b. Project Manager.
 - c. Resident Project Representative(s).
 - 3. ENGINEER:
 - a. Principal-in-Charge.
 - b. Project Manager.

1.04 FACILITATORS

- A. A partnering facilitator may be provided by Owner to help establish and monitor the partnering relationship.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01110 SUMMARY OF WORK

PART 1 GENERAL

1.01 THE REQUIREMENTS

- A. The Work in this Contract shall consist of performing all Work to fulfill the requirements set forth in the Contract Documents.

1.02 WORK COVERED BY CONTRACT

- A. The Work under this Contract shall consist of, but is not limited to the following:
 - 1. Furnishing all labor, materials and equipment necessary to:
 - a. Procure, install and then remove shoring as required to support the roof structural support system in Primary Clarifiers Nos. 1 through 3 when work is being performed.
 - b. Fabricate and install new truss wall supports to replace the existing failed truss supports in the quantity and location identified by the Engineer in each of Primary Clarifiers Nos. 1 through 3.
 - c. Fabricate and install new roof supports to replace the existing failed roof supports in the quantity and location identified by the Engineer in each of Primary Clarifiers Nos. 1 through 3.
 - d. Procure and install new adhesive anchors to replace existing failed or failing anchors in the quantity and location identified by the Engineer in each of Primary Clarifiers Nos. 1 through 3.
 - e. Provide and install concrete, grout and new rebar, as necessary, to repair the failing concrete structure in all locations that are noted as failing by the Engineer in Primary Clarifiers Nos. 1 through 3.
- B. The Work also includes furnishing and installing related equipment, temporary items, and other appurtenances necessary to complete the Work and to provide a complete and functional system in accordance with the Contract Documents.
- C. The Work is located at the Rock Creek (RC) Water Resource Recovery Facility (WRRF) at 3235 SE River Rd., Hillsboro, OR.

1.03 OTHER WORK AT THE SITE

- A. Other Work or Adjacent Work at site to be coordinated per General Condition Article 8 *OTHER WORK AT THE SITE*. The following list includes, but is not limited to, the additional Work occurring at the Site:

1. Digester 3 and 4 Cover Rehabilitation.
2. Renewable Natural Gas (RNG) Facility

1.04 WORK SEQUENCE

- A. Contractor's attention is directed to Contract Specification 01140 Work Restrictions for detailed information on the Work sequence restrictions.
- B. Contractor shall sequence Work and Site access so that it will not interfere with wastewater treatment operations. The facility must remain in service at all times.
- C. Contractor shall schedule all Work with Owner's personnel to minimize interference with operating the facility.

1.05 CONTRACTOR USE OF SITE

- A. Contractor's use of the Site shall be limited to its construction operations, including onsite storage of materials, onsite fabrication facilities, and field offices.
- B. Contractor access points, staging and parking areas have been designated on the Contract Drawings. Contractor shall restrict its operations to those areas and where the Contract Work shall be performed.
- C. Contractor is advised that all indoor areas (buildings and galleries) are nonsmoking areas.

1.06 OWNER USE OF THE SITE

- A. Owner will utilize the Site during the entire period of construction to conduct Owner's normal operations.

1.07 PROJECT MEETINGS

- A. Preconstruction Conference:
 1. Prior to commencing Work at the Site, a preconstruction conference will be held at Owner's office at a mutually agreed time, but no later than 14 days after the Notice to Proceed. The conference shall be attended by the Contractor's Project Manager, Superintendent, Quality Control Engineer, Safety Representative, and Subcontractors. Subcontractor attendance shall be requested and approved by Engineer. Other attendees will be:
 - a. Engineer and the Resident Project Representative.
 - b. Representatives of Owner.
 - c. Governmental representatives, as appropriate.
 - d. Utilities representatives, as appropriate.

- e. Others as requested by Contractor and Owner upon approval by the Engineer.
- 2. Contractor shall bring the preconstruction conference submittals in accordance with Section 01330, Submittal Procedures.
- 3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to Contractor prior to the meeting date.
- 4. Contractor should be prepared to discuss all of the items listed below.
 - a. Contractor's initial Project Schedule that highlights key Work Restrictions and Work Sequence items.
 - b. Major equipment deliveries and storage plan.
 - c. Shop Drawing, Samples, and Other Submittals schedule per 01330.
 - d. Submittal procedure for Submittal of Shop Drawing, Samples, and Other Submittals.
 - e. Processing applications for payment.
 - f. Maintaining record documents procedure.
 - g. Permit Inspection and Special inspection coordination procedures.
 - h. Field decisions and Change Order procedures
 - i. Use of Site, office, storage areas, and housekeeping
 - j. Site security procedures
 - k. Emergency alarm procedures
 - l. Emergency assembly areas and emergency personnel direction
 - m. Deactivation Request procedures
 - n. Daily reporting of construction activities procedure
 - o. Temporary utilities.
 - p. Designation of Contractors Authorized Representatives and contact information
 - 1) Project Principal
 - 2) Project Manager
 - 3) Superintendent
 - 4) Subcontractor superintendent representatives
- 5. Engineer will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance. Contractor shall advise Engineer within five days of receipt of the minutes if Contractor does not agree with the content of the minutes.
- 6. Contractor and its subcontractors should plan on the conference taking four hours. The conference will include reviewing the Contract Drawings and Specifications with Engineer and Owner.

B. Progress Meetings:

1. Engineer will schedule and hold regular onsite progress meetings at least weekly and at other times as requested by Contractor or as required by progress of the Work. Contractor and Engineer shall attend each meeting and representatives of Owner may also attend. Contractor may at its discretion request attendance by representatives of its suppliers, manufacturers, and subcontractors. Attendance by such representatives shall be subject to approval of Engineer.
2. Contractor to present the following at the progress meeting:
 - a. Overall CPM schedule per Specification Section 01324 – Construction Schedule and anticipated updates to overall CPM Schedule
 - b. Three-week look-ahead schedule as a detailed subset of the overall CPM schedule
 - c. Submittal status
 - d. Request for Information status
 - e. Change order status
 - f. Coordination with operations for facility deactivation and tie-in requests status
 - g. Permit coordination status
 - h. Issues that may impact its progress and propose solutions to resolve these issues
 - i. Payment application status
 - j. Contractor shall include additional status information requested by Engineer.
3. Engineer will preside at the progress meetings and will arrange for keeping and distributing the minutes. Contractor shall advise Engineer within five days of receipt of minutes if Contractor does not agree with the content of the minutes.
4. Engineer shall review the following:
 - a. Actual start and finish dates of completed activities since the last progress meeting.
 - b. Durations and progress of activities not completed.
 - c. Percentage completion of items on the Application for Payment.
 - d. Overall Project progress per the current CPM Construction Schedule and the potential effect on Contract Time and Contract Price.

1.08 PRE-INSTALLATION MEETINGS

- A. Contractor shall provide pre-installation coordination meetings for Work elements that require specialized equipment, suppliers, manufacturers, and installers to ensure successful integration into the Project.

Pre-installation meetings coordination meetings include:

1. Planning and scheduling site visits with Engineer for identifying deficiencies to be repaired and observations required by Engineer.

2. Scheduling and planning for QA/QC Inspections of the Work.

- B. Contractor shall distribute to each anticipated participant a written notice and agenda for each meeting at least four days before the meeting.
- C. Contractor shall schedule the pre-installation meeting per the specification requirements or at least 21 days in advance of installation.
- D. Contractors shall conduct meetings in Engineer's field office or other mutually agreed upon place.
- E. Contractor shall require attendance of the Superintendent and all appropriate manufacturers, suppliers, installers, and subcontractors.
- F. Contractor shall invite Owner and Engineer.
- G. Engineer to preside at meetings.
- H. Engineer to record minutes of meeting and distribute copies of minutes to participants and interested parties.

1.09 POST CONSTRUCTION MEETING

- A. Contractor shall meet with Owner and Engineer and inspect the Work 11 months after the date of Substantial Completion.
- B. Owner shall arrange the meeting at least 7 days before meeting.
- C. Contractor shall meet in Owner's office or other mutually agreed upon place.
- D. Contractor shall inspect the Work with Owner and Engineer and draft a list of items to be completed or corrected.
- E. Contractor shall review the service and maintenance contracts with Owner and Engineer, and take appropriate corrective action when necessary.
- F. Contractor shall complete or correct defective work and extend the correction period accordingly per General Conditions 15.08 *Correction Period*
- G. Contractor shall require attendance of Superintendent, appropriate manufacturers and installers of major units of constructions, and affected subcontractors.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01140 WORK RESTRICTIONS

PART 1 GENERAL

1.01 THE REQUIREMENT

- A. Work shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the public and the operation and maintenance of existing facilities.
- B. The Contractor shall incorporate the construction and schedule constraints of this Section in preparing the construction schedules required under Section 01324, Construction Schedule.

1.02 EXISTING TREATMENT PLANT

- A. The Work shall be executed while all existing wastewater treatment facilities and pump stations are in operation except as noted in this Specification Section.
- B. Operation of the existing facility shall not be jeopardized nor shall the efficiency or volume of wastewater conveyance be reduced as a result of the execution of the Work. Impairing the operational capabilities of the treatment plant will result in serious environmental damage and monetary fines.
- C. Conduct Work in a manner that will not impair the operational capabilities of essential elements of the treatment process or reduce the capacity of the entire treatment plant below levels sufficient to treat the quality of wastewater to the water quality limitations specified in the discharge permit. The status of the treatment plant shall be defined as “operational” when it is capable of treating the entire quantity of wastewater received to the water quality limits specified in the discharge permit.
- D. The construction sequence and constraints in this Section do not include all items affecting the completion of the Work, but are intended to describe the sequence of critical events and associated constraints necessary to minimize disruption to the ongoing treatment plant processes and to ensure compliance with NPDES Permit requirements and prevent all overflows within the collection system.
- E. The Work Restrictions described are not all inclusive and that additional items of Work not included or described may be required to minimize disruption and ensure operational compliance. Deviation from or modification of these suggested sequences is permitted if techniques and methods known to the Contractor will result in reducing disruption to the facility operation and maintaining treatment efficiency, avoiding violation of scheduling constraints,

and if deviation is approved in advance by the Engineer and Owner's Representative.

1.03 OPERATION OF PLANT EQUIPMENT

- A. Operational functions, deactivations, or shutdown of existing treatment plant processes or equipment required to facilitate Contractor's Work will be done by the Owner's personnel only.
- B. The plant operation and maintenance personnel will cooperate as is practical in order to facilitate Contractor's Work. However, certain shutdown and connections may only be permissible at times other than normal working hours such as nights or weekends. No additional payment will be made to the Contractor for any night, weekend, or holiday premium or overtime payments.
- C. If it becomes necessary for the proper operation or maintenance of portions of the plant, the Owner may require the Contractor to reschedule an approved shutdown. If notice of said rescheduling is given to the Contractor at least 24 hours in advance of the scheduled shutdown, the Contractor shall not be entitled to additional compensation due to the impacts of rescheduling. The Contractor shall then reschedule its Work so there shall be no conflict with necessary operations or maintenance of the plant. The Contractor shall, within 2 working days, furnish the Owner's Representative a revised Deactivation Request and a plan for rescheduling the shutdown in accordance with the requirements of the construction schedule.

1.04 DEACTIVATION REQUESTS

- A. The Contractor shall not remove from service, operate any equipment, tie-in, de-energize, and or modify operational settings for any facility without permission from the Owner's Project Representative.
- B. Modifications to existing facilities, the construction of new facilities, and the connection of new to existing facilities may require the temporary outage or bypass of existing treatment processes or facilities. In such cases, the Contractor shall coordinate Work with the Owner's Representative as described below. The Contractor shall submit a detailed Deactivation Plan and time schedule for all Work activities to accomplish modification.
- C. Deactivation Plans shall be submitted to the Owner's Representative for approval a minimum of 14 days in advance of the time that such deactivations are required. The Deactivation Plan shall be coordinated with the construction schedule and shall meet the Work Restrictions. The Deactivation Plan shall describe the Contractor's method of bypassing any deactivated unit and for preventing bypassing of other treatment units; the length of time required to complete the operation; any necessary temporary power, controls, instrumentation, or alarms required to maintain control, monitoring, and alarms for the associated facilities; and the manpower, plant, and equipment

which the Contractor shall provide in order to ensure proper operation of associated treatment units. All costs for preparing and implementing the Deactivation Plans shall be the responsibility of the Contractor as part of the Work.

- D. The Contractor shall not begin an alteration affecting existing facilities until specific written approval has been granted by the Owner's Representative in each case.
- E. The Owner's Representative will coordinate the Contractor's planned procedure with Owner personnel. The Owner's Representative have the authority to modify any proposed shutdown procedures if such procedures would adversely impact the plant operations.
- F. The Owner's Representative shall be notified in writing a minimum of 7 days in advance of the required deactivation if the schedule for performing the Work has changed or if revisions to the Deactivation Plan are required. The Contractor shall provide written confirmation of the deactivation date and time 2 days prior to the actual deactivation. This notification shall also provide confirmation that the Contractor has all the required parts, materials, tools, and equipment on-hand to successfully undertake and complete the deactivation.

1.05 BYPASS FACILITIES

- A. Bypassing of untreated or partially treated sewage to surface waters or drainage courses is strictly prohibited during construction. In the event accidental bypassing is caused by the Contractor's operations, the Owner shall immediately be entitled to employ others to stop the bypassing and costs incurred there from, including any regulatory agency fines resulting there from, will be deducted from the Contractor's construction progress payments. If accidental bypass occurs, the Contractor shall immediately inform the Owner's Representative.
- B. Install and maintain bypass facilities, including pumping, and temporary components required to keep facility operations online.
- C. Bypass pumping control must mimic typical plant flow and must be capable of evenly splitting flow and controlling flow rate based on process requirements.
- D. Bypass pumping redundancy, installed or standby, must be provided and approved by Engineer and Owner prior to use.
- E. Conditions that require bypass facilities include, but are not limited to:
 - 1. Work sequencing activities required to complete Project.
 - 2. Failure to meet Work Constraints identified herein.

3. Inclement weather during temporary shutdowns that require increased treatment or containment capacity.

1.06 TEMPORARY CONNECTIONS

- A. The making of connections to existing facilities or other operations that interfere with the operation of the existing equipment or process flow paths shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall be completed as quickly as possible and with as little delay as possible, and shall proceed continuously (24 hours a day and 7 days a week) if necessary to complete modifications and/or connections in the minimum time.
- B. The cost of any temporary facilities and night, weekend, or holiday work and overtime payments required during process interruptions shall be included in the price of the Work.
- C. Temporary facilities and piping shall be provided to minimize interference by Contractor with Owner's operation and maintenance of the wastewater treatment plant. Unless otherwise indicated, each temporary pipeline (including sample lines) shall be of the same size as its connection to the existing or permanent facility at the downstream end of the pipeline. Piping materials shall be suitable for the material being conveyed and be as required in the Contract Specifications. Temporary bulkheads necessary to isolate wetted process areas to perform Work shall be designed and stamped by an engineer registered in the State of Oregon.
- D. When temporary electrical power, controls, instrumentation, or alarms are required for routine continuous operations of existing or new equipment, the Contractor shall provide the necessary equipment and appurtenances. Prior to installing said equipment and appurtenances, Contractor shall furnish a submittal on the proposed components and installation for Engineer's review and approval.
- E. A plan showing the size and location of the temporary facilities and piping shall be submitted to the Engineer and Owner's Representative at the same time as the Deactivation Plan required under this Section. All costs for design, provision, operation, and removal of temporary facilities and piping shall be the responsibility of the Contractor.

1.07 SCHEDULE CONSTRAINTS

- A. General: It is the Contractor's responsibility to coordinate and plan the construction activities to integrate each schedule constraint into performance of the overall Work. The constraints identified herein are general descriptions of the major activities requiring sequencing or interface with the existing plant operation. It is not the intent of this Section to list all sequences, constraints,

or coordination items required for the Work. Coordination of the detailed Work constraints within Specification Sections is required.

- B. Contractor shall review the requirements for start-up and testing in Section 01756 Testing and Facility Startup.
- C. Process, Facility, or Service Shutdown:
 - 1. All diversions and shutdowns to plant flows and processes shall be subject to the requirements for a deactivation request and actual process, flow, and weather conditions existing at the time of the requested deactivation. Owner's determination regarding the acceptability of proceeding with a planned diversion or shutdown shall be final.
 - 2. Contractor shall work continuously during diversions and shutdowns (1) if necessary, (2) when specified, or (3) when requested by Owner and Engineer to complete the work within the time allotted.
- D. Work Constraints:
 - 1. The submitted Work Sequence Plan shall incorporate the following general Work Constraints regarding treatment plant operations:
 - a. **Contractor must allow sludge haulers full use of and unimpeded access to WRRF roads at all hours.**
 - b. **Contractor must allow grit and screening haulers full use of and unimpeded access to the headworks during regular work hours.**
 - c. **Contractor must allow septage haulers full use of and unimpeded access to the Septage Receiving Station at all hours.**
 - d. **Work will only be allowed on one Primary Clarifier at a time unless approved by Owner.**
 - e. **Work on a Primary Clarifier must be complete, accepted by Owner and be brought back to full operational activity before another Primary Clarifier will be taken out of service for Contractor.**
 - f. **After a Primary Clarifier has been returned to service, the RC WRRF will require a 7-day operational test of the Primary Clarifier that was completed by the Contractor before accepting it as complete and beginning the drawdown of the next available Primary Clarifier.**
 - g. **If the Primary Clarifier acceptance test fails, a new 7-day testing period will begin again once the operational deficiencies have been addressed by the Contractor.**
 - h. **Work on a Primary Clarifier will only be allowed in the Dry Season which is from approximately April 15 to October 31.**
 - i. **Owner will only partially clean Primary Clarifier before turning over to Contractor.**

- 1) Owner will use hoses to clean as much as possible on each Primary Clarifier from the exterior of each of the Clarifier access hatches.
 - 2) After hosing down as much debris as possible, Owner will dewater the Primary Clarifier until there is about a foot of fluid remaining in the Clarifier.
 - 3) Contractor can pump remaining fluid into an adjacent operational Primary Clarifier or use a vacuum truck and dispose of material in a designated manhole.
 - 4) Contractor will have access to adjacent hose bibs and one 1.5" fire hose for use during their work.
 - j. Contractor will have to participate in Lock-Out/Tag-Out (LO/TO) with Owner. Contractor will be allowed use of a lock box or use individual locks for each worker.
2. The submitted Work Sequence Plan shall incorporate the following Work Constraints regarding treatment process and operations:
 - a. Two primary clarifiers must be in operation at all times.
 - b. All primary clarifiers must be in operation before April 15 and after October 31 of each Calendar year.
 - c. Contractor must provide continuous odor control for primary clarifiers as directed by Owner.
 3. Water from dewatering operations shall be directed to the onsite sanitary sewer system. The water shall meet a 400 mg/L TSS limit or be treated by Contractor to meet the limit. Verification of discharge locations shall be coordinated with the Owner's Representative.
 4. The Work will include working around facilities containing sewage, sludge, and hydrogen sulfide gas and other sewage gasses. The Contractor shall establish and abide by its Safety Plan including observing confined space testing, entry and work procedures at all times. The Contractor shall also review and include pertinent provisions of the Owner's treatment plant safety plan in its own Safety Plan with regard to working around chemicals and other conditions present at wastewater treatment plants.
 5. The Contractor shall limit its work activities and traffic to the area of the Project Work and shall not enter any other plant areas without prior written permission from the Owner. The Contractor shall strictly obey all speed limits and other traffic laws at all times.

1.08 CONSTRUCTION SEQUENCING

A. WORK SEQUENCE PLAN

1. Using Work Constraints identified herein, the Contractor shall develop an independent Work Sequence Plan and is not necessarily obligated to

follow the work sequencing described herein. The Work Sequence Plan shall include:

- a. Description and sequence of major construction activities that affect plant operations.
- b. Explanation of how Work Constraints and Milestones will be met.
- c. Coordination with Facility Startup, Training and Testing and Construction Schedule.

B. All construction activities shall be scheduled and sequenced to ensure continuous operation of the existing conveyance and treatment facilities. The Contractor's scheduling shall develop all construction sequencing so that the Work will not adversely impact conveyance or treatment. The Contractor shall be responsible for development of the construction sequencing. In implementing the construction sequencing, the Contractor shall maintain the existing facilities in service until new facilities are constructed and are operational to supplement the existing capacity. When new facilities are operational (as defined in Section 01756, Testing, Training, and Facility Startup, and Section 01770, Closeout Procedures) and accepted by the Owner, the existing facilities may be taken out of service upon approval by the Engineer and Owner's Representative.

C. The following general guidelines shall be used by the Contractor in planning the sequence of construction.

1. During all modification and demolition work, safe working conditions for personnel shall be maintained at all times. The foregoing includes at least proper trench excavation, the provision of temporary equipment guards, supports, warning signs, walkways, covers over openings, handrailing, lighting, traffic control measures, and protection of electrical equipment and power supply.
2. All temporary facilities shall be constructed in accordance with applicable codes and regulations to operate safely and properly.
3. Valves to be temporarily shut off during the Work shall be coordinated with the Owner's Representative, tagged as such and shall be wired shut with a crimped lead seal and padlocked for safety in accordance with the Contractor's Safety Plan and in a manner acceptable to the Owner.
4. Electrical and mechanical equipment to be temporarily shut off during the Work shall be locked out and tagged for safety in accordance with the Contractor's Safety Plan and in a manner acceptable to the Owner.
5. All in-road work shall be planned with a traffic control plan that will be reviewed and approved prior to start of work.
6. Owner will take Primary Clarifiers and Primary Influent Flow Split Structure (PIFSS) out of service after which Contractor shall take responsibility for the Primary Clarifier they are working on. Contractor should anticipate 5 working days for each clarifier to take it out of service and to restore it to service. Contractor should expect to dispose of approximately 40 cubic yards from each of the primary clarifiers.

Liquids may be pumped to on site sewer. Debris may be disposed of in Owner's dumpster located in the headworks.

- D. Suggested Sequencing of Major Activities: This Section provides a suggested sequence for major construction activities that incorporates the Work Constraints and Milestones specified. Additional and parallel activities will be required. The Contractor may utilize all or part of this suggested sequence in the submitted Work Sequence Plan to meet the required Work Constraints and Milestones. The Work Sequence Plan must provide an equivalent level of reliability, flexibility, and operating characteristics with respect to plant operations and meeting plant discharge permit requirements. The Contract Times, Liquidated Damages, and Contract Milestones are based, in part, on the suggested sequencing described herein. The Owner reserves the right to modify the Contract Times, Liquidated Damages, and Contract Milestones based on Contractor-initiated changes to the suggested sequencing at no additional cost to the Owner.
- E. The Contractor shall use the Interim Milestones for substantial and final completion as defined below and in the Contract Documents in developing its construction plan and baseline CPM schedule. These Interim Milestones are not all-inclusive; the Contractor shall develop and include additional construction sequencing measures as necessary to maintain operation of existing facilities and to complete the Work within the Contract time.
 - 1. Substantial Completion: Substantial Completion shall be the point in time when all 3 Primary Clarifiers have been returned to service and are operational and accepted by the District.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01292
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 GENERAL

- A. This Section defines the process whereby the Schedule of Values (lump sum price breakdown) shall be developed. Monthly progress payment amounts shall be determined, in part, from the monthly progress updates of the CPM Schedule activities.

1.02 PRELIMINARY SCHEDULE OF VALUES

- A. The Contractor shall submit a preliminary Schedule of Values for the general and major components. The draft SOV shall be provided at the Preconstruction Conference. The SOV shall include, at a minimum, the proposed list and value for all Work components. All components shall include a separate line item as indicated in Exhibit A – Example Schedule of Values. Exhibit A is the minimum requirements and may be changed, amended, added to and/or deleted from when establishing the Preliminary SOV.
- B. The Contractor and Owner/Engineer shall meet and jointly review the Schedule of Values and make any adjustments, in the opinion of the Owner and/or Engineer, these are necessary to establish fair and reasonable allocation of values for the major Work components. Front-end loading will not be permitted. The Owner or Engineer may require reallocation of major Work components from items in the above listing if in the opinion of the Owner or Engineer such reallocation is necessary.

1.03 FINAL SCHEDULE OF VALUES

- A. The Contractor shall prepare and submit a final Schedule of Values to the Owner and/or Engineer within 30 days from the date of Notice to Proceed. The detailed Schedule of Values shall be the final agreed upon line items and values for all general and major work items. The Owner and/or Engineer shall be the sole judge of acceptable numbers, details and description of values established. The Exhibit A – Example Schedule of Values is the minimum requirements. The number and detail of descriptions shall be determined by the Owner and/or Engineer. Once finalized the schedule of values will be added to the Electronic Construction Management Software system.

1.04 ESTIMATED PROGRESS PAYMENTS

- A. Within 15 days after Engineer's acceptance of the Detailed Schedule of Values and the Original CPM Construction Schedule as per Section 01324, Construction Schedule, Paragraph 1.3.D, the Contractor shall provide the Engineer with an

estimate of anticipated Progress Payments, by month, throughout the Project's construction duration.

1.05 CHANGES TO SCHEDULE OF VALUES

- A. In the event that the Contractor and Engineer agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.
- B. Approved change orders reflected in the CPM Schedule shall be incorporated into the Schedule of Values as a single unit identified by the change order number.

1.06 COMPLETE AND TIMELY SUBMISSIONS

- A. The Schedule of Values information is an integral part of the progress payment information. As such, it is critical information for evaluating the Project's progress. Accordingly, if any submittal required by this Section is found to be incomplete or is submitted later than required, it may result in a deferral by Engineer to recommend all or any part of Contractor's Application for Payment, either partial or final.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

EXHIBIT A – EXAMPLE SCHEDULE OF VALUES

PROCESS	DESCRIPTION	AMOUNT	BILLED TO DATE	AMOUNT REMAINING	NOTES
1 - GENERAL					
1	Mobilization	-	-	-	Max 1% of Contract
2	Bonds and Insurance	-	-	-	
3	Demobilization	-	-	-	Max 2% of Contract
4	Project Management	-	-	-	
5	Temporary Utilities	-	-	-	
6	Erosion Control	-	-	-	
7	Permits	-	-	-	
8	General Conditions/CPM Schedule	-	-	-	
9	Demolition	-	-	-	May expand per area
10	Startup and Testing	-	-	-	10% of total Electrical, Installation and Controls. Shall not be paid until successful completion of all requirements in 01756
11	Performance Testing/Closeout	-	-	-	
12	Dewatering	-	-	-	
13	Construction Entrance, Dust Control, Tire Wash	-	-	-	Pay per month
14	Shoring and Excavation Protection	-	-	-	
2 – EQUIPMENT OR AREA #1					
1	Mechanical Equipment	-	-	-	
2	Installation of Mechanical Equipment	-	-	-	
3	Electrical	-	-	-	
4	Instrumentation and Controls	-	-	-	
5	Component #1	-	-	-	
6	Installation of Component #1	-	-	-	
7	Slide Gates	-	-	-	

EXHIBIT A – EXAMPLE SCHEDULE OF VALUES

PROCESS	DESCRIPTION	AMOUNT	BILLED TO DATE	AMOUNT REMAINING	NOTES
8	Installation of Slide Gates	-	-	-	
9	Motor Actuated Valves	-	-	-	
10	Installation of Motor Actuated Valves	-	-	-	
11	Instrumentation	-	-	-	
12	Subgrade Preparation	-	-	-	
13	Ground Improvements	-	-	-	
14	Formwork	-	-	-	May expand for multiple pours/areas
15	Reinforcing Steel	-	-	-	May expand for multiple pours/areas
16	Placement of Concrete	-	-	-	May expand for multiple pours/areas
17	Metal Fabrications	-	-	-	
3 – EQUIPMENT OR AREA #2, ...(continue list based on equipment and areas)...					
1	Mechanical Equipment	-	-	-	
2	Installation of Mechanical Equipment	-	-	-	
3	Electrical	-	-	-	
4	Instrumentation and Controls	-	-	-	
5	Component #1	-	-	-	
6	Installation of Component #1	-	-	-	
7	Slide Gates	-	-	-	
8	Installation of Slide Gates	-	-	-	
9	Motor Actuated Valves	-	-	-	
10	Installation of Motor Actuated Valves	-	-	-	
11	Instrumentation	-	-	-	
12	Subgrade Preparation	-	-	-	
13	Ground Improvements	-	-	-	

EXHIBIT A – EXAMPLE SCHEDULE OF VALUES

PROCESS	DESCRIPTION	AMOUNT	BILLED TO DATE	AMOUNT REMAINING	NOTES
14	Formwork	-	-	-	May expand for multiple pours/areas
15	Reinforcing Steel	-	-	-	May expand for multiple pours/areas
16	Placement of Concrete	-	-	-	May expand for multiple pours/areas
17	Metal Fabrications	-	-	-	
X - SITE CIVIL					
1	Major Pipe #1	-	-	-	
2	Major Pipe #1 Installation	-	-	-	
3	Major Pipe #2 Relocation	-	-	-	
4	Major Pipe #2	-	-	-	
5	Major Pipe #2 Installation	-	-	-	
6	Major Pipe #3	-	-	-	
7	Major Pipe #3 Installation	-	-	-	
8	Manholes	-	-	-	
9	Manhole Installation	-	-	-	
10	Electrical Handholds	-	-	-	
11	Electrical Handhold Installation	-	-	-	
12	Ductbank	-	-	-	
13	Ductbank Installation	-	-	-	
14	Miscellaneous small pipe/conduits	-	-	-	
15	Miscellaneous small pipe/conduits installation	-	-	-	
16	Grading	-	-	-	
17	Paving	-	-	-	
18	Sidewalks	-	-	-	
19	Gravel Surfaces	-	-	-	

EXHIBIT A – EXAMPLE SCHEDULE OF VALUES

PROCESS	DESCRIPTION	AMOUNT	BILLED TO DATE	AMOUNT REMAINING	NOTES
20	Site Lighting	-	-	-	
21	Storm Drain Pipe	-	-	-	
22	Storm Drain Pipe Installation	-	-	-	
23	Import Suitable Backfill	-	-	-	
24	Export Unsuitables	-	-	-	

SECTION 01320

WEB-BASED CONSTRUCTION MANAGEMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Owner and Contractor shall utilize Procore Technology, Inc's Construction Operating System (Construction OS) web-based system for electronic submittal of all data and documents throughout the duration of the Contract. Construction OS is a web-based electronic media site that is hosted by Procore utilizing their Construction OS web solution. Construction OS will be made available to all contractors' project personnel, subcontractor personnel, suppliers, consultants and the Designer of Record. The joint use of this system is to facilitate; electronic exchange of information, automation of key processes, and overall management of the contract. Construction OS Project Management utility shall be the primary means of project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents, the paper documents will govern. Construction OS is a registered trademark of Procore Technology, Inc.

1.02 USER ACCESS LIMITATIONS

- A. The Owners representative will control the Contractor's access to Construction OS by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system; determine assigned function-based authorizations (determines what can be seen) and user privileges (determines what they can do). Sub-contractors and suppliers will be given access to Construction OS through the Contractor. Entry of information exchanged and transferred between the Contractor and its sub-contractors and suppliers on Construction OS shall be the responsibility of the Contractor.
- B. Joint Ownership of Data - Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the Construction OS system) by the Owners Representative and the Contractor will be jointly owned.
- C. Data access after project completion - All Project participants can request a copy of their project information from Construction OS upon completion of the project. Participants are responsible for fees related to Construction OS, preparing and shipping the data archive. To request an

archive complete a support request in the Construction OS application. The support request should include the address for shipping the archive too.

1.03 AUTOMATED SYSTEM NOTIFICATION AND AUDIT LOG TRACKING

- A. Review comments made (or lack thereof) by the Owner on Contractor-submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

1.04 SUBMITTALS

- A. See Section 01330, Submittal Procedures.

1.05 COMPUTER REQUIREMENTS

- A. The Contractor shall use computer hardware and software that meets the requirements of the Construction OS system as recommended by Procore Technology, Inc to access and utilize Construction OS. As recommendations are modified by Construction OS, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The contractor will ensure that connectivity to the Construction OS system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. It is recommended a faster connection be used when uploading pictures and files into the system. Construction OS supports the current and prior two major versions of Chrome, Firefox, Internet Explorer and Safari on a rolling basis.

1.06 CONTRACTOR RESPONSIBILITY

- A. The Contractor shall be responsible for the validity of their information placed in Construction OS and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in Construction OS to the maximum extent possible. If a form does not exist in Construction OS the Contractor must include a form of their own or provided by the Owner representative as an attachment to a submittal. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel

in the use of Construction OS (outside what is provided by the owner) and the other programs indicated above as needed.

1. User Access Administration - Provide a list of Contractor's key Construction OS personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owners Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and subcontractors to Construction OS.

1.07 CONNECTIVITY PROBLEMS

- A. Construction OS is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. Construction OS response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc. and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of Construction OS including, but not limited to: slow response time, down time periods, connectivity problems, or loss of information. The contractor will ensure that connectivity to the Construction OS system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage of the Construction OS be grounds for a time extension or cost adjustment to the contract.

1.08 TRAINING

- A. The Owner has arranged for a 2 hour training session. The Contractor will coordinate the training time. Training will be open to all appropriate Contractor, and Engineer personnel.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. Construction OS project management application (no equal). Provided by Procore Technology, Inc, www.procore.com.

PART 3 EXECUTION

3.01 CONSTRUCTION OS UTILIZATION

- A. Construction OS shall be utilized in connection with submittal preparation and information management required by Sections:

Section 01110, Summary of Work
Section 01140, Work Restrictions
Section 01330, Submittal Procedures

and other Division One sections. Requirements of this section are in addition to requirements of all other sections of the specifications.

- B. Design Document Submittals - All design drawings and specifications shall be submitted as CAD .dwg files or PDF attachments to the Construction OS submittal work flow process and form.
- C. Shop Drawings - Shop drawing and design data documents shall be submitted as cad.dwg files or PDF attachments to the Construction OS submittal work flow process and form. Examples of shop drawings include, but are not limited to:
1. Standard manufacturer installation drawings.
 2. Drawings prepared to illustrate portions of the work designed or developed by the Contractor.
- D. Product Data - Product catalog data and manufacturers instructions shall be submitted as PDF attachments to the Construction OS submittal work flow process and form. Examples of product data include, but are not limited to:
1. Manufacturer's printed literature.
 2. Preprinted product specification data and installation instructions.
- E. Samples - Sample submittals shall be physically submitted as specified in Section 01330, Submittal Procedures. Contractor shall enter submittal data information into Construction OS with a copy of the submittal form(s) attached to the sample. Examples of samples include, but are not limited to:
1. Product finishes and color selection samples.
 2. Product finishes and color verification samples.
 3. Finish/color boards.
 4. Physical samples of materials.
- F. Administrative Submittals - All correspondence and pre-construction submittals shall be submitted using Construction OS. Examples of administrative submittals include, but are not limited to:
1. Digging permits and notices for excavation.
 2. List of product substitutions

3. List of contact personnel.
 4. Notices for roadway interruption, work outside regular hours, and utility cut overs.
 5. Requests for Information (RFI).
 6. Plans for safety, demolition, environmental protection, and similar activities.
 7. Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports, Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.
 8. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.
 9. Any general correspondence submitted.
- G. Compliance Submittals Test reports, certificates, and manufacture field report submittals shall be submitted on Construction OS as PDF attachments. Examples of compliance submittals include, but are not limited to:
1. Field test reports.
 2. Quality Control certifications.
 3. Manufacturers documentation and certifications for quality of products and materials provided.
- H. Record and Closeout Submittals - Operation and maintenance data and closeout submittals shall be submitted on Construction OS as PDF documents during the approval and review stage as specified, with actual set of documents submitted for final. Examples of record submittals include, but are not limited to:
1. Operation and Maintenance Manuals: Final documents shall be submitted as specified.
 2. As-built Drawings: Final documents shall be submitted as specified.
 3. Extra Materials: Submittal forms shall indicate when actual materials are submitted.
- I. Financial Submittals Schedule of Value, Pay Estimates and Change Request Proposals shall be submitted on Construction OS. Supporting material for Pay Estimates and Change Requests shall be submitted on Construction OS as PDF attachments. Examples of compliance submittals include, but are not limited to:
1. Contractors Schedule of Values
 2. Contractors Monthly Progress Payment Requests
 3. Contract Change proposals requested by the project owner.

End of Section

SECTION 01324 CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 SUMMARY

- A. Scheduling of the Work shall be performed by the Contractor in accordance with the requirements of this Section.
- B. Development of the schedule, the project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling. Where submittals are required hereunder, the Contractor shall submit four copies of each submittal item.

1.02 INITIAL SCHEDULE SUBMITTALS

- A. The Contractor shall submit two short-term schedule documents at the Preconstruction Conference which shall serve as the Contractor's Plan of Operation for the initial 60-day period of the Contract Time and to identify the manner in which the Contractor intends to complete all Work within the Contract Time.
 - 1. 60-Day Plan of Operation: During the initial 60 days of the Contract Time, the Contractor shall conduct operations in accordance with a 60 day bar chart type plan of operation. The bar chart so prepared shall show the accomplishment of the Contractor's early activities (mobilization, permits, submittals necessary for early material and equipment procurement, submittals necessary for long-lead equipment procurement, CPM submittals, initial Site work and other submittals and activities required in the first 60 days). Refer to Section 01140, Work Restrictions, for milestones and submittals required within the first 60 days.
 - 2. Project Overview Bar Chart: The overview bar chart shall indicate the major components of the Work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the Work will be made substantially complete and placed into service in order to meet the project milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as (1) site work, (2) completion of all structural concrete, (3) major mechanical work, (4) equipment procurement, (5) equipment installation, (6) major electrical work, (7) instrumentation and control work, (8) time requirements for start-up and testing from Section 13400, Instrumentation and Control for Process Systems, and (9) other important work within the overall project scope. Planned durations and

start dates shall be indicated for each work item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 36 inches by 60 inches in size. Not more than four sheets shall be employed to represent this overview information.

- B. The Engineer and the Contractor shall meet to review and discuss the 60-day plan of operation and project overview gantt chart within 5 days after submittal to the Engineer. The Engineer's review and comment on the schedules will be limited to conformance with the sequencing and milestone requirements in the Contract Documents. The Contractor shall make corrections to the schedules necessary to comply with the requirements and shall adjust the schedules to incorporate any missing information requested by the Engineer.

1.03 CPM SCHEDULE SUBMITTALS

- A. Original CPM Schedule Submittal: Within 30 days after the commencement date stated in the Notice to Proceed, the Contractor shall submit for review by the Engineer a hard copy of the CPM Schedule and appropriate schedule logic information. The Contractor shall also submit an electronic copy of all the schedule submittal information. The electronic version shall be compatible with Microsoft Project 2013 to generate network diagrams and schedule reports identical to the hard copies submitted. This submittal shall have already been reviewed and approved by the Contractor's Project Manager, Project Superintendent, and the Project Estimator prior to submission. The CPM Schedule shall be a time-scaled network diagram of the "i-j" activity-on-arrow or precedence type. The Network Diagram shall describe the activities to be accomplished and their logical relationships and show the critical path.
- B. The Computerized Schedule Report tabulations shall include the following:
 - 1. Report of activities sorted by activity number. Activity numbers, where practical, shall correlate to the area numbers, if so designated in the Contract Drawings.
 - 2. Report of activities sorted by early start date.
 - 3. Report of activities sorted by total float.
 - 4. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities.

- C. Original CPM Schedule Review Meeting: The Contractor shall, within 40 days from the commencement date stated in the Notice to Proceed, meet with the Engineer to review the original CPM schedule submittal. The Contractor shall have the Project Manager, Project Superintendent, and the Project Scheduler in attendance. The Engineer's review will be limited to the conformance to the Contract Documents. However, the review may also include:
1. Clarifications of the design intent, process, and startup requirements.
 2. Directions to include activities and information missing from the submittal.
 3. Requests to the Contractor to clarify the schedule.
- D. Revisions to the Original CPM Schedule: Within 50 days after the commencement date stated in the Notice to Proceed, the Contractor shall have revised the original CPM schedule submittal to address all review comments from the original CPM schedule review meeting and resubmit the network diagrams and reports for the Engineer's review. The Engineer, within 10 days from the date that the Contractor submitted the revised schedule will either (1) accept the schedule as submitted, or (2) advise the Contractor in writing to review any part or parts of the schedule which either do not meet the Contract requirements or are unsatisfactory for the Engineer to monitor the project's progress and status. The Engineer may accept the schedule with conditions that the first monthly CPM schedule update be revised to correct deficiencies identified. When the schedule is accepted, it shall be considered as the "Original CPM Construction Schedule" until an updated schedule has been submitted. The Owner reserves the right to require that the Contractor adjust, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of the Work. No additional compensation will be provided for such adjustments, additions, or clarifications.
- E. Acceptance:
1. Acceptance of the Contractor's schedule by the Engineer and Owner will be based solely upon compliance with the requirements. By way of the Contractor assigning activity durations and proposing the sequence of the Work, the Contractor agrees to utilize sufficient and necessary management and other resources to perform the work in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.
 2. Submission of the Contractor's progress schedule to the Owner or Engineer shall not relieve the Contractor of total responsibility for scheduling, sequencing, and pursuing the Work to comply with the

requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed Work.

F. Monthly Updates and Periodic CPM Schedule Submittals:

1. Following the acceptance of the Contractor's original CPM Schedule, the Contractor shall monitor the progress of the Work and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Each schedule update submitted shall be complete including all information requested in the original schedule submittal and be in the schedule report format indicated below. Each update shall continue to show all work activities including those already completed. Completed activities shall accurately reflect "as built" information by indicating when the work was actually started and completed.
2. Neither the submission nor the updating of the Contractor's original schedule submittal nor the submission, updating, change, or revision of any other report, curve, schedule, or narrative submitted to the Engineer by the Contractor under this Contract, nor the Engineer's review or acceptance of any such report, curve, schedule, or narrative shall have the effect of amending or modifying, in any way, the Contract Times or milestone dates or of modifying or limiting, in any way, the Contractor's obligations under this Contract. Only a signed, fully executed Change Order can modify contractual obligations.
3. The monthly schedule update submittal will be reviewed monthly with the Contractor during a weekly construction progress meeting. The goal of these schedule review meetings is to enable the Contractor and the Engineer to initiate appropriate remedial action to minimize any known or foreseen delay in completion of the Work and to determine the amount of Work completed since the last month's schedule update. The status of the Work will be determined by the percent complete of each activity in the updated CPM Schedule. These meetings are considered a critical component of the overall monthly schedule update submittal, and the Contractor shall have appropriate personnel attend. As a minimum, these meetings shall be attended by the Contractor's Project Manager and Project Superintendent. Within 7 working days after the monthly schedule review meeting, the Contractor shall submit the revised CPM Schedule, the revised CPM computerized tabulations as noted in this Section, the revised successor/predecessor report, the Project Status Reports as defined below and the Contractor's Application for Payment. Within 5 working days of receipt of the revised submittals, the Engineer will either accept or reject the monthly schedule update submittal. If rejected, the update shall be corrected and resubmitted by the Contractor before the Application for Payment for the update period will be processed.

- G. Schedule Revisions: The Contractor shall highlight or otherwise identify all changes to the schedule logic or activity durations made from the previous schedule. The Contractor shall modify any portions of the CPM schedule which become infeasible because of activities behind schedule or for any other valid reason.
- H. The Contractor shall include plan and actual progress for each task.
- I. Three-Week Look-Ahead Schedule Submittals: Each week, the Contractor shall submit a schedule of planned activities and progress detailing activities for the 3-week period following the date of the weekly submission to the Engineer.

1.04 CHANGE ORDERS AND WORK CHANGE DIRECTIVES

- A. Upon approval of a Change Order, or upon receipt by the Contractor of a signed Work Change Directive or other authorization to proceed with additional work, the change shall be reflected in the next submittal of the CPM Schedule. The Contractor shall utilize a sub-network in the schedule depicting the changed work and its effect on other activities. This sub-network shall be tied to the main network with appropriate logic so that a true analysis of the critical path can be made.

1.05 CPM STANDARDS

- A. Definitions: CPM, as required by this Section, shall be interpreted to be generally as outlined in the Association of General Contractors (AGC) publication, "The Use of CPM in Construction." except that either "i-j" arrow diagrams or precedence diagramming format may be utilized. In the case of conflicts between this specification and the AGC document, this specification shall govern.
- B. Construction Schedules: Construction schedules shall include a graphic network diagram and computerized construction schedule reports as required below for status reporting.
- C. Networks: The CPM network shall be in a form of a time scaled "i-j" activity-on-arrow or precedence type diagram and may be divided into a number of separate sheets with suitable match lines relating the interface points among the sheets. Individual sheets shall not exceed 24 inches by 36 inches.
- D. Construction and procurement activities shall be presented in a time-scaled format with a calendar time line along the entire sheet length. Each activity arrow or node shall be plotted so that the beginning and completion dates of each activity are accurately represented along the calendar time line. All activities shall use symbols that clearly distinguish between critical path activities, noncritical activities, and free float for each noncritical activity. All activity items shall be identified by their respective activity number,

responsibility code, and work duration. All noncritical path activities shall show total float time in scale form by utilizing a dotted line or some other graphical means.

E. Duration Estimates: The duration estimate for each activity shall be computed in working days and shall represent the single best estimate considering the scope of the work and resources planned for the activity. Except for certain nonlabor activities, such as curing of concrete or delivery of materials, activity duration shall not exceed 10 working days nor be less than 1 working day unless otherwise accepted by the Engineer.

F. Float Time:

1. Definition: Unless otherwise provided herein, float is synonymous with total float. Total float is the period of time measured by the number of working days each noncritical path activity may be delayed before it and its succeeding activities become part of the critical path. If a noncritical path activity is delayed beyond its float period, then that activity becomes part of the critical path and controls the end date of the work. Thus, delay of a noncritical path activity beyond its float period will cause delay to the project itself.
2. Float Ownership: Neither the Owner nor the Contractor owns the float time. The project owns the float time. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date. For example, if Party A uses some, but not all of the float time and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B shall be liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs since it did not consume all of the float time and additional float time remained, therefore, the project's completion date was unaffected.

1.06 SCHEDULE REPORT FORMAT

A. Schedule Reports: Schedule Reports shall be prepared based on the CPM Schedule, and shall include the following minimum data for each activity:

1. Activity numbers.
2. Work Order No.
3. Estimated activity duration.
4. Activity description.
5. Activity's percent completion.
6. Early start date (calendar dated).
7. Early finish date (calendar dated).
8. Late start date (calendar dated).
9. Late finish date (calendar dated).
10. Status (whether critical).

11. Total float for each activity.
 12. Free float for each activity.
- B. Project Information: Each Schedule Report shall be prefaced with the following summary data:
1. Project name.
 2. Contractor.
 3. Type of tabulation.
 4. Project duration.
 5. Contract Times (revised to reflect time extensions by Change Order).
 6. The commencement date stated in the Notice to Proceed.
 7. The data date and plot date of the CPM Schedule.
 8. If an update, cite the new schedule completion date.

1.07 COMPLETE AND TIMELY SUBMISSIONS

- A. The CPM Construction Schedule information is an integral part of the Project scheduling and reporting. As such, it is critical information to evaluating the project's progress and the proper planning of the Owner's and Engineer's work effort associated with this Project. Accordingly, if any submittal required by this Section is found to be incomplete or is submitted later than required, it may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.08 NETWORK DETAILS AND GRAPHICAL OUTPUT

- A. Produce a clear, legible, and accurate calendar based, time scaled, graphical network diagram. Group activities related to the same physical areas of the Work. Produce the network diagram based upon the early start of all activities.
- B. Include for each activity, the description, activity number, estimated duration in working days, total float and all activity relationship lines.
- C. Illustrate order and interdependence of activities and sequence in which Work is planned to be accomplished. Incorporate the basic concept of the precedence diagram network method to show how the start of one activity is dependent upon the start or completion of preceding activities and its completion restricts the start of following activities.
- D. Indicate the critical path for the project.
- E. Delineate the specified contract duration and identify the planned completion of the Work as a milestone. The time period between the planned and Contract completion dates, if any, shall be shown on the schedule as an activity identified as project float unless a Change Order is issued pursuant to CPM Standards.

- F. Identify system shutdown dates, system tie-in dates, specified interim completion or milestone dates and contract completion dates as milestones.
- G. Include, in Addition to Construction Activities:
 - 1. Submission dates and review periods for major equipment submittals and scaffolding submittals:
 - a. Scaffolding Reviews: Allow 4-week review period for each scaffolding submittal.
 - 2. Any activity by the Owner or the Engineer that may affect progress or required completion dates.
 - 3. Equipment and long-lead material deliveries over 8 weeks.
 - 4. Approvals required by regulatory agencies or other third parties.
- H. Produce network diagram on 22-inch by 34-inch sheets with grid coordinate system on the border of all sheets utilizing alpha and numeric designations.
- I. Identify the execution of the following, but not limited, and omitting items not applicable to the Work:
 - 1. Mobilization.
 - 2. All required submittals and submittal review times showing 30-calendar day duration for such activities and equal amount of time for resubmittal reviews.
 - 3. Equipment and materials procurement/fabrication/delivery.
 - 4. Scaffolding design and submission of detailed scaffolding submittals. Identify submission as a milestone.
 - 5. Scaffolding review, scaffolding materials procurement, scaffolding installation and scaffolding removal.
 - 6. Primary Clarifier Cleaning.
 - 7. Concrete, including installation of forms and reinforcement, placement of concrete, curing, stripping, finishing, curing and patching.
 - 8. Metal fastenings, framing, structures, and fabrications.
 - 9. Installation and cure time for adhesive anchors.
 - 10. Finishes and cure time including coating and painting, flooring, ceiling, and wall covering.
 - 11. Conveying equipment including hoists and cranes, conveyor systems, and materials handling equipment, including identification of ordering lead time and installation.
 - 12. All materials testing.
 - 13. Substantial completion. Substantial completion activity shall meet all requirements set forth in Section 00800, Supplementary Conditions.
 - 14. Punch list work.
 - 15. Demobilization.

1.09 SCHEDULE OF SHOP DRAWING AND SAMPLE SUBMITTALS

- A. After Preliminary Schedule has been submitted and accepted by Owner, Contractor shall submit a list of all Shop Drawings and sample submittals anticipated in first 90 calendar days after Notice to Proceed using early start dates.
- B. Submittal of this preliminary list shall be a condition precedent to making of progress payments during the first 90 calendar days after Notice to Proceed.
- C. After Baseline Schedule has been submitted and accepted by Owner, Contractor shall print out and submit list of all Shop Drawings and sample submittals for all Work using early start dates. This listing will contain all submittals required for the entire Work including those listed above.
- D. Submittal of final list shall be a condition precedent to making of progress payments after the first 90 calendar days after Notice to Proceed.
- E. These schedules shall conform to the requirements of the General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01329 SAFETY

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements for Contractor's development and maintenance of a Project Specific Safety Plan.
- B. Before any Work at the Site is started, Contractor shall have prepared Contractor's written Project Specific Safety Plan and make available both printed and electronic versions to all Contractors, Subcontractors, Engineering, Inspection, and Owner's staff involved in the Work.
- C. Project Specific Safety Plan shall be in accordance with *General Conditions 7.12 Safety and Protection. 7.13 Safety Representative. 7.14 Hazard Communication Programs. 7.15 Emergencies*, and including but not limited to additional hazards identified in this section.
- D. A specific employee or officer will be designated by the Contractor to enforce compliance with all requirements set forth by the Oregon Health Authority and OSHA, including social distancing policies. Contractor will minimize all contact with Owner's personnel and occupied areas, and provide notice to the Owner when occupied areas will be encroached on.
- E. Contractor shall require all Subcontractors to develop their own Project Specific Safety Plan, and adhere to all applicable Safety Laws and Regulations, and Owner's Safety Programs.

1.02 SAFETY AND HEALTH REGULATIONS

- A. Contractor's Project Specific Safety Plan shall comply with all federal, state, and local safety and health regulations and laws including, but not limited to, the following:
 - 1. Oregon Revised Statutes, ORS 654.
 - 2. Oregon Safe Employment Act (OSEA).
 - 3. Oregon Occupational Safety and Health Code of the Oregon Occupational Safety and Health Division (OR-OSHA), Oregon Administrative Rules (OAR), Chapter 437.
 - a. Division 01, General Administrative Rules.
 - b. Division 02, General Occupational Safety and Health Rules.
 - c. Division 03, Construction.
 - 4. Oregon Executive Order No. 20-12

1.03 CONTRACTOR SAFETY ORIENTATION TRAINING

- A. Prior to commencing Work at the Site, all Contractor and Subcontractor personnel shall complete the Clean Water Services Safety Orientation for Contractor Personnel. This online training will provide an overview of the facility, including review of the emergency gathering area, chemicals stored on site, lockout/tagout, housekeeping, and other Owner specific safety requirements. Once the training is completed, sign the completion certificate and provide a copy to the Owner. The safety orientation training may be accessed at <http://contractorsafety.cleanwaterservices.org/>.

1.04 HAZARD REVIEW WORKSHEET

- A. Owner and Engineer have determined that the following hazards are reasonably anticipated to arise during the course of the Work:
- 1. Confined Space Entry (OAR 437-002-0146)**
 - 2. Control of Hazardous Entry - LO/TO (OAR 437, Division 2/J, 1910.147, 437-002-0154)**
 - 3. Emergency Action Plan (OAR 437-002-0042)**
 - 4. Working at Elevation (OAR 437, Division 2/D, 2/F, 2/I, 2/N)**
 - 5. Industrial Truck Hazards (OAR 437-002-0227, 437-004-1700, 1910.178, 1926.602(c))**
 - 6. Ladders (OAR 437, Division 2/D, 1910.23, 437-002-0026)**
 - 7. Scaffolding (OAR 437, Division 3/L)**
- B. A hazard review worksheet has been included as a supplement to this Section. Contractor shall provide written responses for how they plan to address each of the hazards noted above and identify any others anticipated by the Contractor. This information shall be included in their Project Specific Safety Plan.

1.05 EMERGENCY ACTION PLAN

- A. Contractor shall include in their Project Specific Safety Plan, an Emergency Action Plan. The Emergency Action Plan shall address how to handle, at a minimum, the following types of incidents:
1. Medical emergencies
 2. Weather emergencies
 3. Natural disasters
 4. Heavy equipment failures
 5. Hazardous material incidents
 6. Worker injuries
 7. Fall arrest rescues
 8. Confined space rescues
 9. Fires and explosions
 10. Any other potential emergency as dictated by the work or site conditions

- B. The Emergency Action Plan shall note:
 - 1. Address and description of the project site
 - 2. Emergency response numbers for the emergency services (police, fire, medical), and any specialty rescue subcontractors
 - 3. Name and address of nearest medical facilities
 - 4. Reporting procedure for emergency situations
 - 5. Any local alarms or procedures
 - 6. Procedure for accounting for all Contractor personnel in the event of an emergency
- C. The Emergency Action Plan shall be posted in a conspicuous location, where all Contractor's personnel can access it and reference it. Contractor shall keep the Emergency Action Plan up-to-date throughout the project.

1.06 CONSTRUCTION SAFETY PLAN – OWNERS SAFETY PROGRAMS

- A. Permit-Required Confined Space Entry (PRCSE)
<http://osha.oregon.gov/OSHApubs/2864.pdf>
 - 1. Project specific PRCSE spaces include, but not limited to, the following:
 - a. Manholes
 - b. Open tanks
 - c. Structures above and below grade with the potential to contain wastewater
 - d. Enclosed tanks
 - e. Wet wells and dry wells of pump stations
 - f. Electrical vaults
 - g. Primary Clarifiers.
- B. Factory Mutual (FM) Global - Hot Work Yellow Tag Permit Program
 - 1. Project specific hot work yellow tag permit activities include, but not limited to, the following:
 - a. Grinding
 - b. Torch cutting
 - c. Welding
 - d. Pipe cutting
 - e. Gas piping
- C. Transmit to Owner and Engineer copies of reports and other documents related to accidents or injuries encountered during construction.

1.07 STOP WORK AUTHORITY

- A. All Owner's personnel shall have "stop work authority", where they may require the Contractor to immediately halt activities where there is an

imminent danger to personnel or property. Such orders shall not be the basis for any claim for additional time or compensation.

- B. Contractor shall ensure that the circumstances causing the stop work authority to be exercised are corrected, and that all unsafe conditions are rectified, prior to resuming work.

1.08 PANDEMIC SAFETY PLANS

- A. During public health crises, such as COVID-19, Contractor shall develop project-specific safety plans and procedures that address guidelines and best practices provided by the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA), OR-OSHA and shall be in accordance with any ordinances and executive orders set forth by the federal government, city, or state. Plans and procedures shall be communicated to employees and any other affected personnel (e.g., subcontractors).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CONDUCT

- A. Contractor and Subcontractors shall ensure that their personnel do not report to work impaired by any substance, drug, or alcohol, whether lawful or unlawful. "Impaired" means under the influence of a substance such that the employee's motor senses (i.e. sight, hearing, balance, reaction, reflex) or judgment either are, or may be reasonably assumed to be, affected.
- B. All Contractor and Subcontractor personnel shall obey all precautionary warning signs, product and process labels, and posted instructions.
- C. Contractor and Subcontractor personnel shall confine their activities to the assigned work areas.
- D. Derisive remarks, unsolicited comments that are sexual in nature, threatening, intimidating, coercive, or other unsafe or disruptive behavior such as fighting, and horseplay are unacceptable. Contractor shall establish rules with necessary enforcement to prevent such behavior.
- E. Contractor shall perform all work in a manner that safeguards persons from injury and property from damage.

3.02 SAFETY EQUIPMENT AND SUPPLIES

- A. Prior to commencing work, Contractor shall obtain all safety equipment and supplies required to complete the work and shall require Contractor's personnel to use it where needed.
- B. Owner will not provide any safety equipment or supplies.
- C. Contractor shall make safety equipment and supplies available to Owner's staff as necessary to facilitate safe access to inspect and review the Work.
- D. Fire extinguishers and first aid kits shall be readily available throughout the site.

3.03 PROHIBITED ITEMS

- A. Contractor's personnel shall not bring any of the following items onto the Site:
 - 1. Firearms
 - 2. Weapons
 - 3. Controlled or illegal substances
 - 4. Alcoholic beverages
- B. Smoking, including electronic cigarettes and vaping, is prohibited inside buildings, including those under renovation or unoccupied, and within 25 feet of building entrances. Smoking shall only take place in designated areas.

3.04 NOTIFICATION TO OWNER

- A. Contractor shall report all safety concerns, visits by regulatory agencies, and incidents to Owner's Project Manager.

3.05 COMPLIANCE

- A. If Contractor or Subcontractor or personnel of either entity fail to adhere to the Contractor's Project Specific Safety Plan submitted under this Section the requirements of this section, Safety Laws and Regulations, or the Owner's Safety Programs, Owner reserves the right to require the Contractor to take immediate corrective action, which may include, but is not limited to:
 - 1. submittal of a written corrective action plan to Owner;
 - 2. additions or modifications to Contractor's Safety Plan, resubmittal required;
 - 3. removal from the Site of any Contractor or Subcontractor personnel not implementing, maintaining, or following the necessary safety and health measures to protect persons or property from damage injury, or loss; and

4. increasing the amount of Contractor or Subcontractor safety and health training.

3.06 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this Specification:
 1. Oregon OSHA – Confined Spaces and Permit Spaces
 2. Facilities Management – Hot Work Yellow Permit
 3. Oregon OSHA – ABCs of Construction Site Safety
 4. Hazard Review Worksheet

END OF SECTION

Confined spaces and permit spaces



**How to comply with *Oregon* OSHA's
confined space rule 437-002-0146
for general industry and construction work**

About this guide

Confined spaces are harmless as long as they are not occupied. But when workers enter a confined space to inspect equipment, fix leaks, or do construction work, they can encounter toxic gasses, corrosive chemicals, flammable solvents, or machines that start unexpectedly. If something goes wrong, a confined space can be difficult or impossible to exit. And would-be rescuers can share the fate of those they are trying to rescue.

This guide explains how to identify confined spaces and how to protect general-industry and construction workers who may need to enter them.

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• Confined space evaluation survey: Use this survey to evaluate confined spaces at your workplace. http://www.orosha.org/pdf/pubs/forms/confined_space_permit_space_survey.doc	
• Sample confined space entry permits: Examples of entry permits. http://www.orosha.org/pdf/pubs/forms/entry-permit.doc	
• Sample permit-space program: A written confined space program for your workplace. http://www.orosha.org/pdf/pubs/forms/permit-space-booklet.doc	
• Permit space evaluation form: Use this form to identify hazards in permit spaces at your workplace. http://www.orosha.org/pdf/pubs/forms/permit-space-eval-form.doc	
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About Oregon OSHA's confined space rule: 437-002-0146

Oregon OSHA's confined space rule – [437-002-0146](#) – protects general industry and construction industry employees who enter confined spaces that have serious or life-threatening hazards.

What 437-002-0146 requires you to do

The rule requires you to:

- Survey your workplace to identify permit spaces
- Inform employees about the location of the permit spaces and the hazards associated with those spaces
- Keep unauthorized employees out of the spaces
- Prepare a written permit-space program to protect employees who must enter a permit space
- Include a catalog of your permit spaces in your written program that describes why they are permit spaces
- Ensure that any equipment is used in accordance with the manufacturer's instructions and that your employees who use the equipment have been trained
- Ensure that employees who work around permit spaces are trained so that they understand the presence, location, and hazards associated with the spaces, and they are aware of your permit-space program
- Have an agreement with another rescue service provider if your employees will not provide rescue services

Exceptions to 437-002-0146

The rule does not apply to:

- Construction work regulated by Division 3/P Excavations, except for entry into sanitary sewer spaces that are large enough to bodily enter.
- Construction work regulated by Division 3/S Underground Construction, Caissons, Cofferdams and Compressed Air, except for sewers.
- Enclosed spaces regulated by 1910.269 in Division 2/R Electric Power Generation, Transmission and Distribution, except when that standard requires compliance with this standard.
- Enclosed spaces regulated by 1926.953 in Division 3/V Electric Power Generation, Transmission and Distribution, except when that standard requires compliance with this standard.
- Manholes and vaults regulated by 1910.268(o) in Division 2/R Telecommunications, unless the space cannot be made safe to enter even after following the requirements of 1910.268(o).
- Welding in confined spaces regulated by Division 2/Q Welding, Cutting & Brazing, when the only hazards are related to the welding process.
- Grain bins, silos, tanks, and other grain storage structures regulated by 1910.272, Grain Handling Facilities.
- Diving operations regulated by Division 2/T, Commercial Diving Operations.

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

Key sections of 437-002-0146

Oregon OSHA's confined space rule has 13 sections:

- | | | |
|----------------------------|--|------------------------------|
| 1. Purpose and application | 5. Permit-required confined space entry programs and permits | 9. Rescue |
| 2. Exceptions | 6. Permit entry | 10. Alternate entry |
| 3. Definitions | 7. Equipment | 11. Training |
| 4. Evaluation | 8. Personnel | 12. Multi-employer worksites |
| | | 13. Records |

The table below shows which of the rule's key sections apply to confined spaces, permit spaces, and confined spaces that are never entered. The table also shows which sections apply if you use alternate entry procedures, have other employers enter your confined space, or if you provide rescue services.

Key sections of Oregon OSHA's confined space rule: 437-002-0146										
	4	5	6	7	8	9	10	11	12	13
For spaces that are:	<i>Evaluation</i>	<i>Permit space entry programs and permits</i>	<i>Permit Entry</i>	<i>Equipment</i>	<i>Personnel</i>	<i>Rescue</i>	<i>Alternate entry</i>	<i>Training</i>	<i>Multi-employer worksites</i>	<i>Records</i>
■ Confined spaces	✓									
■ Permit spaces	✓	✓	✓	✓	✓	✓		✓	✓	✓
■ Never entered	✓									
If you only:										
■ Use alternate entry procedures	✓			✓			✓	✓		
■ Have other employers enter your space	✓								✓	✓
■ Are a rescue service provider		✓	✓	✓	✓	✓		✓		✓

Confined spaces and permit spaces – How to comply with Oregon OSHA’s confined space rule

Common questions about 437-002-0146



Q: I have a permit-space program for my facility that meets the requirements for federal OSHA’s confined space rule, 1910.146, and my employees follow those requirements when they enter permit spaces. Are the requirements for 1910.146 and 437-002-0146 the same?

A: Many of the requirements are the same; however, there are also new requirements under 437-002-0146 as shown in the table below.

Similar requirements under 1910.146 and 437-002-0146	New requirements under 437-002-0146
• Definition of a confined space • Definition of a permit space • Requirement for a written program when employees enter a permit space • Roles, responsibilities, and training of entrants, attendant, and entry supervisors • Requirement that unauthorized persons do not enter a permit space • Process for entering, performing work, and exiting a permit space • Information required on the entry permit (1910.146 requires the duration of the entry; 437-002-0146 requires starting and stopping times). • Requirement for pre-planning non-entry and entry rescues • Training requirements, practice, and qualifications of rescue personnel	• Include a catalog of your permit spaces in your written program that describes why they are permit spaces. • Ensure that any equipment is used in accordance with the manufacturer’s instructions and that employees who use the equipment have been trained. • Ensure that employees who work around permit spaces are trained so that they understand the presence, location, and hazards associated with the spaces, and they are aware of your permit-space program. • Have an agreement with another rescue service provider if your employees will not provide rescue services.



Q: We enter a confined space under the alternate entry procedures in 1910.146(c)(5) or reclassify the space according to 1910.146(c)(7). Are these requirements included in Oregon OSHA’s confined space rule?

A: No. Oregon OSHA’s confined space rule does not include these requirements. Under Oregon OSHA’s rule, workers can use alternate entry procedures to enter a permit space without a permit (documentation is required to verify safe entry) and attendants, an entry supervisor, and rescue services are not required. See Page 25 in this guide for more information on alternate entry procedures.

What is a confined space?

A confined space is a space that meets all of the following conditions:

- It is large enough and so configured that an employee can fully enter the space and perform work.
- It has limited or restricted means for entry, exit, or both.
- It is not designed for continuous human occupancy.

It is large enough and so configured that an employee can fully enter the space and perform work. A space that is just large enough for a person to squeeze into, but not perform any work, is not a confined space. Similarly, a space that is too small for a person to enter completely is not a confined space.

It has limited or restricted means for entry, exit, or both. If a person must contort his or her body to enter or move around inside a space, it probably has a limited means of entry and exit. Climbing through a porthole to enter a space or crawling through a tunnel toward an exit are examples of spaces that have limited means of entry and exit.

Another way of measuring limited means of entry and exit is to determine how difficult it would be to remove an injured person from the space; if there is a need for a technical rescue to remove an injured person, you probably have a limited means entry and exit. Evaluate each space on a case-by-case basis.

It is not designed for continuous human occupancy. What is the primary function and purpose of the space? A space that is designed for periodic occupancy is not the same as a space that is designed for continuous occupancy.

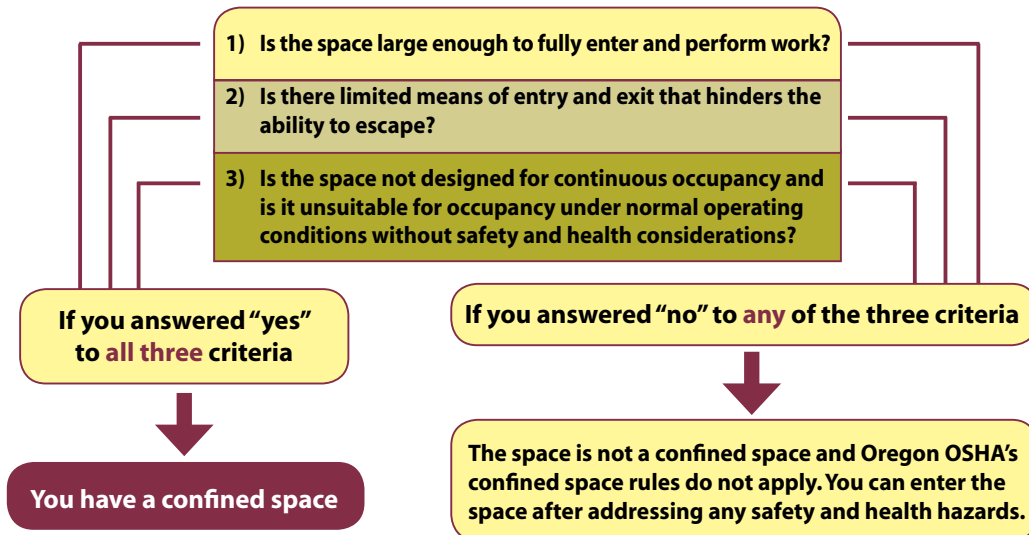
The presence of a fixed ladder, lighting, or ventilation does not always mean that the space was designed for continuous occupancy. Is the space designed for a person to work there or is it designed to house and protect equipment that needs to be monitored or occasionally maintained? For example, a space may have lighting for periodic occupancy that may be necessary to safely enter and exit, read gauges, or perform maintenance or repairs. Similarly, ventilation may be necessary to keep equipment from overheating or to provide fresh air for temporary job assignments or tasks. In both cases, the work performed is intermittent or temporary.

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

Examples of confined spaces

Confined spaces include those with depth and open tops and those with narrow openings.	
Spaces with depth and open tops	Spaces with narrow openings
Pits	Ship compartments
Wells	Silos
Vats	Pipes
Bins	Tunnels
Hoppers	Tanks
Degreasers	Casings
Kettles	Sewers

Evaluate the Space



What is a permit space?

A permit space is a confined space that has one or more of the following characteristics:

- It has — or could have — a hazardous atmosphere.
- It contains material that could trap or bury a person.
- It is shaped so that a person could become trapped or asphyxiated.
- It has other safety or health hazards that could harm a person.

Hazards in permit spaces

Most accidents in permit spaces happen when workers and untrained rescuers do not recognize hazards in the spaces or they do not control the hazards before they enter. Never assume a permit space is safe to enter.

Permit spaces can have two types of hazards: hazardous atmospheres and physical hazards.

Hazardous atmospheres

A hazardous atmosphere affects the air in the space and can cause death or acute illness, or impair the ability of workers to escape. Hazardous atmospheres include:

- **Corrosive atmospheres.** Corrosive atmospheres accumulate from some manufacturing processes and biological or chemical reactions. Some cause immediate damage to the skin and eyes; some have no immediate effect, but cause cancer with prolonged exposure.
- **Flammable or explosive gasses, liquids, vapors, mists, fibers, or dusts.** Flammable gasses such as acetylene, butane, propane, hydrogen, and methane are common in permit spaces. Grain, nitrated fertilizers, and ground chemicals can produce combustible dusts.
- **Air or oxygen displacement.** Some substances (such as inerting gasses) can displace air or oxygen in a confined space; examples include nitrogen, helium, steam, Freon, argon, and carbon dioxide.
- **Oxygen deficiency.** Oxygen-deficient atmospheres (oxygen concentration below 19.5 percent) affect heart rate, muscle coordination, and breathing. Unprotected workers cannot survive in an oxygen-deficient atmosphere.
- **Oxygen enrichment.** Oxygen-enriched atmospheres (oxygen concentration above 23.5 percent), which can be caused by welding and from the improper use of oxygen for breathing air, increase the risk of fire or explosions.
- **Toxic dusts, mists, fumes, smoke, vapors, fibers, or gasses.** These can be released by manufacturing processes, stored materials, and work tasks. A hazardous atmosphere that poses a threat to life, would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape from a confined space is called immediately dangerous to life or health (IDLH).

Some hazardous atmospheres (hydrogen fluoride gas and cadmium vapor, for example) may cause serious health effects that result 12 to 72 hours after exposure.

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

Air-monitoring equipment: Trained employees can use an air-monitoring meter to test for hazardous atmospheres. However, they must first calibrate the meter and use it according to the manufacturer's instructions. Inaccurate instruments can expose workers to excessive levels of toxic gas or an oxygen-deficient atmosphere. The only way to guarantee that an instrument will detect gas accurately is to test it.

"Bump test" your air-monitoring meter every day – before you use it. A bump test verifies that an air-monitoring meter is properly calibrated. You perform a bump test by exposing the meter to a known concentration of test gas. Compare the instrument reading to the actual quantity of gas present. If the instrument's response is within an acceptable tolerance range of the actual concentration, then the meter is calibrated properly.

Physical hazards

Physical hazards come in many different forms and can cause death or serious physical harm. Examples include:

- **Access problems.** In an emergency, entrants may not be able to exit quickly.
- **Absorbed chemicals.** Chemicals can be absorbed through the skin or other tissues or membranes such as the eyes.
- **Corrosive chemicals.** Corrosive chemicals can cause severe eye or skin damage if exposed workers are not wearing protective clothing or eyewear.
- **Falling objects.** Objects can fall into the space because topside openings are unguarded or improperly guarded.
- **Illumination problems.** Poor lighting makes it difficult for workers to enter, work in, and exit a permit space.
- **Inwardly converging surfaces.** Inwardly converging walls and downward sloping floors that taper to a smaller cross section can trap a worker.
- **Material that could trap or bury a person.** Loose materials drawn from the bottom of storage bins can suffocate or bury a worker. Liquids or materials that are suddenly released into the space can have the same effect.
- **Mechanical, electrical, hydraulic, and pneumatic energy.** Mechanical and hydraulic equipment can move unexpectedly. Workers servicing mechanical and hydraulic equipment can be seriously injured or killed if the energy is not properly controlled.

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

- **Noise.** Noise interferes with essential communication between workers in a confined space and those who are monitoring their work on the outside. High noise levels can impair hearing and cause hearing loss. Permit spaces can amplify sounds produced by tools and equipment.
- **Radiation.** Sources of radiation include x-rays, isotopes, lasers, and welders.
- **Slippery surfaces.** Wet, slippery surfaces increase the risk of falls. Leaks, spills, and condensation are common in permit spaces.
- **Extreme temperatures.** Hot environments put workers at risk for heat stress, especially when they do strenuous work or are wearing protective clothing. Cold environments make their tasks more difficult to accomplish.

Eliminating physical hazards. Ways to eliminate physical hazards in a confined space include:

- Locking out equipment (following the requirements in 1910.147, Lockout/Tagout)
- Blanking and blinding piping systems
- Physically separating piping systems from the space

Always evaluate the space in its normal state before eliminating hazards.

Evaluating confined spaces and permit spaces: 437-002-0146(4)

Determine if any of your confined spaces have hazards that make them permit spaces.

Do not allow any employees to enter a confined space until it has been fully evaluated.

At workplaces where confined spaces are being built, host employers or controlling contractors do not need to evaluate confined spaces unless:

- One of their employees will enter the space
- An employee of an employer responsible to the host employer or controlling contractor will enter the space
- A host employer or controlling contractor assumes control over the space

If your workplace has a permit space, your employees must know where it is located, that it is hazardous, and that it is a permit space.

- Allow employees to observe the evaluation of the space.
- Identify the space as a permit space. You can use signs, labels, or tags to identify the space.
- When conditions within the space change, re-evaluate it.
- Prevent unauthorized employees from entering the space.

If someone else will enter a permit space under your control (employees of another employer, for example), inform them:

- About all hazards or potential hazards in the spaces
- If the spaces have been evaluated before and what that evaluation discovered
- What your precautions or procedures are for entering the spaces

If your employees will enter a permit space, they must follow the requirements of your written permit-space program.

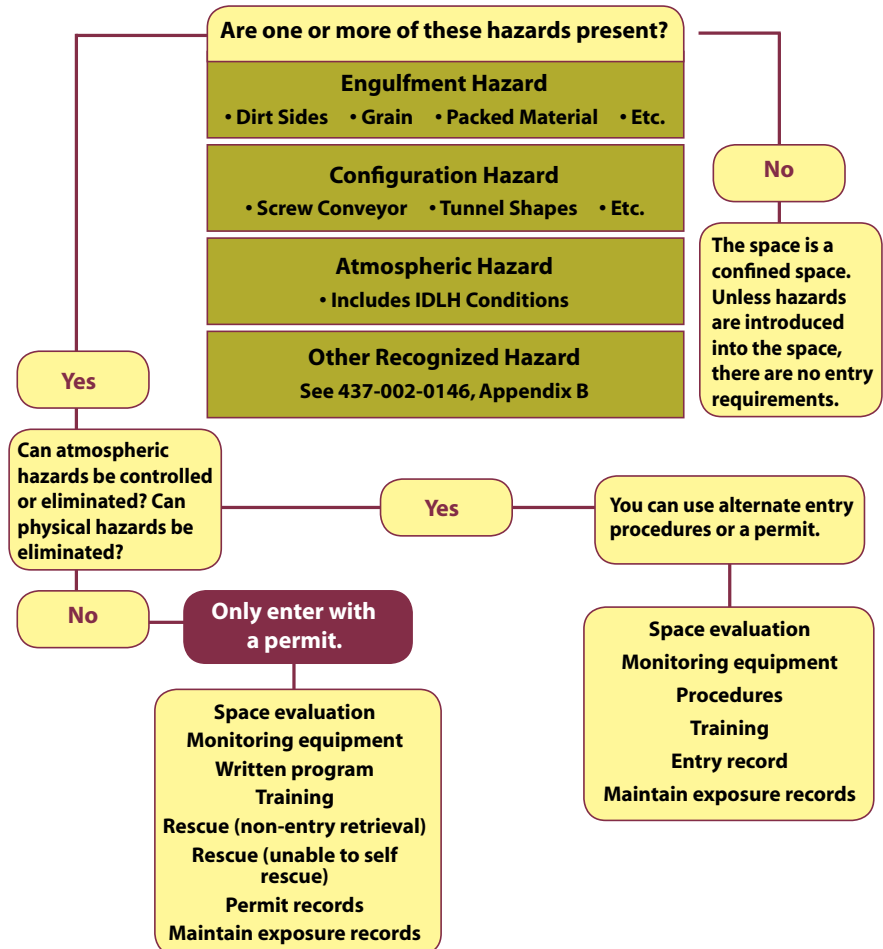
If you have mobile employees, you must determine whether there are confined spaces at the sites where they will be working. If confined spaces are present, the space must be evaluated to identify any physical or atmospheric hazards that make it a permit space.

The permit-space program and the entry permit: 437-002-0146(5)

If your employees will enter a confined space that has one or more of the hazards shown in the chart to the right, the space is a permit space and you must prepare a written permit-space program before they enter. Entry occurs when any part of a worker's body enters the space opening.

- An entry permit is required if atmospheric and physical hazards cannot be controlled or eliminated.
- You can use alternate entry procedures to enter a permit space if all physical hazards can be eliminated and all atmospheric hazards can be eliminated or controlled with continuous ventilation.

You determined that you have a confined space.



Requirements for a written permit space program

A written permit-space program must include:

- A procedure for issuing an entry permit
- Provisions for training employees about the written program and entry permits
- Measures taken to prohibit unauthorized employees from entering permit spaces
- The roles of entrants, attendants, entry supervisors, rescuers, and those who test or monitor the atmosphere in the space
- Provisions for training employees about their roles
- Duties of designated employees
- Instructions for identifying and evaluating hazards
- Methods for eliminating or controlling hazards
- Instructions for using and maintaining equipment
- Instructions for coordinating entry with another employer
- Procedures for concluding entry and canceling the entry permit

At fixed sites, the written program must include a list of all of your permit spaces (or the types of permit spaces if you have several of the same kind). For example, if you have sewer manholes, you do not have to include each one on the list; identify them as “sewer manholes,” describe how to recognize them, and describe the hazards that make them permit spaces.

Employees must have access to the written permit-space program before entering a permit space.

Requirements for the entry permit

The entry permit describes acceptable entry conditions and verifies that a permit space is safe for workers to enter. No one can enter a permit space until a completed entry permit verifies that the hazards in the space have been eliminated or controlled. An entry supervisor must sign the entry permit, post it on the space where employees can see it, and cancel it after the work is finished.

The entry permit must include the following information:

- Description of the space that will be entered
- Purpose of the entry
- Entry date and the start and stop times of the work
- Hazards associated with the space
- Acceptable entry conditions
- Results of tests and monitoring performed to evaluate hazardous atmospheres
- Names or initials of the testers and the date the tests were performed
- Measures used before entry to isolate the space and eliminate or control hazards
- Names of entrants and attendants
- Name of the current entry supervisor
- Signature of the entry supervisor
- Communication procedures necessary for entrants and attendants to maintain contact during the entry
- Equipment necessary for safe entry
- Rescue services available and contact information for the service providers
- Permits for other work in the space (such as hot work)
- Description of problems encountered during entry

You must also develop a procedure for issuing an entry permit that describes how to:

- Evaluate the space's hazards
- Evaluate work-related hazards
- Identify safe entry conditions

Employees must have access to the completed permit before they enter a permit space so they can confirm that pre-entry preparations have been completed.

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

You must review your entry program when there is any reason to believe employees are not protected. Situations that require a review include:

- Unauthorized entry
- When a new hazard is identified
- When a condition prohibited by the permit occurs during entry
- When an injury or near miss occurs during entry
- When an employee reports concerns about the permit's effectiveness or the procedure for issuing the permit

When you revise your program, do not allow anyone into the affected space until the revisions are complete.

Permit entry: 437-002-0146(6)

Before workers enter a permit space, you must ensure that the hazards associated with the space have been eliminated or controlled. A completed entry permit verifies that hazards have been eliminated or controlled and the space is safe. The entry supervisor must certify that the space is safe to enter, sign the entry permit, and post it on the space so that authorized entrants can see it.

Establishing safe entry conditions

Essential conditions for safe entry include:

- **Guarding the space.** Use warning signs or barriers to keep out unauthorized people and to protect entrants from falling objects.
- **Isolating the space.** Disconnect, lock out, or tag out hazardous equipment in the space. If you lock out equipment, remember that “lock out” includes testing to ensure the lockout method works.
- **Testing the space for hazardous atmospheres.** Test the atmosphere from outside the space for all potential atmospheric hazards, which may include oxygen; flammable gasses, dusts, or vapors; toxic gasses or vapors; and corrosive atmospheres. Provide entrants with test results. Re-test the space if an entrant believes that initial testing was inadequate.
- **Eliminating or controlling hazardous atmospheres.** Eliminate or control the hazards in the space then document the method and the steps necessary to eliminate or control the hazards. Allow entrants to observe testing, monitoring, and any other activity necessary to eliminate or control hazards.
- **Providing necessary equipment.** Ensure that entrants have the equipment they need to do their jobs (including rescue equipment) and that they know how to use the equipment.
- **Planning for emergencies.** Attendants must know how to respond to emergencies, including who to contact and how to remove entrants.

Maintaining safe entry conditions

When work begins inside the space, you must ensure safe conditions are maintained until the work is finished.

Essential conditions for maintaining safe entry include:

- **Monitoring activity inside and outside the space.** Attendants must constantly monitor the space for hazards while employees are inside.
- **Maintaining communications between attendants and entrants.** Attendants and entrants must keep in contact with each other. They must know what communications equipment to use and how to use it.
- **Keeping unauthorized people away from the space.** The entry supervisor and the attendants are responsible for keeping people away.

If the space must be evacuated, do not allow re-entry unless you do either of the following:

- Evaluate the conditions in the space to ensure it is safe for re-entry and ensure that the permit notes the evacuation
- Issue a new entry permit

Equipment necessary for entering a permit space: 437-002-0146(7)

You must have all necessary equipment to ensure safe entry into permit spaces. This equipment can include:

- Testing and monitoring equipment
- Ventilating equipment to maintain acceptable entry conditions
- Communication equipment, such as a two-way radio, for communication between the attendant and entrants, and to initiate a rescue
- Appropriate lighting, so they can see and can exit the space quickly in an emergency
- Barriers or shields to protect them from hazards outside the space such as pedestrians and vehicles
- Ladders or similar equipment so they can enter and exit the space
- Rescue equipment, if they are unable to evacuate in an emergency
- Appropriate personal protective equipment

The equipment must be available to the employees at no cost, must be used in accordance with the instructions from the manufacturer, and the employees must be trained to use it properly.

Employees' duties and responsibilities: 437-002-0146(8)

Working in a permit space involves entrants, attendants, and entry supervisors. Before anyone enters, you must designate who has each of these duties.

Entrants are the employees you allow to enter a permit space. Attendants monitor the entrants' activities from outside the space. The entry supervisor ensures that attendants and entrants follow entry procedures.

Entrants must

- Know the about hazards that they may face during entry and the signs, symptoms, and consequences of exposure
- Communicate with the attendants so the attendants can monitor their status and warn them when they need to evacuate
- Tell the attendants about hazardous conditions in the space or symptoms of exposure
- Leave the space immediately when:
 - ➔ An order to evacuate is given by an attendant or the entry supervisor
 - ➔ An entrant recognizes any warning sign or symptom of exposure to a dangerous situation
 - ➔ An entrant detects a dangerous or hazardous condition
 - ➔ An evacuation alarm is activated

Attendants must

- Know the hazards entrants may face during entry and the signs, symptoms, and consequences of exposure
- Be aware of the behavioral effects of hazards on entrants
- Keep an ongoing count of entrants and ensure that the count identifies who is in the space
- Remain outside the space during entry operations until relieved by another attendant
- Communicate with entrants to monitor their status and to alert them if they need to evacuate
- Summon emergency responders as soon as entrants need to escape from the space
- Perform non-entry rescues following your established rescue procedure
- Do nothing that would interfere with monitoring and protecting an entrant

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

- Monitor activity inside and outside the space and order an immediate evacuation when:
- There is a hazardous condition in the space
- An entrant's behavior is affected by exposure to a hazard
- A situation outside the space could endanger the entrants
- It is not possible to perform the duties required of an attendant

An attendant can monitor more than one space at a time if the duties for one space do not interfere with duties for another space. If an attendant's attention is focused on one space – during a rescue, for example – all other spaces that the attendant is monitoring must be evacuated or another attendant must take over those duties.

When unauthorized people approach or enter a permit space while entry is under way, attendants must:

- Warn them to stay away from the space
- Tell them that they must exit immediately if they have entered the space
- Inform the authorized entrants and the entry supervisor if unauthorized people have entered the space

You can give attendants authority to remove unauthorized people who attempt to enter a space during entry operations as long as the attendants do not enter the space.

Entry supervisors must

- Know the hazards that entrants may face during entry, including the signs, symptoms, and consequences of exposure
- Understand how to control or eliminate hazards associated with the space
- Verify that all tests specified by the entry permit have been conducted and that all procedures and equipment specified by the permit are in place before signing the permit and allowing entry to begin
- Inform entrants and attendants about the hazards and conditions associated with the space and the methods used to eliminate or control the hazards
- Terminate the entry and cancel the entry permit as required by the entry procedure
- Verify that rescue service providers are available and that they can be contacted in an emergency
- Remove unauthorized people who enter or who attempt to enter the space during entry operations
- Re-evaluate conditions in the space whenever responsibility for an entry operation is transferred, new hazards are identified, or when the work performed in the space changes

Performing rescues: 437-002-0146(9)

Before you authorize employees to enter a permit space, you must ensure that trained emergency responders will be available if an entrant needs help. Responders must be able to reach the site promptly and know how to deal with the emergency. You can use an on-site rescue team or a third-party rescue service as long as the responder meets your needs in an emergency. Third-party rescue services must agree to provide the service. (Emergency responders are not required when you use alternate entry procedures.)

Those who do not understand permit-space hazards or who respond inappropriately are often the victims in many permit-space accidents. Keep in mind that many fire departments are not equipped to respond to permit-space emergencies.

Firefighters who are not on your designated rescue team and who respond to emergency (911) calls for a confined space rescue must comply with Subdivision 2/L, 437-002-0182, Oregon Rules for Fire Fighters.

Developing a rescue procedure

Before your employees enter a permit space, you must have a procedure for removing them when they are unable to evacuate. The procedure must include the process for summoning rescue services and transporting injured entrants to a medical facility. Safety Data Sheets (SDS) must be kept at worksites. If an entrant is exposed to a hazardous substance, that written material must be made available to the treating medical facility.

Performing non-entry rescues

Use non-entry rescue methods and equipment unless they would increase the overall risk to an entrant. Each entrant must use a chest or full-body harness with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at a similar point that makes it possible to remove the entrant from a confined space. Equipment such as wristlets or ankle straps may be used if a chest or full-body harness is not feasible. The other end of the retrieval line must be attached to a mechanical device or to a fixed point outside the space so that the rescue can begin immediately. A mechanical device must be available to retrieve entrants from permit spaces greater than five feet deep.

Designate a rescue person or team to perform rescues in a timely manner. Response time is based on the hazards associated with the space. For example, immediately dangerous to life or health (IDLH) hazards require an immediate response and responders must be available on site for the duration of the entry. All rescuers must be knowledgeable in basic first aid and cardiopulmonary resuscitation (CPR) and at least one rescuer must be certified in first aid and CPR.

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

Rescuers must practice non-entry rescues within 12 months before an entry. Practice rescues must include:

- Every type of space in which the rescue team might perform rescues
- Removing people or mannequins from the actual permit spaces or a simulated space that has similar characteristics

Performing entry rescues

Consider entry rescues only when a non-entry rescue would increase the overall risk to an entrant or is not feasible.

Designate a rescue team that can respond in a timely manner, can rescue entrants efficiently, and has the appropriate equipment. Ensure that the rescue team has:

- Information about the hazards it may encounter during a rescue
- Access to the permit spaces they need to enter
- Appropriate personal protective equipment (PPE)
- Any other equipment necessary for safe entry

The team must practice rescues within 12 months before an entry. Rescues must involve removing people or mannequins from the actual permit spaces or from spaces that have similar characteristics. Rescuers must have the same training as entrants, attendants, and entry supervisors. All rescue team members must be knowledgeable in basic first aid and CPR and at least one rescuer must be certified in first aid and CPR.

Mobile workers and rescue

When your workers are mobile, they do not need to do an annual practice rescue (either entry or non-entry) if the rescue team does a practice rescue in the space that needs to be entered.

The rescue team must have access to the space before the entry because they need to develop a rescue plan and practice before the actual entry. If the team has access to a space similar to the one that needs to be entered, they can use that space for the practice rescue instead.



Experienced emergency responders must be available if an entrant needs help.

Third-party rescue service providers

When a third-party rescue service is used, ensure that the service:

- Agrees to provide the service
- Is capable of performing all necessary rescue operations
- Is knowledgeable in first aid and CPR and at least one member is certified in first aid and CPR

Third-party rescue service providers must:

- Obtain the evaluation information about every permit space they may need to enter
- Be familiar with procedures necessary to remove entrants from permit spaces in an emergency or when they are not able to evacuate
- Use the entry permit to identify all physical and atmospheric hazards in the space and determine the procedure to follow for entering the space



Third-party rescue services must be capable of performing all necessary rescue operations.

Alternate entry: 437-002-0146(10)

What is alternate entry?

Alternate entry is a set of specific procedures for entering a permit space without an entry permit; however, the space remains a permit space under alternate entry. The following sections of 437-002-0146 apply under alternate entry:

- Evaluation, 437-002-0146(4)
- Equipment, 437-002-0146(7)
- Alternate entry, 437-002-0146(10)
- Training, 437-002-0146(11)

Employees may enter a permit space under alternate entry only after you do one of the following:

- Eliminate all physical hazards and hazardous atmospheres in the space so that conditions that caused the hazards no longer exist
- Eliminate all physical hazards in the space and control all hazardous atmospheres with continuous ventilation

Alternate entry procedures

Develop and implement alternate entry procedures that address:

- The hazards associated with the space
- The methods used to eliminate the hazards
- The methods used to ensure that the hazards have been eliminated
- The methods used to test the space for all hazardous atmospheres
- The methods used to determine if unsafe conditions occur before or during entry
- The criteria and conditions for evacuating the space
- The methods for training employees in these procedures
- The methods for ensuring employees follow these procedures

Ensure that all employees who enter:

- Have the opportunity to observe the activities required to comply with the alternate entry procedures
- Have an effective means of communication, such as a two-way radio, cellphone, or voice (if other employees are present) to request help in an emergency

Documenting alternate entry

Document each entry. Include:

- The location of the space
- The hazards associated with the space
- Measures taken to eliminate the hazards
- Measures used to control hazardous atmospheres (when applicable)
- The identity of the direct-reading instruments used to test the atmosphere (when applicable)
- The results of atmospheric testing (when applicable)
- The entry date
- The duration of the entry
- Any conditions that caused the evacuation of the space
- The name, title, and signature of the person responsible for ensuring that the space is safe to enter

Keep the document where the space is located for the duration of the entry.

Alternate entry in continuous systems

Alternate entry cannot be used to enter a permit space that is a continuous system (such as a sewer) unless you segregate the area to be entered from the rest of the space, demonstrate that engulfment can't happen and the only hazard is atmospheric, or you demonstrate and document that the hazardous conditions do not exist within the entire system during the entry.

Alternate entry with continuous ventilation

When using ventilation to control hazardous atmospheres:

- Use only properly calibrated direct-reading meters to test the atmosphere
- Ensure that direct-reading instruments are used and tested according to the manufacturer's instructions
- Test the space for hazardous atmospheres before entering
- Ensure that employees do not enter the space until testing has verified that all hazardous atmospheres are controlled by ventilation
- Perform continuous monitoring for all hazardous atmospheres while employees are in the space

Rescue procedure not required under alternate entry

There is no requirement for a rescue procedure when workers enter a confined space under alternate entry because hazards in the space have been eliminated or controlled.

Evacuating a permit space under alternate entry

Employees must immediately evacuate a space:

- When monitoring indicates the presence of a hazardous atmosphere
- When a direct-reading meter used for monitoring fails
- When ventilation fails
- When a new hazard is identified or conditions in the space change

When a space is evacuated, it cannot be re-entered unless the conditions that caused the evacuation are corrected.

Re-entry must be treated and documented as a new entry.

Training employees: 437-002-0146(11)

Training employees involved in permit space work

Train employees involved in permit space activities so they acquire the understanding, knowledge, and skills necessary to safely perform their duties and their assigned responsibilities.

Training is required for new employees and for all other employees:

- Before an employee is assigned permit-space duties
- Before there is a change in an employee's assigned duties
- When there is a new permit space hazard for which an employee has not been trained
- When there are changes to the written permit-space program
- When a review of an entry permit identifies problems with an entry
- When there is a deviation from established procedures or an employee's knowledge of the procedures is inadequate

Record each employee's training, including the employee's name, the trainer's signature, the training date, and the employee's responsibilities. Employees must be able to inspect their training records.

Awareness training for employees

Awareness training is required for employees who work in areas (or who may work in areas) where permit spaces are present. The purpose of awareness training is to ensure that employees understand that their employer has permit spaces, there is a process for entering the spaces, and that they can identify the spaces.

Awareness training is not required for employees when the exposure to those spaces is negligible – such as office workers walking in a parking lot that has a sewer manhole or entering a building with a baghouse near it – as long as those employees have no other exposures to permit spaces. Awareness training is also not required when the entrances to all permit spaces are locked and access would require extraordinary means (such as a chop saw or cutting torch).

Confined spaces and permit spaces – How to comply with Oregon OSHA's confined space rule

Awareness training must provide a basic overview of:

- The written permit-space program
- How to recognize a permit space
- How entry is authorized by the entry permit
- How entry is authorized by the alternate entry procedures (if used)

Repeat the training when there is a change in the written permit-space program and when there are new or previously unidentified permit spaces.

Entry operations at multi-employer worksites: 437-002-0146(12)

Before someone else's employees enter permit spaces under your control

Let their employers know about the hazards of those spaces and about any precautions or procedures that you require to protect your employees.

When your employees are working in a space, and someone else's employees will be working in or around that space, coordinate entry operations with the other employers so your employees are not exposed to hazards created or discovered by the other employees, and vice-versa.

After the operations are finished, discuss any hazards that employees created or encountered.

After your employees enter someone else's permit space

Let whoever is in control of that space (it might be a property owner or a general contractor) know about the precautions and procedures you followed and about any hazards that you or your employees found during entry.

Recordkeeping: 437-002-0146(13)

Permit entry. Keep cancelled entry permits for at least one year from the date the permit expires. Review permits within one year of their cancellation to ensure that the procedures for issuing them are still effective and the information on them still protects employees who enter the space.

Alternate entry. Keep the entry document where the space is located for the duration of the entry; after the entry, there is no requirement to keep it. However, the document may be helpful when you review the effectiveness of your confined space program.

Notes:

*Oregon*OSHA Services

Oregon OSHA offers a wide variety of safety and health services to employers and employees:

Appeals

503-947-7426; 800-922-2689; admin.web@oregon.gov

- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

Conferences

503-378-3272; 888-292-5247, Option 1; oregon.conferences@oregon.gov

- Co-hosts conferences throughout Oregon that enable employees and employers to learn and share ideas with local and nationally recognized safety and health professionals.

Consultative Services

503-378-3272; 800-922-2689; consult.web@oregon.gov

- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

Enforcement

503-378-3272; 800-922-2689; enforce.web@oregon.gov

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.

Public Education

503-947-7443; 888-292-5247, Option 2; ed.web@oregon.gov

- Provides workshops and materials covering management of basic safety and health programs, safety committees, accident investigation, technical topics, and job safety analysis.

Standards and Technical Resources

503-378-3272; 800-922-2689; tech.web@oregon.gov

- Develops, interprets, and gives technical advice on Oregon OSHA's safety and health rules.
- Publishes safe-practices guides, pamphlets, and other materials for employers and employees
- Manages the Oregon OSHA Resource Center, which offers safety videos, books, periodicals, and research assistance for employers and employees.

Need more information? Call your nearest Oregon OSHA office.

Salem Central Office

350 Winter St. NE
Salem, OR 97301-3882

Phone: 503-378-3272

Toll-free: 800-922-2689

Fax: 503-947-7461

en Español: 800-843-8086

Web site: www.orosha.org

Bend

Red Oaks Square
1230 NE Third St., Suite A-115
Bend, OR 97701-4374
541-388-6066

Consultation: 541-388-6068

Eugene

1140 Willagillespie, Suite 42
Eugene, OR 97401-2101
541-686-7562

Consultation: 541-686-7913

Medford

1840 Barnett Road, Suite D
Medford, OR 97504-8250
541-776-6030

Consultation: 541-776-6016

Pendleton

200 SE Hailey Ave.
Pendleton, OR 97801-3056
541-276-9175

Consultation: 541-276-2353

Portland

Durham Plaza
16760 SW Upper Boones Ferry Road, Suite 200
Tigard, OR 97224-7696
503-229-5910

Consultation: 503-229-6193

Salem

1340 Tandem Ave. NE, Suite 160
Salem, OR 97303
503-378-3274

Consultation: 503-373-7819



HOT WORK PERMIT

STOP!

Avoid hot work or seek an alternative/safer method, if possible.

This **Hot Work Permit** is required for any temporary operation involving open flames or producing heat and/or sparks.

This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Instructions

1. Firesafety Supervisor:

- Specify the precautions to take
- Fill out and keep **Part 1** during the hot work process
- Issue **Part 2** to the person doing the job.
- Keep **Part 2** on file for future reference, including signed confirmation that the one-hour fire watch and three-hour monitoring have been completed.

HOT WORK BY

- ☐ Employee
☐ Contractor _____

DATE

JOB NUMBER

LOCATION/BUILDING AND FLOOR

IDENTIFY OBJECT/SPECIFIC LOCATION

NATURE OF JOB

NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR

TIME STARTED: a.m. p.m. TIME FINISHED: a.m. p.m.
Permit Expires DATE TIME a.m. p.m.

Note: Emergency notification on back of form.
Use as appropriate for your facility.

To order additional hot work permits or other FM Global resources, order online 24 hours a day, seven days a week, at www.fmglobalcatalog.com.

Part 1

Y NA

- ☐ The fire pump is in operation and switched to automatic.
☐ Control valves to water supply for sprinkler system are open.
☐ Hose streams and extinguishers are in service/operable.
☐ Hot work equipment in good working condition.

Requirements within 35 ft. (11 m) of hot work

- ☐ Ignitable liquid, dust, lint and oily deposits removed.
☐ Explosive atmosphere in area eliminated.
☐ Floors swept clean.
☐ Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐ Remove other combustible material where possible.
Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields.
☐ All wall and floor openings covered.
☐ FM Approved welding pads, blankets and curtains installed under and around work.
☐ Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.

Hot work on walls, ceilings or roofs

- ☐ Construction is noncombustible and without combustible covering or insulation.
☐ Combustible material on other side of walls, ceilings or roofs is moved away.

Hot work on enclosed equipment

- ☐ Enclosed equipment cleaned of all combustible material.
☐ Containers purged of ignitable liquid/vapor.
☐ Pressurized vessels, piping and equipment removed from service, isolated and vented.

Fire watch/hot work area monitoring

- ☐ Fire watch will be provided during and for one (1) hour after work, including any break activity.
☐ Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
☐ Fire watch is trained in use of equipment and in sounding alarm.
☐ Fire watch may be required in adjoining areas, above and below.
☐ Monitor hot work area for up to an additional three (3) hours after the one (1) hour fire watch.

☐ Other precautions taken:

HOT WORK PERMIT

STOP!**Avoid hot work or seek an alternative/safer method, if possible.****This *Hot Work Permit* is required for any temporary operation involving open flames or producing heat and/or sparks.****This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.****Instructions****1. Firesafety Supervisor:**

- A.** Specify the precautions to take
- B.** Fill out and keep **Part 1** during the hot work process (**Part 1A** is for quality assurance documentation, if necessary).
- C.** Issue **Part 2** to the person doing the job.
- D.** Keep **Part 2** on file for future reference, including signed confirmation that the one-hour fire watch and three-hour monitoring have been completed.

HOT WORK BY

- ☐ Employee
☐ Contractor _____

DATE**JOB NUMBER****LOCATION/BUILDING AND FLOOR****IDENTIFY OBJECT/SPECIFIC LOCATION****NATURE OF JOB****NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK**

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR

TIME STARTED:	a.m.	p.m.	TIME FINISHED:	a.m.	p.m.
Permit Expires			DATE	TIME	a.m. p.m.

Note: Emergency notification on back of form.
Use as appropriate for your facility.

To order additional hot work permits or other FM Global resources, order online 24 hours a day, seven days a week, at www.fmglobalcatalog.com.

Part 1A**Y NA**

- ☐ The fire pump is in operation and switched to automatic.
☐ Control valves to water supply for sprinkler system are open.
☐ Hose streams and extinguishers are in service/operable.
☐ Hot work equipment in good working condition.

Requirements within 35 ft. (11 m) of hot work

- ☐ Ignitable liquid, dust, lint and oily deposits removed.
☐ Explosive atmosphere in area eliminated.
☐ Floors swept clean.
☐ Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐ Remove other combustible material where possible.
Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields.
☐ All wall and floor openings covered.
☐ FM Approved welding pads, blankets and curtains installed under and around work.
☐ Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.

Hot work on walls, ceilings or roofs

- ☐ Construction is noncombustible and without combustible covering or insulation.
☐ Combustible material on other side of walls, ceilings or roofs is moved away.

Hot work on enclosed equipment

- ☐ Enclosed equipment cleaned of all combustible material.
☐ Containers purged of ignitable liquid/vapor.
☐ Pressurized vessels, piping and equipment removed from service, isolated and vented.

Fire watch/hot work area monitoring

- ☐ Fire watch will be provided during and for one (1) hour after work, including any break activity.
☐ Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
☐ Fire watch is trained in use of equipment and in sounding alarm.
☐ Fire watch may be required in adjoining areas, above and below.
☐ Monitor hot work area for up to an additional three (3) hours after the one (1) hour fire watch.

☐ **Other precautions taken:**

WARNING

HOT WORK IN PROGRESS! Watch for fire!

Instructions

- 1. Person performing hot work:** Indicate time started and post permit at hot work location. After hot work is completed, indicate time and leave permit posted for fire watch.
- 2. Fire Watch:** Watch area during hot work and for one (1) hour after completion. Prior to leaving area, perform final inspection, sign, leave permit posted and notify firesafety supervisor.
- 3. Monitor:** Monitor area for additional three (3) hours. Perform final inspection, sign and return to firesafety supervisor.

HOT WORK BY

- ☐ Employee
☐ Contractor _____

DATE

JOB NUMBER

LOCATION/BUILDING AND FLOOR

IDENTIFY OBJECT/SPECIFIC LOCATION

NATURE OF JOB

NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR

TIME STARTED:	a.m.	p.m.	TIME FINISHED:	a.m.	p.m.
Permit Expires			DATE	TIME	a.m. p.m.

Fire watch signoff: Work area and all adjacent areas to which sparks and heat might have spread were inspected during the watch period and were found firesafe.

Signed:

Final checkup: Work area was monitored for three (3) hours following completion of the one (1) hour fire watch and found firesafe.

Signed:

Part 2

Y NA

- ☐ The fire pump is in operation and switched to automatic.
☐ Control valves to water supply for sprinkler system are open.
☐ Hose streams and extinguishers are in service/operable.
☐ Hot work equipment in good working condition.

Requirements within 35 ft. (11 m) of hot work

- ☐ Ignitable liquid, dust, lint and oily deposits removed.
☐ Explosive atmosphere in area eliminated.
☐ Floors swept clean.
☐ Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐ Remove other combustible material where possible. Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields.
☐ All wall and floor openings covered.
☐ FM Approved welding pads, blankets and curtains installed under and around work.
☐ Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.

Hot work on walls, ceilings or roofs

- ☐ Construction is noncombustible and without combustible covering or insulation.
☐ Combustible material on other side of walls, ceilings or roofs is moved away.

Hot work on enclosed equipment

- ☐ Enclosed equipment cleaned of all combustible material.
☐ Containers purged of ignitable liquid/vapor.
☐ Pressurized vessels, piping and equipment removed from service, isolated and vented.

Fire watch/hot work area monitoring

- ☐ Fire watch will be provided during and for one (1) hour after work, including any break activity.
☐ Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
☐ Fire watch is trained in use of equipment and in sounding alarm.
☐ Fire watch may be required in adjoining areas, above and below.
☐ Monitor hot work area for up to an additional three (3) hours after the one (1) hour fire watch.

- ☐ Other precautions taken:

WARNING!

HOT WORK IN PROGRESS
Watch for fire!

In case of emergency:

Call: _____

At: _____

WARNING!



The **ABCs** of construction site safety



A Division of the
Department of Consumer
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On the cover: Crane operator

The **ABC**s of construction site safety



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About this guide

This guide consists of 28 “A-to-Z” workplace safety topics for construction-industry employers. Most topics include key construction-industry rules and summarize what you need to do to comply. If you are looking for a primer on our workplace safety and health rules for the construction industry, this guide is a good place to start. It does not cover all of our construction rules but most topics include links to related rules and other important information so that you can learn more.

Need more information or help?

- Oregon OSHA offers a variety of services including confidential, free safety, health, and ergonomic consultations in addition to no-cost workshops. Oregon OSHA’s enforcement officers also provide pre-job conferences for construction companies.
- Oregon OSHA’s [program directives](#) and [interpretations](#) offer additional guidance for complying with Oregon OSHA rules.
- Oregon OSHA’s [Resource Center](#) has a large selection of books and periodicals as well as the American National Standards Institute (ANSI) and other consensus standards; the staff can provide technical and research assistance. The Resource Center also has an audiovisual library covering vehicle safety, respiratory health, toxic materials, hazard communication, ergonomics, hearing conservation, asbestos, general safety, industrial hygiene, accident investigation, confined work spaces, bloodborne pathogens, safety committees, construction, and more.
- The [Resource newsletter](#) focuses on safe work practices and news you can use to make your workplace safer and healthier. You can [subscribe](#) and sign up online.

This guide

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Accident prevention and accident investigation

Accident prevention responsibilities – Division 3, Subdivision C, 1926.20(b)

It is the employer's responsibility to maintain programs that comply with Oregon OSHA's construction rules.

- Such programs must provide for frequent and regular inspections of the job sites, materials, and equipment by competent persons designated by the employer.
- Use of machinery, tools, material, or equipment that does not comply with applicable requirements of this rule is prohibited. Machines, tools, material, or equipment must be identified as unsafe by tagging or locking the controls to make them inoperable or must be physically removed from the place of operation.
- The employer must permit only those employees qualified by training or experience to operate machinery or equipment.

Employer responsibilities – Division 1, 437-001-0760(1)

The employer must ensure that employees are properly instructed and supervised in the safe operation of any machinery, tools, equipment, process, or practice that they are authorized to use.

The employer must take all reasonable means to require employees:

- To work and act in a safe and healthful manner
- To conduct their work in compliance with all applicable safety and health rules



- To use all means and methods that are necessary to safely accomplish all work where employees are exposed to a hazard
- Not to remove, displace, damage, destroy, or carry off any safety device, guard, notice, or warning provided for use in any employment or place of employment when such use is required by applicable safety and health rules

Investigations of injuries – Division 1, 437-001-0760(3)

The employer must investigate every lost-time injury to determine the means that should be taken to prevent recurrence. The employer must promptly install any safeguard or take any corrective measure indicated or found advisable.

Supervisors or people in charge of work are agents of the employer in the discharge of their authorized duties and are at all times responsible for:

- The execution in a safe manner of the work under their supervision
- The safe conduct of their crew while under their supervision
- The safety of all employees under their supervision



Barricades and other traffic controls

Traffic control – Division 3, Subdivision G, 437-003-0420

- Adequate, appropriate traffic controls must be provided for all operations on or adjacent to a highway, street, or roadway. The traffic controls must conform to the Millennium Edition of the (FHWA) Manual on Uniform Traffic Control Devices ([MUTCD](#)), December 2000.
- Barricades for protection of employees must conform to the Millennium Edition of the (FHWA) Manual on Uniform Traffic Control Devices ([MUTCD](#)), December 2000.

Note: Employers can use the most current edition of the MUTCD.

- Signaling by flaggers and the use of flaggers, including warning garments worn by flaggers, must also conform to the Millennium Edition of the (FHWA) Manual on Uniform Traffic Control Devices ([MUTCD](#)), December 2000.

Note: Flagger's warning garments must conform to the MUTCD. Construction employees, other than flaggers, exposed to highway type moving vehicles in construction zones and street/highway traffic must wear highly visible upper body garments that comply with 437-003-0134(7).

Vehicle drivers and riders – Division 3, Subdivision O, 437-003-3224(12)

- Traffic control: Employees must set up appropriate traffic controls when they stop on or adjacent to a highway, street, or road in a way that creates a hazard and when traffic cannot adjust safely on its own. The controls must conform to the Millennium Edition of the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices ([MUTCD](#)), December 2000.
- Employers who follow the most current edition of the [Oregon Temporary Traffic Control Handbook for Operations of Three Days or Less](#) comply with this requirement.



C**hemicals**

Hazard communication – Division 3, Subdivision D, 1926.59

Employers must prepare a hazard communication program if their employees use or may be exposed to hazardous chemicals. The purpose of the hazard communication rule is to ensure that all hazardous chemicals are evaluated and employees get the information by a hazard communication program.

The hazard communication rule applies to any hazardous chemical in which employees may be exposed under normal conditions of use, or in a foreseeable emergency. A “hazardous chemical” is any chemical that presents a physical or health hazard.

Health hazards produce acute or chronic health effects and include carcinogens, toxic agents, irritants, corrosives, and sensitizers. Physical hazards include compressed gases, explosives, flammables, organic peroxides, oxidizers, and unstable (reactive) agents.

Contractors’ employees must also be informed about the hazardous chemicals they may be exposed to. The written hazard communication program must include the methods the employer will use to provide contractors’ employees on-site access to safety data sheets (SDS); the methods to inform them of any precautionary measures; and methods to inform other employees of the labeling system used in the workplace.

The employer must ensure that each container of hazardous chemicals in the workplace is labeled, tagged, or marked to identify the hazardous chemicals and appropriate hazard warnings.



What do you think is in this bottle?

Employees need to understand the information provided by the pictograms, signal word, hazard statement, and precautionary statements on the container label provided by the chemical manufacturer, importer, or distributor.

The employer must maintain copies of the required SDS for each hazardous chemical, and must ensure that they are readily accessible during each work shift by employees when they are in their work areas. When employees must travel between workplaces during a work shift, the SDS may be kept at the primary workplace facility; however, the employer must ensure that employees can immediately obtain the required information in an emergency.

Questions that an employer needs to consider

- Where do you keep your SDSs?
- If they are in someone's office, how do you ensure information access when that person is unavailable, sick, or on vacation?
- How do you ensure access after normal working hours, weekends, or holidays?
- If you have more than one shift, do all employees on all shifts have the same access?
- How do you maintain access to employee exposure and medical records? Subdivision C, 1926.33



onfined Spaces

Confined spaces – Division 2, Subdivision J, OAR 437-002-0146

(applies to both general industry and construction employers)

When workers enter a confined space to do construction work, they can encounter toxic gases, corrosive chemicals, flammable solvents, or machines that start unexpectedly. If something goes wrong, a confined space can be difficult or impossible to exit. And would-be rescuers can share the fate of those they are trying to rescue.

Key sections of OAR 437-002-0146 include:

- Evaluation, 437-002-0146(4)
- Permit-required confined space entry programs and permits, 437-002-0146(5)
- Permit entry, 437-002-0146(6)
- Equipment, 437-002-0146(7)
- Personnel, 437-002-0146(8)
- Rescue, 437-002-0146(9)
- Alternate entry, 437-002-0146(10)
- Training, 437-002-0146(11)
- Multi-employer worksites, 437-002-0146(12)
- Records, 437-002-0146(13)

Evaluation – Division 2, Subdivision J, OAR 437-002-0146(4)

It is the employer's responsibility to determine if any of their confined spaces are permit-required confined spaces. Employers must prohibit employees from entering unevaluated confined spaces until it is fully evaluated. Effective measures to prevent unauthorized employees from entering permit spaces must be taken.

Permit-required confined space entry program and permits – Division 2, Subdivision J, OAR 437-002-0146(5)

Employers must develop and implement a written program that describes the means, practices, and procedures for employees to safely identify and enter permit spaces.

Rescue – Division 2, Subdivision J, OAR 437-002-0146(9)

It is the employer's responsibility, before employees enter a permit space, to develop and implement procedures to remove entrants in the event of an emergency or when they are unable to evacuate without outside assistance.

Training - Division 2, Subdivision J, OAR 437-002-0146(11)

Employers must train each employee involved in permit space activities so they have the understanding, knowledge, and skills necessary to safely perform their duties, according to their assigned responsibilities.



CC: Cranes

Cranes and derricks — Division 3, Subdivision CC

This rule covers requirements for the safe use of cranes and derricks used in construction. Some key sections in Subdivision CC include:

- Scope, 1926.1400
- Ground conditions, 1926.1402
- Assembly/disassembly – general requirements, 1926.1404
- Power line safety (up to 350 kV) – equipment operations, 1926.1408
- Inspections, 1926.1412
- Operation, 1926.1417
- Authority to stop operation, 1926.1418
- Training, 1926.1430
- Hoisting personnel, 1926.1431

Assembly/disassembly requirements covered in 1926.1404 include:

- Manufacturer prohibitions
- Manufacturer assembly/disassembly procedure
- Employer assembly/disassembly procedure



Inspection requirements covered in 1926.1412 include:

- Repaired/adjusted equipment, 1926.1412(b)
- Post assemble
- Each shift
- Monthly
- Annual comprehensive

Operation requirements covered in 1926.1417 include:

- Operation procedures, 1926.1417(b)
- Leaving the equipment unattended, 1926.1417(e)
- Capacity, 1926.1417(o)

Training requirements covered in 1926.1430 include:

- Overhead power lines, 1926.1430(a)
- Signal persons, 1926.1430(b)
- Operators, 1926.1430(c)



Division 3 – construction rules

Division 3, which includes all of Oregon OSHA's safety and health rules for the construction industry, has the following subdivisions:

- C: General Safety and Health Provisions
- CC: Cranes and Derricks in Construction
- D: Occupational Health and Environmental Controls
- E: Personal Protective and Life Saving Equipment
- F: Fire Protection and Prevention
- G: Signs, Signals, and Barricades
- H: Materials Handling, Storage, Use, and Disposal
- I: Tools – Hand and Power
- J: Welding and Cutting
- K: Electrical
- L: Scaffolding
- M: Fall Protection
- N: Helicopters, Hoists, Elevators, and Conveyors
- O: Motor Vehicles, Mechanized Equipment, and Marine Operations
- P: Excavations
- Q: Concrete and Masonry Construction
- R: Steel Erection
- S: Underground Construction, Caissons, Cofferdams, and Compressed Air
- T: Demolition
- U: Blasting and Use of Explosives
- V: Power Transmission and Distribution
- W: Rollover Protective Structures; Overhead Protection
- X: Stairways and Ladders
- Z: Toxic and Hazardous Substances

Oregon OSHA also has [program directives](#) and [interpretations](#) of its rules.

Note: When a specific type of equipment, process, or practice is *not* limited to the construction industry, the provisions in other Oregon OSHA divisions will apply. See OAR 437-003-0005, *Additional Applicability*.



Standards and rules are available online at www.orosha.org.

Electrical

Oregon OSHA's electrical requirements for the construction industry are in Division 3, **Subdivision K** and include the following sections:

- General requirements
- Installation safety requirements
- Safety-related work practices (including lockout/tagout)
- Safety-related maintenance and environmental considerations
- Safety requirements for special equipment

Branch circuits – Division 3, Subdivision K, 437-003-0404

- All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacles on construction sites that are for temporary power and are available for use by employees, must have approved ground-fault circuit interrupters (GFCIs).
- GFCI protection must be at the outlet end of the circuit. Extension cords or other devices with listed ground-fault circuit interrupter protection for personnel identified for portable are acceptable.
- Receptacles more than 125-volt, single phase, 30-amperes must have protection that complies with GFCI protection above, or an assured equipment grounding conductor program.



Typical “Spider box” supplies GFCI-protected receptacle for use on construction sites.

Working near overhead high-voltage lines and equipment – Division 3, Subdivision K, 437-003-0047

Do not enter or perform any activity (such as handling, erecting, operating, transporting, or storing any tools, equipment, or materials, moving a building or structure) within the restricted space surrounding an overhead high-voltage line or equipment unless:

- You are the owner, an authorized employee, or authorized (in writing) agent of the overhead high voltage system.
- Proper notification is provided and the line and equipment is de-energized and visibly grounded by the owner of the high-voltage system or authorized agent, or accidental contact is prevented by use of insulating barriers or guards.
- Insulated lines (not tree wire) and equipment designed and engineered to allow only incidental contact are installed by the owner of the high-voltage system or authorized agent.

Restricted space

- For lines rated more than 600 V to 50 kV, restricted space extends 10 feet in all directions from the surface of the line or equipment.
- For lines rated over 50 kV, restricted space extends 10 feet plus 0.4 inch for each one kV over 50 kV, or twice the length of the insulator (but never less than 10 feet) in all directions from the surface of the line or equipment.
- For equipment or structures in transit, on level surfaces, restricted space extends four feet in all directions from lines or equipment rated 50 kV or less, 10 feet in all directions for lines or equipment rated over 50 kV, and 16 feet in all directions for lines or equipment rated over 345 kV up to and including 750 kV.

Fall Protection

Oregon OSHA's fall protection requirements for the construction industry are in Division 3, **Subdivision M**, and include the following sections:

- Scope, application, and definitions, 1926.500
- Duty to have fall protection (general fall protection), 437-003-1501
- Fall protection systems criteria and practices, 1926.502, 437-003-0502, 437-003- 1502, and 437-003-2502.
- Training requirements, 437-003-0503

General fall protection – Division 3, **Subdivision M**, 437-003-1501

Except where permitted by another standard, when employees are exposed to a hazard of falling 6 feet or more to a lower level, the employer must ensure that fall protection systems are provided, installed, and implemented according to the criteria in 1926.502, 437-003-0502, 437-003- 1502, and 437-003-2502. In addition, each employee working less than 6 feet above dangerous equipment must be protected from falls into or onto dangerous equipment by guardrail systems or equipment guards.

Holes: Each employee on walking/working surfaces must be protected from falling through holes (including skylights) more than six feet above lower levels. Each employee on a walking/working surface must be protected from objects falling through holes (including skylights) and from tripping in or stepping into holes (including skylights) **by covers**.

Wall openings: Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is six feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface, must be protected from falling.

Established floors, mezzanines, balconies, and walkways: Each employee on established floors, mezzanines, balconies, and walkways, with an unprotected side or edge six feet or more above a lower level, must be protected from falling.

Excavations: Each employee at the edge of an excavation six feet or more in depth must be protected from falling when the excavations are not readily seen because of plant growth or other visual barrier. Each employee at the edge of a well, pit, shaft, and similar excavation six feet or more in depth must be protected from falling.

Each employee must be protected from falls into or onto dangerous equipment, regardless of the fall distance.

When an employee is exposed to falling objects, the employer must have each employee wear a hard hat and must implement an additional measure of protection such as erecting toeboards, screens, or guardrail systems; erecting a canopy structure; or barricading the area and prohibiting employees from entering the barricaded area.



Although he is wearing a harness, wouldn't you want to look at the rest of his fall protection system?

Guarding

Oregon OSHA's equipment guarding requirements for the construction industry are in Division 3, **Subdivision I** and include the following sections:

- General requirements, 1926.300
- Hand tools, 1926.301
- Power-operated hand tools, 1926.302
- Powder-actuated tools, 437-003-0925
- Abrasive wheels and tools, 1926.303
- Woodworking tools, 1926.304
- Jacks – lever and ratchet, screw, and hydraulic, 1926.305

Condition of tools: All hand and power tools and similar equipment, whether furnished by the employer or the employee, must be maintained in a safe condition.

Guarding: When power-operated tools are designed to accommodate guards, they must be equipped with guards when in use. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded if employees could contact them.

Types of guarding: One or more methods of machine guarding must be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips, and sparks.

Guarding abrasive wheel machinery requirements are in Division 3, **Subdivision I**, 1926.303.



Health hazards

Oregon OSHA's requirements covering construction-industry health hazards are in Division 3, **Subdivision D** and include the following sections:

- Medical services and first aid, [1926.50](#)
- Sanitation, [1926.51](#)
- Drinking water, [437-003-0015](#)
- Toilets, [437-003-0020](#)
- Occupational noise exposure, [1926.52](#)
- Ionizing radiation, [1926.53](#)
- Non-ionizing radiation, [1926.54](#)
- Illumination, [1926.56](#)
- Ventilation, [1926.57](#)
- Hazard communication, [1926.59](#)
- Methylenedianiline (MDA), [1926.60](#)
- Lead, [1926.62](#)

Toxic and hazardous substances

Requirements covering toxic and hazardous substances are in **Division 3, Subdivision Z** and include:

- Air contaminants, [437-003-1000](#)
- Asbestos, [1926.1101](#)
- Chromium, [1926.1126](#)
- Cadmium, [1926.1127](#)
- Methylene Chloride, [1926.1152](#)



Make sure you stay hydrated when working in the heat. (WGN Blog)



Silica is not just dust. It is hazardous to your health.

Safety training and education – Division 3, Subdivision C, 1926.21(b)

- Employees required to handle or use poisons, caustics, and other harmful substances must be instructed about safe handling and use and be made aware of the potential hazards, personal hygiene, and personal protective measures required.
- At job sites where harmful plants or animals are present, employees who may be exposed must be instructed about the potential hazards, how to avoid injury, and the first-aid procedures in the event of injury.
- Employees handling or using flammable liquids, gases, or toxic materials must be instructed in the safe handling and use of these materials and made aware of other specific requirements in Division 3, **Subdivision C**.



Whether it is toxic adhesives, asbestos, silica, lead, or countless other occupational health dangers, employees must be instructed on the hazards and control measures.

Employer's responsibilities – Division 1, 437-001-0760(1)

- The employer is responsible for providing controls necessary to protect employees' health from harmful or hazardous conditions and for maintaining such controls in good working order.
- Every employer must inform the employees regarding the known health hazards to which they are exposed, the measures that have been taken for the prevention and control of such hazards, and the proper methods for using such controls.



Inspections

Oregon OSHA rules that have requirements for workplace inspections include:

Safety training and education – Division 3, Subdivision C, 1926.21(b)

The employer must instruct each employee how to recognize and avoid unsafe conditions and about any Oregon OSHA regulations applicable to his work.

Accident prevention responsibilities – Division 3, Subdivision C, 1926.20(b)

It is the employer's responsibility to initiate and maintain programs necessary to comply with 1926.20(b). Such programs must provide for frequent and regular inspections of the job sites, materials, and equipment to be made by competent persons designated by the employers.

Use of any machinery, tool, material, or equipment that does not comply with applicable Division 3 requirements is prohibited. The machine, tool, material, or equipment must either be identified as unsafe by tagging or locking the controls to make them inoperable or must be physically removed from its place of operation.

The employer must only permit employees qualified by training or experience to operate equipment and machinery.

Safety committees – Division 1, 437-001-0765(7)

Employers who have safety committees must establish procedures for conducting workplace safety and health inspections. People trained in hazard identification must conduct the inspections.

Inspections must be conducted quarterly at primary fixed locations, office environments, and satellite locations. Inspections at mobile work locations, infrequently visited sites, and sites that do not lend themselves to quarterly inspections, must be conducted as often as the safety committee determines is necessary.



Should this worker begin his inspection at his hard hat?
(Source: Paul A. Anderson, Cal/OSHA Hazard Compliance Unit-North)

Job Hazard Analysis

Job hazard analysis – or JHA – is an industry best practice method of identifying, assessing, and controlling hazards associated with a specific job. A JHA breaks a job down into tasks; each task is evaluated to determine if there is a better, safer way to do it. A job-hazard analysis works well for jobs with difficult-to-control hazards and jobs with histories of accidents or near misses. JHAs for complex jobs can take a considerable amount of time and expertise to develop. You may want to enlist the help of a safety professional for such tasks.

Most Oregon OSHA rules do not specifically require a JHA. However, employers are required to take the necessary steps to ensure that jobs are safe and healthful. A JHA helps fulfill this requirement. Employers applying for Oregon OSHA's Safety and Health Achievement Recognition Program ([SHARP](#)) and the Voluntary Protection Program ([VPP](#)) conduct JHAs.

Key steps in a JHA:

- Prepare: Review accident histories, involve employees, conduct risk assessment, and prioritize jobs based on hazardous exposures. Often, jobs need to be broken into tasks to better analyze the steps involved.
- Observe the task and list the steps required to accomplish it.
- Identify hazards in each step.
- Another hazard tracking method is categorizing into the following types: struck-by, struck-against, contact-by, contact-with, caught-on, caught-in, caught-between, fall-to-surface, fall-to-below, overexertion, bodily reaction, and overexposure.
- Develop hazard controls (engineering controls, management controls, PPE, and/or interim measures).
- Write a safe job procedure.

JOB HAZARD ANALYSIS		
JOB NAME:		
CONSTRUCTION PHASE:		
START DATE:		PAGE 1 OF
OPERATION	HAZARD	ACTION TO BE TAKEN

Compliments of Howard S. Wright Constructors

Keepp the site clean

General safety and health provisions – Division 3, Subdivision C, 1926.20

Contractor requirements: No contractor or subcontractor for any part of the contract work can require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions that are unsanitary, hazardous, or dangerous to their health or safety.

Housekeeping – Division 3, Subdivision C, 1926.25

- During the construction, alteration, or repair work, forms and scrap lumber with protruding nails and all other debris must be cleared from work areas, passageways, and stairs in and around buildings or other structures.
- Combustible scrap and debris must be removed at regular intervals during the course of construction. A safe means must be provided for removal.
- Containers must be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes, such as caustics, acids, harmful dusts, etc., must be equipped with covers. Garbage and other waste must be disposed of at frequent, regular intervals.

Sanitation – Division 3, Subdivision D, 1926.51

Sanitation requirements for construction sites in 1926.51 cover:

- Potable water, 1926.51(a)
- Nonpotable water, 1926.51(b)
- Drinking water, 437-003-0015
- Toilets at construction jobsites, 1926.51(c)

See also Oregon OSHA program directive **A-97**, Toilet facilities: reasonable accessibility

General requirements for storage – Division 3, Subdivision H, 1926.250(a)

- All materials stored in tiers must be stacked, racked, blocked, interlocked, or secured to prevent sliding, falling, or collapse.
- Maximum safe load limits of floors within buildings and structures, in pounds per square foot, must be conspicuously posted in all storage areas, except for floor or slab on grade. Maximum safe loads must not be exceeded.
- Aisles and passageways must be kept clear to provide for the free and safe movement of material handling equipment or employees. Such areas must be kept in good repair.



Any issues here?

Housekeeping: Storage areas must be kept free from materials that constitute tripping, fire, explosion hazards, or harbor pests. Vegetation must also be controlled when necessary.

Ladders and stairways

Oregon OSHA's construction requirements covering ladders and stairways are in Division 3, **Subdivision X**, and include the following sections:

- Scope, application, and definitions, 1926.1050
- General requirements, 1926.1051
- Stairways, 1926.1052
- Ladders, 1926.1053
- Extension ladders, 437-003-0065
- Training requirements, 1926.1060

Training requirements – Division 3, Subdivision X, 1926.1060

The employer must provide a training program for each employee using ladders or stairways. The program must enable each employee to recognize ladder and stairway hazards and must train each employee how to minimize the hazards.

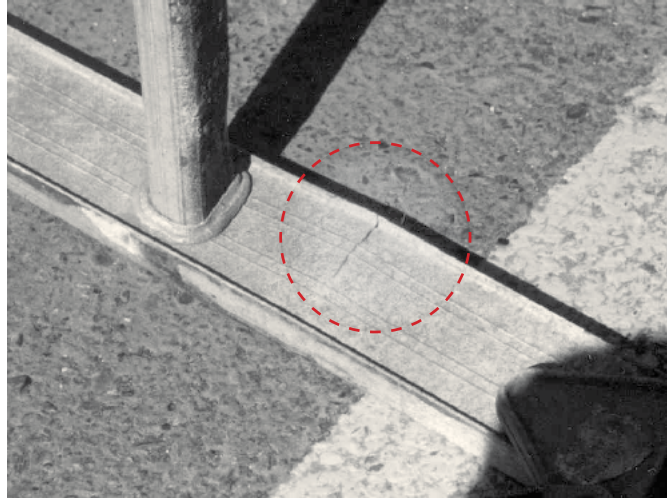
The employer must ensure that each employee has been trained by a competent person in the following areas:

- The nature of fall hazards in the work area
- The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used
- The proper construction, use, placement, and care in handling of all stairways and ladders
- The maximum intended load-carrying capacities of ladders used
- The requirements in Division 3, **Subdivision X**

Retraining must be provided for each employee as necessary.

Ladder safety essentials include:

- Appropriate selection
- Regular inspection
- Proper setup
- Safe use
- Proper maintenance and storage
- Training



Pre-use inspections are critical. Do you see the small fracture in this picture?

Medical and first aid

First aid and medical attention – Division 3, Subdivision C, 1926.23

First-aid services and provisions for medical care must be made available by the employer for every employee covered by these requirements.

Medical services and first aid – Division 3, Subdivision D, 1926.50

Key requirements:

- The employer must ensure the availability of medical personnel for advice and consultation on matters of occupational health.
- Provisions must be made for prompt medical attention in case of serious injury before commencement of a project.
- In the absence of an infirmary, clinic, hospital, or physician reasonably accessible to the worksite, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training, must be available at the site to render first aid.



- First-aid supplies must be easily accessible when required. The contents of the first-aid kit must be placed in a weatherproof container with individual sealed packages for each type of item, and must be checked by the employer before being sent out on each job and at least weekly on each job to ensure that the expended items are replaced.
- Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, must be provided.
- Where 911 services are not available, the phone numbers of the physicians, hospitals, or ambulances must be conspicuously posted.

Appendix A to 1926.50, First-aid kits (Non-mandatory), includes the following points:

- Employers should evaluate the need for additional first-aid kits at the worksite, including additional first-aid equipment and supplies.
- Employers, who have unique or changing first-aid needs in their workplace, may need to enhance their first-aid kits. Advice from the local fire or rescue department or medical professionals may be helpful.
- If employees may be exposed to blood or other potentially infectious materials while using first-aid supplies, employers must provide personal protective equipment such as gloves, gowns, face shields, masks, and eye protection.

Note: Employers with employees in the construction industry who have occupational exposure to blood or other potentially infectious materials must follow the requirements in Division 2, Subdivision Z, 1910.1030 *Bloodborne Pathogens*.

Noise

Occupational noise exposure – Division 3, Subdivision D, 1926.52 and 437-003-0027

Whenever an employee is exposed to noise at a construction site, the requirements of Division 2, Subdivision G, Occupational Noise Exposure, 1910.95 apply. These requirements cover:

- Permissible exposure limits
- Hearing conservation program, 1910.95(c)
- Monitoring, 1910.95(d)
- Employee notification, 1910.95(e)
- Observation of monitoring, 1910.95(f)
- Audiometric testing, 1910.95(g)
- Hearing protectors, 1910.95(i)
- Hearing protector attenuation, 1910.95(j)
- Training program, 1910.95(k)
- Access to information and training materials, 1910.95(l)
- Recordkeeping, 1910.95(m)

Hours per day	Sound level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.25 or less	115

Employers must have a hearing conservation program whenever employee noise exposures equal or exceed an eight-hour time-weighted average sound level (TWA) of 85 dBA.

When employees are exposed to sound levels exceeding those listed in the table on the facing page, administrative or engineering controls must be used.



Concrete cutting is often around 110 to 115 dBA.

rganize a safety committee or hold safety meetings

Safety committees and safety meetings – Division 1, 437-001-0765

The purpose of safety committees and safety meetings is to bring employees and management together in a non-adversarial, cooperative effort to promote workplace safety and health. Safety committees and safety meetings will assist you make continuous improvement to your safety and health programs.

If more than half of your employees report to construction sites, you can have a safety committee or hold safety meetings.

Safety meetings must:

- Include all available employees
- Include at least one employer representative authorized to ensure correction of safety and health issues
- Be held on company time and attendees paid at their regular rate of pay

Safety meetings must occur at least monthly and before the start of each job that lasts more than one week.

Safety meetings must include discussions of:

- Safety and health issues
- Accident investigations, causes, and the suggested corrective measures

Employers in construction, utility work, and manufacturing must document, make available to all employees, and keep for three years a written record of each meeting that includes the following:

- Hazards related to tools, equipment, work environment, and unsafe work practices identified and discussed during the meeting
- The date of the meeting
- The names of those attending the meeting

If you are a subcontractor on a multi-employer worksite, your employees may attend the

prime contractor's safety meetings. You may keep the minutes from these meetings as a part of your records. If you choose this option, you must still meet to discuss accidents involving your employees.



Personal protective equipment (PPE)

Personal protective equipment – Division 3, Subdivision E, 437-003-0134

The employer is responsible for requiring employees to wear appropriate PPE in all operations where there is an exposure to hazards or where this requirement indicates the need for using such equipment.

Personal protective and life saving equipment – Division 3, Subdivision E

This rule covers requirements for the use, selection, and maintenance of PPE and lifesaving equipment, including:

- Payment for protective equipment, 437-003-0134(4)
- Head protection, 437-003-0134(9)
- Eye and face protection, 437-003-0134(8)
- Respiratory protection, 1926.103
- Working over or near water, 1926.106
- Foot protection, 437-003-0134(10)

Head protection – Division 3, Subdivision E, 437-003-0134(9)

- Employees working in areas where there is a danger of head injury from impact, falling or flying objects, or electrical shock and burns must be protected by hard hats.
- Hard hats must meet the specifications contained in American National Standards Institute, Z89.1, Safety Requirements for Industrial Head Protection.

High-visibility garments – Division 3, Subdivision E, 437-003-0134(7)

Employees, other than flaggers, exposed to hazards caused by on-highway type moving vehicles in construction zones and highway traffic must wear highly visible upper body garments. The colors must contrast with other colors in the area to make the worker stand out. Colors equivalent to strong red, strong orange, strong yellow, strong yellow-green, or fluorescent versions of these colors are acceptable. During hours of darkness, the garments must also have reflective material visible from all sides for 1,000 feet.

Note: High visibility garments for **flaggers** must meet the requirements in Division 3, **Subdivision G**, 437-003-0420(2).



Personal protective equipment (PPE) – *continued*

Respiratory Protection – Division 3, Subdivision E, 1926.103

Construction work can certainly produce an assortment of harmful dust, gas, fumes, mist, smoke, and vapor. In order to protect your health, effective engineering and work practice controls such as ventilation, wet methods, and confinement of the task must be established. However, if these measures are not feasible, or not protective enough, appropriate respirators must be used.

When respirators are required, a written program must be implemented covering many important elements such as respirator selection procedures, fit testing for tight-fitting respirators, maintenance protocol, medical evaluations, and training. The employer must also designate a program administrator to oversee the respiratory protection program and conduct required evaluations. Please refer to 1926.103 (See Division 2, Subdivision I, 1910.134) for more details and consider consulting an industrial hygienist to help develop a program or review an existing one.



When it comes to PPE, do not forget other important factors such as proper selection, inspection, and training.

Qualified and competent persons

Requirements for qualified and competent persons are in several Oregon OSHA rules such as **fall protection**, **scaffolding**, **steel erection**, **rigging**, **excavation**, **asbestos**, and **lead**. The general definitions for “qualified” and “competent person” are in Division 3, Subdivision C, 1926.32:

- 1926.32(m) “Qualified” means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.
- 1926.32(f) “Competent person” means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Division 3, Subdivision R (**Steel erection**) also adds the following: “In Oregon, a competent person is considered to be someone with equivalent skills as a qualified person in identifying existing and potential hazards in the workplace, while also being authorized by the employer or employer’s representative to take immediate corrective action to control or eliminate hazards.”



Excavations and rigging



Scaffolding



Asbestos

A competent person must be able to recognize hazards and have the authority to correct them.



Confined spaces

Rigging

Requirements for rigging equipment for material handling are in Division 3, Subdivision H, 1926.251, and include the following:

- Rigging equipment for material handling must be inspected before use on each shift and whenever necessary during its use to ensure that it is safe.
- Defective rigging equipment must be removed from service.
- Rigging equipment must not be loaded in excess of its recommended safe working load (See Division 3, Subdivision H Tables H-1 through H-20).
- Rigging equipment, when not in use, must be removed from the immediate work area so as not to present a hazard to employees.
- Custom-designed grabs, hooks, clamps, or other lifting accessories, for units such as modular panels, prefabricated structures, and similar materials, must be marked to indicate the safe working loads and must be proof-tested before use to 125 percent of their rated load. Included are alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene).
- Each day before being used, slings and all fastenings and attachments must be inspected for damage or defects by a competent person designated by the employer (additional inspections must be performed when conditions warrant).





Scaffolding

Oregon OSHA's scaffolding requirements are covered in Division 3, Subdivision L, [Scaffolding](#).

Key sections include:

- Scope, application and definitions, 1926.450
- General requirements, 1926.451
- Additional requirements applicable to specific types of scaffolds, 1926.452
- Aerial lifts, 1926.453
- Training requirements, 1926.454

Oregon OSHA's scaffold standard includes provisions for both supported and suspended scaffolding, in addition to general requirements for capacity and platform construction, safe access, fall protection, falling object protection, safe use, and training. The standard also contains additional requirements for specific types of scaffolds.



Manually propelled elevating aerial platforms – Division 3, Subdivision L, 437-003-0071

When employees use manually propelled elevating aerial platforms as covered by ANSI/SIA A92.3-1990, the manufacturer's operating manual must be with the equipment. You must follow all operating and maintenance instructions and recommendations of the manufacturer.

Boom supported elevating work platforms – Division 3, Subdivision L, 437-003-0073

When employees use boom-supported elevating work platforms as covered by ANSI/SIA A92.5-1992, the manufacturer's operating manual must be with the equipment. Follow all operating and maintenance instructions and recommendations of the manufacturer.

Employees must use personal fall protection that complies with Division 3, Subdivision M, when working in these devices.

Scissor lifts – Division 3, Subdivision L, 437-003-0074

When employees use self-propelled elevating aerial platforms (scissor lifts) as covered by ANSI/SIA A92.6-1990, the manufacturer's operating manual must be with the equipment. Follow all operating and maintenance instructions and recommendations of the manufacturer.

Program directive A-242, Fall protection: aerial lifts used in construction

This Oregon OSHA program directive clarifies the requirement for fall protection when employees are using aerial lifts in construction.

Trenching and excavations

Oregon OSHA's requirements for excavation work are included in Division 3, Subdivision P, **Excavations**. Key sections include:

- Scope, application, and definitions, 1926.650
- Specific excavation requirements, 1926.651
- Underground installations, 437-003-0096
- Requirements for protective systems, 1926.652

Requirements covered in 1926.651 include:

- Surface encumbrances, 1926.651(a)
- Underground installations, 1926.651(b)
- Access and egress, 1926.651(c)
- Exposure to vehicular traffic, 1926.651(d)
- Exposure to falling loads, 1926.651(e)
- Warning system for mobile equipment, 1926.651(f)
- Hazardous atmospheres, 1926.651(g)
- Water accumulation, 1926.651(h)
- Stability of adjacent structures, 1926.651(i)
- Loose rock and soil, 1926.651(j)
- Daily inspections, 1926.651(k)
- Fall protection, 1926.651(l)



Excavation work can be incredibly hazardous. These workers face imminent danger. (OSHA)

Requirements covered in 1926.652 include:

- Protection of employees in excavations, 1926.652(a)
- Design of sloping and benching systems, 1926.652(b)
- Design of support systems, shield systems, and other protective systems, 1926.652(c)
- Materials and equipment, 1926.652(d)
- Installation and removal of support, 1926.652(e)
- Sloping and benching systems, 1926.652(f)
- Shield systems, 1926.652(g)

Each employee in an excavation must be protected from cave-ins by an adequate protective system except when excavations are made entirely in stable rock, or excavations are less than five feet deep and examination of the ground by a competent person provides no indication of a potential cave-in.



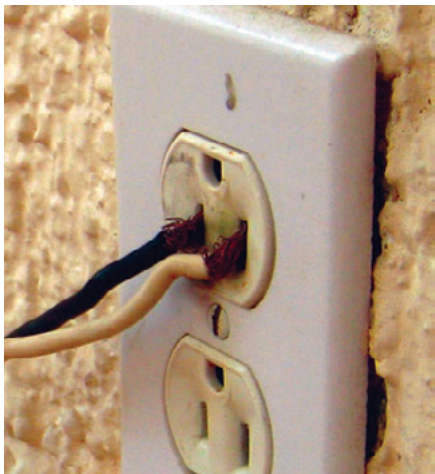
OSI Laborers' Skills Demonstration (October 2008)

Unsafe conditions and unsafe practices

Think of unsafe conditions and unsafe practices as hazards, because if they are not controlled they are likely to cause an injury or illness. Safety hazards cause injuries and health hazards cause illnesses.

Watch for unsafe conditions and unsafe practices; it is something that everyone can do on the job. Missing equipment guards, poorly maintained or defective equipment, and not following written safety procedures are examples. Require employees to report hazards immediately to someone who has authority to act on the report. Employees who report hazards need to be kept informed when and how the hazards will be controlled.

Also, look for new hazards whenever you change equipment, materials, or work processes, and determine how to control them.



Clockwise from top left:
exposed conductors; no fall
protection; no lower blade
guard; and no fall protection,
unstable, no safe access, etc.



Vehicles and mobile equipment

Oregon OSHA's requirements for vehicles and mobile equipment are in Division 3, Subdivision O, **Motor Vehicles, Mechanized Equipment, and Marine Operations**. Key parts of Subdivision O include:

- Equipment, 1926.600
- General requirements, 437-003-0085
- Pinch points, 437-003-0090
- Vehicle drivers and riders, 437-003-3224
- Vehicles for highway and road operation characteristics and maintenance, 437-003-3225
- Vehicles for use on property other than public roads and highways operation, characteristics and maintenance, 437-003-3226
- Material handling equipment (including earthmoving, excavating, and forklifts), 1926.602
- Personnel platforms on forklifts, 437-003-0094
- Pile driving equipment, 1926.603
- Site clearing, 1926.604
- Marine operations and equipment, 1926.605

Safe practices for operating vehicles:

- Do not allow employees to drive or ride in unsafe vehicles.
- Require employees to report any vehicle-related safety problems.
- Secure equipment and tools to prevent them from moving in a vehicle or make sure a barrier is in place to protect the passengers.
- Ensure that vehicles have working horns that can be heard above any surrounding noise.
- Any vehicle that has an obstructed view to the rear must have a backup alarm that can be heard above surrounding noise unless there is a spotter or it is certain that no one can enter the danger area.



Safe practices must be established and enforced when working around mobile equipment and vehicles.

Welding and cutting

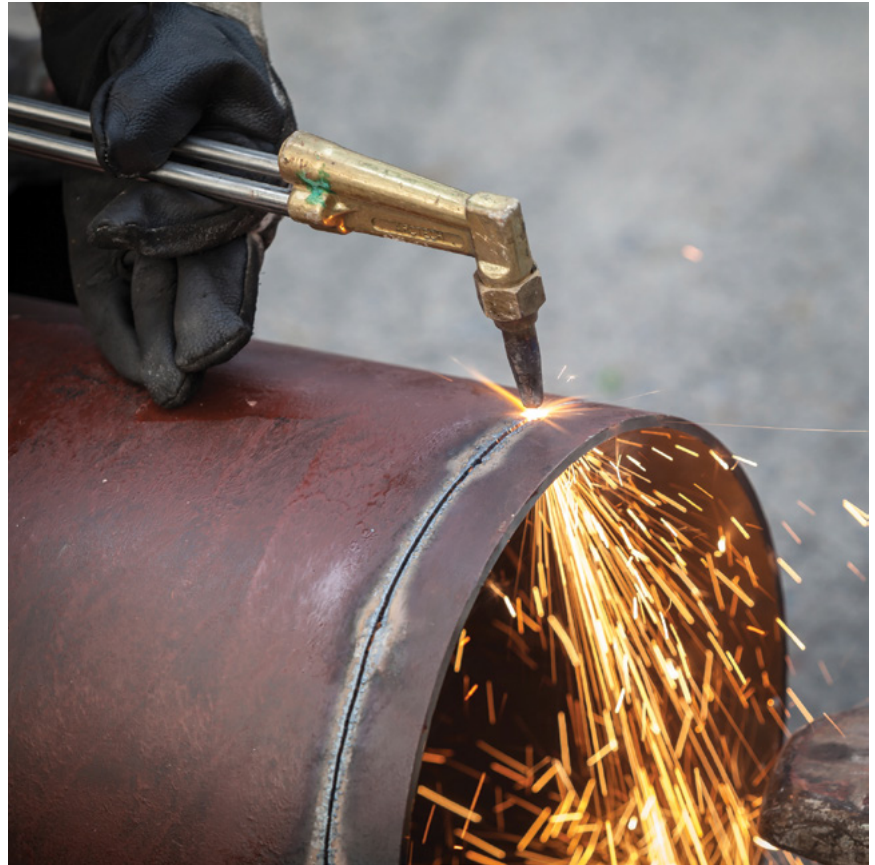
Oregon OSHA's welding requirements are in Division 3, **Subdivision J**, and include the following sections:

- Oxygen-fuel gas welding and cutting, 437-002-2253
- Arc welding and cutting, 1926.351
- Fire prevention, 1926.352
- Ventilation and protection in welding, cutting, and heating (includes confined spaces), 1926.353
- Welding, cutting, and heating in way of preservative coatings, 1926.354

Welding and cutting hazards include:

- Fire and explosion
- Chemical exposure, smoke, fumes, gas
- Burns (eye and skin)
- Noise
- Radiation
- Electric shock

Safe welding and cutting practices include ventilation, guards (screens and covers), and personal protective equipment (gloves, hood/helmet, eye and face protection, and respirators).



X-rays and other radiation

Oregon OSHA's radiation rules, in Division 3, **Subdivision D**, cover **ionizing radiation** and **non-ionizing radiation**.

Electromagnetic (EM) radiation

The most familiar form of electromagnetic (EM) radiation is sunshine, which provides light and heat. Sunshine consists primarily of radiation in infrared (IR), visible, and ultraviolet (UV) frequencies. Lasers also emit EM radiation in these "optical frequencies."

Ionizing radiation and non-ionizing radiation

The higher frequencies of EM radiation, consisting of X-rays and gamma rays, are types of ionizing radiation. Lower frequency radiation, consisting of ultraviolet (UV), infrared (IR), microwave (MW), radio frequency (RF), and extremely low frequency (ELF) are types of non-ionizing radiation. If not properly controlled, non-ionizing radiation, which is found in a wide range of occupational tasks including use of lasers and electric welding, can pose a health risk to potentially exposed employees.



Lasers

Laser stands for “Light Amplification by Stimulated Emission of Radiation.” The laser produces an intense, directional beam of light. The most common cause of laser-induced tissue damage is thermal in nature, where the tissue proteins are denatured due to the temperature rise following absorption of laser energy.

Because some lasers can damage eyes and skin:

- Only qualified, trained employees can install, adjust, and operate laser equipment.
- Laser equipment operators must be able to show proof that they are qualified when they are operating laser equipment.
- Employees who work in areas where potential exposure to laser light greater than five milliwatts exists, must be provided with anti-laser eye protection.
- Areas in which lasers are used must have laser warning signs.
- The laser beam must not be directed at employees.
- Laser equipment must have a label that indicates maximum output.



Y our attitude

- Do you think accidents only happen to other people?
- Do you ignore unsafe situations because it is “not your job”?
- Do you think that an accident will not happen because it has never happened before?
- What if someone close to you was seriously injured in a workplace accident? Would this change your attitude towards safety?

Be aware of your attitude and how it affects others on the job. Do not wait for an accident to happen before you change your attitude towards safety.



Working within a culture that supports a positive attitude toward safety can do wonders to ensure safe construction sites. *OSI Laborer's Skills Demonstration (October 2008)*



Hoffman Construction Company

Over a third of all accepted disabling claims reported to the Oregon Workers' Compensation Division are sprains/strains and other musculoskeletal disorders. Although construction work will always include lifting, carrying, and pulling (among others), many contractors have made great strides in preventing these types of injuries through pre-task planning, employee involvement, medical management, and training their crews to recognize risk factors and best practices.

Zero energy state (lockout/tagout)

Lockout and tagging of electrical circuits – Division 3, Subdivision K, 1926.417

- Controls that are deactivated during work on equipment or circuits must be tagged
- Equipment or circuits that are de-energized must be inoperative and must have tags attached at all points where they can be energized
- Tags must be placed to identify plainly the equipment or circuits being worked on

The control of hazardous energy (lockout/tagout) – Division 2, Subdivision J, 1910.147(c)

Energy control program. The employer must establish a program consisting of energy control procedures, employee training, and periodic inspections. The purpose is to ensure that equipment is isolated from the energy source and made inoperative before any employee performs any service or maintenance where the unexpected energizing, start up, or release of stored energy could occur.

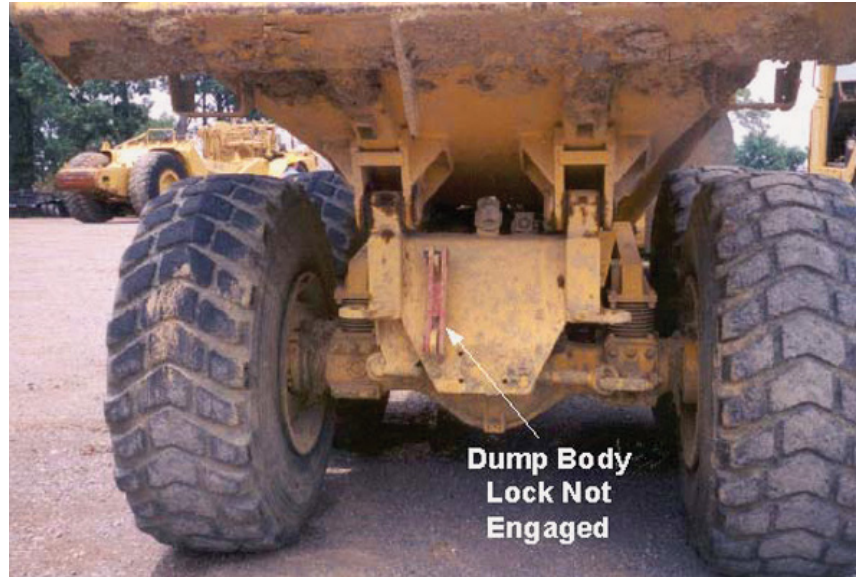
Energy control procedures must clearly outline the following steps for:

- Shutting down the equipment
- Isolating, blocking, and securing the equipment to control hazardous energy
- The placement, removal, and transfer of lockout/tagout devices and who is responsible for them
- The requirements for testing equipment to verify the effectiveness of lockout and tagout devices



Vehicles for highway and road operation characteristics and maintenance – Division 3, Subdivision O, 437-003-3225(8)

- Block or crib heavy equipment supported by slings, hoists, jacks; prevent the equipment from falling when employees work underneath it.
- During equipment repair or maintenance tasks set all controls to “neutral,” stop the motor, and set the brakes.
- During maintenance or inspection on vehicles with dump bins, use an attached, lockable support that prevents unintentional lowering of the bin.
- Disconnect the vehicle battery if the energized system could cause injury.



Dump-truck driver dies after being caught between frame and dump body of off-road truck while performing routine lubrication – Tennessee. *NIOSH In-house FACE Report 2002-08.*

*Oregon*OSHA Services

Oregon OSHA offers a wide variety of safety and health services to employers and employees:

Appeals

503-947-7426; 800-922-2689; admin.web@oregon.gov

- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

Conferences

503-378-3272; 888-292-5247, Option 1; oregon.conferences@oregon.gov

- Co-hosts conferences throughout Oregon that enable employees and employers to learn and share ideas with local and nationally recognized safety and health professionals.

Consultative Services

503-378-3272; 800-922-2689; consult.web@oregon.gov

- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

Enforcement

503-378-3272; 800-922-2689; enforce.web@oregon.gov

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.

Public Education

503-947-7443; 888-292-5247, Option 2; ed.web@oregon.gov

- Provides workshops and materials covering management of basic safety and health programs, safety committees, accident investigation, technical topics, and job safety analysis.

Standards and Technical Resources

503-378-3272; 800-922-2689; tech.web@oregon.gov

- Develops, interprets, and gives technical advice on Oregon OSHA's safety and health rules.
- Publishes safe-practices guides, pamphlets, and other materials for employers and employees
- Manages the Oregon OSHA Resource Center, which offers safety videos, books, periodicals, and research assistance for employers and employees.

Need more information?

**Call your nearest
Oregon OSHA office.**

Salem Central Office

350 Winter St. NE, Room 430
Salem, OR 97301-3882

Phone: 503-378-3272

Toll-free: 800-922-2689

Fax: 503-947-7461

en Español: 800-843-8086

Website: www.orosha.org

Bend

Red Oaks Square
1230 NE Third St., Suite A-115
Bend, OR 97701-4374
541-388-6066

Consultation: 541-388-6068

Eugene

1140 Willagillespie, Suite 42
Eugene, OR 97401-2101
541-686-7562

Consultation: 541-686-7913

Medford

1840 Barnett Road, Suite D
Medford, OR 97504-8250
541-776-6030

Consultation: 541-776-6016

Pendleton

200 SE Hailey Ave.
Pendleton, OR 97801-3056
541-276-9175

Consultation: 541-276-2353

Portland

16760 SW Upper Boones Ferry Road
Durham, OR 97224-7696
503-229-5910

Consultation: 503-229-6193

Salem

1340 Tandem Ave. NE, Suite 160
Salem, OR 97301
503-378-3274

Consultation: 503-373-7819



A Division of the
Department of Consumer
and Business Services

440-4878 (R-1/17)

OR-OSHA

HAZARD REVIEW WORKSHEET

~Please Use Additional Sheets to Answer, As Necessary~

Response Required?

Topic

☒ YES ☐ NO**ACCIDENTS & SAFETY EMERGENCIES**

- What is your plan for preventing damage, injury or loss in emergencies affecting the safety or protection of persons or the work or property at the site or adjacent areas?
- What is your plan for reporting all accidents involving lost work time or damaged CWS property to the CWS engineer/project manager? (Must be notified on the same workday the incident occurred.)
- What is your plan for notifying the CWS of any serious accidents or emergencies that occur during business hours, nights, weekends, and holidays?
- What is your plan for reporting to the CWS in writing if a claim is made by anyone against the contractor or any subcontractor on account of any accident?

Notes: _____

☐ YES ☒ NO**ASBESTOS****OAR 437-003-1926.1101, OAR 437-002-1910.1001**

- Are employees properly trained and who is/are the competent person(s)?
- Are you prepared to post "Danger-Asbestos. Cancer and Lung Hazard. Keep Out" signs and have you identified where they need to be?
- When will the safety conference take place? (Must include an CWS representative, the contractor, the employer, and employees.)

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic****X YES** ☐ NO**CONFINED SPACE ENTRY****OAR 437-002-0146**

- Is your confined space permit entry program at least as stringent as Oregon regulations and CWS procedures?
- What is your plan for notifying the CWS before entering a confined space?
- Do you have all necessary confined space entry and rescue equipment?
- Who will be permitted to enter confined spaces and use confined space equipment? Confirm that they are properly trained.
- How will you coordinate activities with the CWS, including emergency evacuation procedures, when working simultaneously in a permit space?
- Describe process for debriefing the CWS following entry operations to discuss hazards confronted or created during entry.

Notes: _____

☐ YES **X NO****CONSTRUCTION ZONE TRAFFIC CONTROL****OAR 437-003-0420**

- Does your traffic control system conform with the current MUTCD?
- Have you notified affected agencies (e.g., police, fire, ambulance, public works, bus and transit, etc) as needed?
- How and when will you inform occupants of abutting properties of access limitations made necessary by the work?
- Describe the installation & maintenance plan for the traffic control devices?
- Confirm that flaggers have been trained.
- Describe safeguards that will be used to protect workers and the general public (e.g., cones, flashing beacons, opening covers, etc.)
- Describe workers' visibility garments.
- Who will inspect the work site regularly to verify operation of safety devices?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic****X YES** ☐ NO**CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)****OAR 437, Division 2/J, 1910.147, 437-002-0154**

- What is your plan for contacting the CWS about any work involving systems shutdown or startup?
- Describe the LOTO process that will be used, including:
- Identifying hazardous energy exposures
- De-energizing & re-energizing equipment
- Locking out, blocking and tagging energy sources
- Keying (only individual worker keying permitted)
- Re-energizing equipment

Notes: _____☐ YES **X NO****CRANE OPERATIONS****OAR 437, Division 3, Construction – Subdivision CC**

- Do operators have the necessary certification, training and experience for cranes to be used?
- Have cranes and hoisting equipment been inspected and defects corrected?
- What is your planned inspection plan/routine for your cranes?
- Is rigging equipment well-maintained and identified properly as to capacity?
- Where will it be stored?
- Has a qualified signal person been identified for when the point of operation is not in full/direct view of the crane operator?
- Are cranes equipped with an audible, operator-controlled warning device?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic**☐ YES ☒ NO**ELECTRICAL WORK****OAR Chapter 437, Division 2/S, 437-002-0042**

- Will electrical work meet Oregon regulations and the NEC? (required)
- How long will temporary installations be in place? (If one year or more, wiring and equipment shall be installed to conform to the Electrical Safety Orders for permanent installations.)
- What is your plan for implementing a Ground-Fault Circuit Protection program or an Assured Equipment Grounding Conductor program in accordance with Oregon regulations and the NEC?
- Describe your lockout/tagout program. Confirm that it is in accordance with Oregon OSHA regulations.

Notes: _____

☒ YES ☐ NO**EMERGENCY ACTION PLAN****OAR Chapter 437, Division 2/S, 437-002-0042**

- Describe your means of alerting employees to the need to evacuate in the event of an emergency requiring evacuation.
- Describe the means you will use to notify your employees to the need to evacuate.

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic**☐ YES ☒ NO**EXCAVATION & TRENCHING****OAR 437, Division 3/P**

- Will any excavation or trench that will be entered by workers be greater than 5 feet deep and is to be entered by workers? If so:
- Submit detailed plans of how workers will be protected from hazards. Have they been prepared and signed by a registered civil or structural
- engineer (required for excavations deeper than 20 feet).
- Identify (in writing) "Competent person(s)" and confirm that they will:
- Be on site at the beginning of each workday, frequently throughout the day and whenever a protective system is moved.
- Make daily excavation and protective system inspections.
- Is it possible that there will be any atmospheric hazard? What is your plan for atmospheric testing?
- Has any planned sloping or benching been designed by a registered civil engineer? (Required for excavations greater than 20 feet deep.)
- Confirm workers are trained in excavation safety and work site procedures.

Notes: _____☒ YES ☐ NO**WORKING AT ELEVATION (FALL FROM HEIGHT) HAZARDS****OAR 437, Division 2/D, 2/F, 2/I, 2/N**

- Will employees work where is the potential to fall more than four feet for general industry activities or six feet for construction activities?
- Identify (in writing) "Competent person(s)" and confirm that they will be on site during activities that involve fall hazards.
- Confirm workers are trained in fall protection safety, their fall protection equipment and work site procedures.
- Do any fall protection systems require a qualified person?
- Have appropriate fall protection equipment inspections been completed?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required?****Topic**X YES ☐ NO**FIRE PREVENTION & PROTECTION****OAR 437, Division 2/L, 3/F**

- Describe how you will control fire hazards such as accumulation of combustibles, storage of flammables, hot work activities outside designated hot work areas, etc.
- What fire suppression and fire control equipment will you have on site?

Notes: _____X YES ☐ NO**FIRST AID****OAR 437, Division 2/K, 3/C, 1926.23**

- Describe your plans for addressing first aid and emergency medical situations
- Will there be at least one CPR/First Aid trained employee on site whenever work is underway?

Notes: _____X YES ☐ NO**HAZARD COMMUNICATION****OAR 437 Division 2/Z, 3/D, 4/Z**

- Will you have SDS's (MSDS) on site for any chemicals you bring on site?
- How can CWS obtain the SDS for any chemical you bring on site?

Notes: _____X YES ☐ NO**HAZARDOUS, FLAMMABLE, & TOXIC MATERIALS****OAR 437 Division 2/Z, 3/Z**

- Are you knowledgeable about, and in compliance with, all Federal, State, and Local hazardous materials laws, regulations, and ordinances?
- Have you submitted a request for permission to bring hazardous substances on site? (Required if substances, if released, may significantly impact site employees, contractor employees, general public, or the environment.)
- What is your plan for promptly removing or properly disposing of hazardous waste once expired, no longer needed, or when the project is completed?
- Have you planned to limit the amount of hazardous materials needed to perform the job?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic****X YES** ☐ NO**HEAT ILLNESS HAZARDS****OAR 437-003-0015, OAR 437-001-0760(6), 1910.141(b)(1), 1926.51**

- Describe your Heat Illness Prevention Plan including provisions for adequate water and shade for employees.
- Have employees and supervisors been adequately trained?

Notes: _____

X YES ☐ NO**HOT WORK PERMITS**

- Describe your hot work permitting process. (Note: A completed copy of the hot work permit must be posted in the immediate work area.)
- Have employees been properly trained?
- Have firewatchers been:
- Identified?
- Trained, including training on how to sound an alarm
- Equipped with appropriate fire suppression equipment

Note: Firewatchers must be stationed at the hot work area for at least 1/2 hour after the hot work activities are completed.

Notes: _____

X YES ☐ NO**HOUSEKEEPING/SANITATION****OAR 437 Division 3/C, 3/J, 1926.25, 1910.141**

- Describe how you will manage housekeeping issues during the project.
- Who would the CWS contact to have a housekeeping issue addressed?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic**☐ YES ☒ NO**INDUSTRIAL TRUCK (FORKLIFT) HAZARDS****OAR 437, Division 2/N, 3/O, 4/N, 437-002-0227, 437-004-1700, 1910.178, 1926.602(c)**

- Are operators current on their required training and certification?
- Are you providing your own forklift?
- Does it meet the design and construction regulations?
- Is the rated lifting capacity posted and readily visible to the operator?

Notes: _____☒ YES ☐ NO**LADDERS****OAR 437, Division 2/D, 1910.23, 437-002-0026**

- Have employees been trained in safe ladder use?
- Have ladders been inspected frequently and free of damage and defects?
- Where will ladders be stored?
- Describe ladders to be used and confirm that they are appropriate to the work being performed.

Notes: _____☐ YES ☒ NO**LEAD EXPOSURES****OAR 437, Division 3/D, 1926.62**

- Do all your procedures adhere to Oregon regulations?
- What is the plan for monitoring employee exposure and air monitoring data?
- What is your plan for dust containment for work activities that create significant levels of lead dust, nuisance dust, paint overspray, or any other environmental contamination that may adversely affect CWS employees and/or the public at large?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic****X YES** ☐ NO**PERSONAL PROTECTIVE EQUIPMENT****OAR 437, Division 2/I, 3/E, 4/I**

- Remind contractor that they are responsible for all personal protective equipment and that they are not allowed to use any CWS personal protective equipment (i.e. gas meters, respirators, fall protection gear, etc).

Notes: _____**X YES** ☐ NO**RESPIRATORY PROTECTION PLAN****OAR 437, Division 2/I, 1910.134**

- Does your Plan cover training, respirator selection, medical evaluation, fit tests, use, cleaning, sanitizing, inspection, & maintenance?
- Have you evaluated respiratory protection needs lead/ asbestos exposures?

Notes: _____**X YES** ☐ NO**SCAFFOLDING****OAR 437, Division 3/L**

- Does scaffold design conform to design standards, or has it been designed by a licensed engineer?
- Who is the Qualified Person that supervises scaffold erection & dismantling?
- Where will scaffolds be located?

Notes: _____☐ YES **X NO****SIGNS & BARRICADES****OAR 437, Division 3/G**

- Describe the signage and barricades that will be necessary for this project.
- What is your plan for coordinating with the CWS and other agencies if aisles or roadways are to be blocked?
- Will flashing beacon lights be used in conjunction with barricades at night or in very dark work areas?

Notes: _____

HAZARD REVIEW WORKSHEET
~Please Use Additional Sheets to Answer, As Necessary~

Response Required? **Topic**

☒ **YES** ☐ **NO**

WASTE DISPOSAL

- Describe the plan to remove & dispose of debris, trash, & excavation spoils.
- Describe your plan for removing hazardous materials, including hazardous wastes? (Hazardous materials/wastes must be removed by the contractor within 30 days after the completion of the project.)
- Describe the plan for storing and labeling hazardous wastes and ensuring that they are not stored longer than the allowable accumulation times?

Notes: _____

HAZARD REVIEW WORKSHEET*~Please Use Additional Sheets to Answer, As Necessary~***Response Required? Topic****X YES** ☐ NO**WELDING****OAR 437, Division 2/Q, 3/J, 4/Q****General Welding**

- Has all welding equipment been inspected?
- Is an ABC-10+ pound, dry chemical extinguisher in the immediate area?
- Where will welding, cutting or burning activities be performed?
- What is your plan for inspecting work areas and ensuring that they are free of, or protected from, combustible materials?
- Describe your Hot Work Permit program, including firewatchers as needed.
- What is your plan for installing non-combustible barriers when welding in or over an elevated work area where combustible materials are present below?
- Have employees been given and trained on the use of appropriate PPE?
- What is your plan for ensuring adequate ventilation, either natural or mechanical in work areas?
- If welding is to be performed in confined spaces or enclosed buildings, what types of welders will be used and what is your plan for air testing and for ensuring proper ventilation?

Gas Welding

- Describe the labeling and storing plan for compressed gas cylinders.
- Where will the flammable gas storage area be located?
- Describe your plan for separating oxygen and flammable gases(e.g. acetylene) when not in use?
- Where will warning signs such as "No open flames" be posted?
- How will cylinders be transported?
- Have pressure reducing regulators, reverse flow check valves and flashback arresters been installed on the oxygen and acetylene hoses?

Arc Welding

- Will all power circuits be installed and maintained in accordance with applicable provisions of the most current National Electrical Code (NEC)?

Notes: _____

SECTION 01330 SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Wherever submittals are required in the Contract Documents, submit them to the Engineer.
- B. All submittals shall include both electronic copies and a minimum of two hard copies unless additional copies are specified.
- C. Provide four hardcopies for all Division 11, 13, and 16 submittals.
- D. Electronic copies shall be in Microsoft Word, Excel, or Adobe PDF format unless otherwise specified. Electronic copies shall be submitted through a Web Based Construction Management System (ProCore or other as identified). The Owner will provide access rights for the collaboration web site to Contractor personnel as necessary. The Contractor will be required to utilize the collaboration website, including providing and utilizing necessary computers, internet services, phone services, and other office, scheduling, and communication software programs.
- E. Definitions:
 - 1. **Action Submittal:** Written and graphic information submitted by the Contractor that requires the Engineer's approval. (In general, all submittals are to be considered Action Submittals unless specifically indicated as informational or deferred submittals in the Contract Documents.)
 - 2. **Informational Submittals:** Information submitted by the Contractor that does not require the Engineer's approval.
 - 3. **Deferred Submittal:** Information required for the review of Contractor-designed systems that will be submitted to the local authority having jurisdiction for permitting.

1.02 PRECONSTRUCTION CONFERENCE SUBMITTALS

- A. At the preconstruction conference of Section 01110, Summary of Work, the Contractor shall submit the following items to the Engineer for review:
 - 1. A preliminary list of Shop Drawings, Samples, and proposed Substitutes.
 - 2. A preliminary schedule for submission of priority and major Shop Drawings (particularly for long-lead time equipment) and Samples.

3. A list of permits and licenses the Contractor shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
4. A preliminary schedule of values in accordance with Section 01292, Schedule of Values.
5. A 60 -Day Plan of Operation in accordance with Section 01324, Construction Schedule.
6. A Project Overview Gantt Chart in accordance with Section 01324, Construction Schedule.
7. Contractor's Project Specific Safety Plan and Hazard Assessment Worksheet in accordance with Section 01329.

1.03 SHOP DRAWINGS

- A. Wherever called for in the Contract Documents or where required by the Engineer, the Contractor shall furnish to the Engineer for review.
- B. Shop Drawings in Adobe PDF format shall be bookmarked.
- C. Shop Drawings may include detail design calculations, Shop-prepared Drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. If a list, graph, catalog sheet, data sheet, etc., includes more than one item, clearly mark which item is the subject of the submittal and the actual product to be furnished.
- D. Shop Drawings that require Contractor to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the State of Oregon.
- E. Shop Drawings in hard copy shall be accompanied by the Engineer's standard submittal transmittal form, a reproducible copy of which is available from the Engineer. A submittal without the form or where applicable items on the form are not completed will be returned for resubmittal.
- F. Shop Drawing Organization:
 1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components. Example: if a pump section references other sections for the motor, shop-applied protective coating, anchor bolts, local control panel, and variable frequency drive, a single submittal would be acceptable. A single submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.
 2. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph,

- Drawing number, detail number, schedule title, room number, or building name, as applicable.
3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.
- G. Format:
1. Minimum sheet size shall be 8.5 inches by 11 inches. Maximum sheet size shall be 22 inches by 34 inches. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated and stapled or bound, as appropriate. The Engineer will not collate sheets or copies.
 2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.
 3. Each submittal shall be assigned a unique number based on the most relevant specification section number. Submittals shall be numbered sequentially, and the submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number (e.g., 15200-1). If submittal “15200-1” requires a resubmittal, the first resubmittal will bear the designation “15200-1.1” and the second resubmittal will bear the designation “15200-1.2” and so on.
 4. If there is a followup submittal related to a previously submitted class of material or type of equipment (e.g., follow-up submittal to submittal “15200-1”), it shall be assigned the next sequential number “15200-2”. If submittal “15200-2” requires a resubmittal, the first resubmittal will bear the designation “15200-2.1” and the second resubmittal will bear the designation “15200-2.1” and so on.
- H. Shop Drawings that are unorganized, do not have a table of contents, do not clearly indicate what is submitted, and do not meet the requirements of the Contract Documents will be returned without review.
- I. Except as may otherwise be indicated in Sections, the Engineer will return submittal to the Contractor with comments noted thereon, within 21 days following receipt by the Engineer.
- J. It is considered reasonable that the Contractor will make a complete and acceptable submittal to the Engineer by the third resubmittal on an item. Per General Conditions 7.16 E Resubmittal Procedures additional costs for the Engineer’s review shall be the Contractors responsibility.
- K. If a submittal is returned to the Contractor marked “NO EXCEPTIONS TAKEN,” formal revision and resubmission will not be required.

- L. If a submittal is returned marked “MAKE CORRECTIONS NOTED,” Contractor shall make the corrections on the submittal, but formal revision and resubmission will not be required, but written acknowledgement that the corrections were made will be required and the final O&M manual will include both the written acknowledgment of the correction and the correction.
- M. If a submittal is returned marked “AMEND-RESUBMIT,” the Contractor shall revise it and shall resubmit the required number of copies to the Engineer for review. Resubmittal of portions of multi-page or multi-drawing submittals will not be allowed. For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as “AMEND RESUBMIT,” the submittal as a whole is deemed “AMEND RESUBMIT,” and 10 drawings are required to be resubmitted.
- N. If a submittal is returned marked “REJECTED-RESUBMIT,” it shall mean either that the proposed material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with the Contract Documents.
- O. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.
- P. Fabrication of an item may commence only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the Contract requirements.
- Q. Submittals shall be carefully reviewed by an authorized representative of the Contractor prior to submission to the Engineer. Each submittal shall be dated and signed by the Contractor as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated and signed. Any deviations from the Contract Documents shall be noted by the Contractor on the transmittal form and such deviation shall allowed if approved in writing by the Engineer and Owner. The Engineer will only review submittals that have been so verified by the Contractor. Nonverified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.
- R. Corrections or comments made on the Contractor’s Shop Drawings during review do not relieve the Contractor from compliance with Contract Documents. Review is for conformance to the design concept and general compliance with the Contract Documents only. The Contractor is responsible for confirming and correlating quantities and dimensions, fabrication

processes and techniques, coordinating Work with the trades, and satisfactory and safe performance of the Work.

1.04 SAMPLES

- A. The Contractor shall submit the number of samples indicated by the Specification Section. If the number is not indicated, submit not less than three samples. Where the amount of each sample is not indicated, submit such amount as necessary for proper examination and testing by the methods indicated.
- B. Samples shall be individually and indelibly labeled or tagged, indicating the salient physical characteristics and manufacturer's name. Upon acceptance by the Engineer, one set of the samples will be stamped and dated by the Engineer and returned to the Contractor, one set of samples will be retained by the Engineer, and one set shall remain at the Site in the Engineer's field office until completion of the Work.
- C. Unless indicated otherwise in Specification Section, the Engineer will select colors and textures from the manufacturer's standard colors and standard materials, products, or equipment lines. If certain samples represent nonstandard colors, materials, products, or equipment lines that will require an increase in Contract Times or Price, the Contractor shall clearly state so on the transmittal page of the submittal.
- D. The Contractor shall schedule sample submittals such that:
 - 1. Sample submittals for color and texture selection are complete so the Engineer has 45 days to assemble color panels and select color and texture dependent products and materials without delay to the construction schedule.
 - 2. After the Engineer selects colors and textures, the Contractor has sufficient time to provide the products or materials without delay to the construction schedule. The Contract Times will not be extended for the Contractor's failure to allow enough review and approval or selection time, failure to submit complete samples requiring color or texture selection, or failure to submit complete or approvable samples.

1.05 TECHNICAL OPERATION AND MAINTENANCE INFORMATION

- A. The Contractor shall submit technical operation and maintenance (O&M) information for each item of mechanical, electrical, and instrumentation equipment in an organized manner as specified in Section 01782, Operation and Maintenance Data, and in the Specifications Sections of the Contract Documents. O&M information, instructions and data shall be provided for each maintainable material and piece of equipment. It shall be written so that it can be used and understood by the Owner's operation and maintenance staff.

- B. O&M Submittal Schedule: Except where indicated otherwise, technical O&M information shall be submitted in initial draft form to the Engineer not later than 90 days prior to any startup, system testing or operator training.
1. Subsequent drafts shall be provided by the Contractor within 30 days from the date of Contractor's receipt of review comments from the Engineer.
 2. The approved Operation and Maintenance Manual must be available prior to any startup, system testing, or operator training.
 3. The Contractor's attention is drawn to Section 01770, Closeout Procedures, where the submission of the Operation and Maintenance Manual is related to payments.

1.06 RECORD DOCUMENTS

- A. The Contractor shall maintain one set of Drawings at the Site for the preparation of record drawings. On these, it shall mark every project condition, location, configuration, and any other change or deviation which may differ from the Contract Drawings
- B. Buried or concealed construction and utility features shall be surveyed and located with coordinates recording the horizontal and vertical location of buried utilities regardless if they that differ from the locations indicated, or that were not indicated on the Contract Drawings.
- C. Record drawings shall be supplemented by any detailed sketches and pictures as necessary to fully indicate the Work as actually constructed.
- D. These record drawings are the Contractor's representation of as-built conditions, and shall be maintained up-to-date during the progress of the Work.
- E. Using erasable colored pencils (not ink or indelible pencil), indicate in green when showing information deleted from the Drawings, red when showing information added to the Drawings, and blue and circled in blue to show notes.
- F. Notes shall identify relevant Change Orders by number and date. Preparation of record drawings shall conform to the following:
1. Date entries.
 2. Call attention to entry by "cloud" drawn around area or areas affected.
 3. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.

- b. Horizontal and vertical locations of existing new underground facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directives, Change Orders, Written Amendments, and Engineer's written interpretations and clarifications using consistent symbols for each and showing appropriate document tracking number.
 - 4. Dimensions of Schematic Layouts: Show record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
 - a. Clearly identify the item by accurate notation such as "cast iron drain," "galv. water," and the like.
 - b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like.
 - c. Make identification so descriptive that it may be related reliably to Specifications.
- G. The Contractor shall maintain one set of Specifications at the Site for the preparation of record specifications. On these shall be recorded every change or deviation during the course of the project resulting from Work Change Directives, Field Orders, Substitutions, Engineer's written interpretation, and other reason. Record specifications shall be marked with green, red and blue pencils in the same manner as record drawings, noting the document or other reason that caused the change.
- H. Prior to submitting each Application for Payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.
- I. In the case of those Drawings that depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawings shall be updated by indicating those portions which are superseded by Change Order Drawings or final Shop Drawings, and by including appropriate reference information describing the change orders by number and the Shop Drawings by manufacturer, Drawing, and revision numbers.

- J. Disorganized or incomplete record documents will not be accepted. The Contractor shall revise them and resubmit within 10 days.
- K. Current as-built markups of record documents shall be accessible to the Engineer during the construction period and shall be provided to the Owner prior to requesting final payment. Current markups of electrical and instrumentation drawings shall be accessible to Owner during startup and until final record drawings are available.
- L. The request for final payment will not be accepted until the record documents have been completed and delivered to the Engineer.
- M. Information submitted by the Contractor will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information.

1.07 QUALITY CONTROL (QC) SUBMITTALS

- A. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the Engineer that the Contractor has satisfied requirements of the Contract Documents.
- B. Unless otherwise indicated, QC submittals shall be submitted:
 - 1. Before delivery and unloading, for the following types of submittals:
 - a. Manufacturers' installation instructions.
 - b. Manufacturers' and Installers' experience qualifications.
 - c. Ready mix concrete delivery tickets.
 - d. Design calculations.
 - e. Affidavits and manufacturers' certification of compliance with indicated product requirements.
 - f. Laboratory analysis results.
 - g. Factory test reports.
 - 2. For the following types of submittals, the manufacturer's field representative shall submit a draft certification prior to leaving the Project site and a final certification within 7 days of the event documented:
 - a. Manufacturers' field representative certification of proper installation.
 - 3. Within 30 days of the event documented for the following types of submittals:
 - a. Field measurement.
 - b. Field test reports.
 - c. Receipt of permit.
 - d. Receipt of regulatory approval.
 - 4. Submittal and testing requirements as specified in Section 13400, Instrumentation and Control for Process Systems.

- C. The Engineer will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures above for Shop Drawings and samples will not apply.

1.08 INFORMATIONAL SUBMITTALS

- A. Informational submittals formalize the flow of information between the Contractor and the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01352
ALTERATION PROJECT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Requirements and procedures for performing alterations to existing facilities.

1.02 SUBMITTALS

- A. Alterations Schedule: Submit in accordance with requirements for Progress Schedules.

1.03 SEQUENCE AND SCHEDULES

- A. Perform Work in sequences and within times specified in Section 01140, Work Restrictions.
- B. Submit separate detailed sub-schedule for alterations, coordinated with construction schedules. Indicate:
 - 1. Each stage of Work and dates of occupancy of areas.
 - 2. Date of Substantial Completion for each area of alterations as appropriate.
 - 3. Trades and Subcontractors employed in each stage.

1.04 WORK INVOLVED WITH EXISTING OPERATING FACILITIES

- A. Perform the Work while existing facility is in operation.
- B. Do not jeopardize operation or materially reduce efficiency of existing facility.
- C. Coordinate the Work with operation of the facility.
 - 1. Do not begin alterations of designated portions of the Work until specific permission has been granted in writing by Owner in each case.
 - 2. Engineer and Owner's Construction Coordinator will coordinate the planned procedure with Owner's operations and maintenance staff.
 - 3. Complete as quickly as possible and with as little delay as possible, connections to existing equipment and utilities, and other operations that interfere with the operation of existing facility.
- D. Operational functions of the facility that are required to be performed to facilitate the Work will be performed by facility personnel only.

- E. Owner staff will cooperate in every way practicable to assist in expediting the Work.
- F. When necessary for the proper operation or maintenance of portions of the facility, reschedule Work operations so that the Work will not conflict with necessary operations or maintenance of the facility.

1.05 ALTERATIONS, CUTTING, AND PROTECTION

- A. Assign relocation, removal, cutting, and patching to trades qualified to perform in manner which causes least damage and provide means of returning surfaces to appearance of new construction.
- B. Provide weather protection, waterproofing, heat and humidity control as needed to prevent damage to remaining existing and new construction.
- C. Provide temporary enclosures as specified in Section 01500, Temporary Facilities and Controls, to separate construction areas from existing building and from areas occupied by Owner, and to provide weather protection.

1.06 SALVAGE SCHEDULE

- A. Salvage Schedule:
 - 1. No equipment is intended to be salvaged for Owner.

1.07 PREPARATION

- A. Identify existing materials that shall be patched, extended, or matched.
- B. In addition to demolition specified and Construction specifically indicated on the Drawings, cut, move or remove items as necessary to provide access or to allow alteration and new construction to proceed, including:
 - 1. Repair or removal of hazardous or unsanitary conditions.
 - 2. Removal of abandoned items and items serving no useful purpose, such as abandoned piping, conduit and wiring.
 - 3. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals, and deteriorated concrete.
 - 4. Cleaning of surfaces and removal of surface finishes needed to install new construction and finishes.
 - 5. Disposal of items removed and not salvaged.
- C. Cut and remove minimum amount of existing construction in manner which avoids damage to adjacent work.

- D. Cut finish surfaces such as masonry, tile, plaster, and metals by methods which terminate surfaces in straight line at natural points of division.
- E. Perform cutting and patching as specified in Section 01732, Cutting and Patching.

1.08 TRANSITION FROM EXISTING TO NEW WORK

- A. When new construction abuts or finishes flush with existing construction, make smooth transitions and match architecture of existing construction.
- B. Where partitions are removed, patch floors, walls, and ceilings with finish materials which match existing materials.
- C. Where removal of partitions results in adjacent spaces becoming one, rework floors, walls, and ceilings to provide smooth planes without breaks, steps, or bulkheads.
- D. Where changes of plane exceed 2 inches, request instructions for making transition.
- E. Trim and refinish existing doors as necessary to clear new floors.
- F. Match patched construction with adjacent construction in texture and appearance so that patch or transition is invisible at 5-foot distance.
- G. When finished surfaces are cut so that smooth transition is impossible, terminate existing surface in neat manner along straight line at natural line of division and provide appropriate trim.

1.09 DAMAGED SURFACES

- A. Patch and replace portions of existing finished surfaces which are damaged, lifted and discolored with matching material.
- B. Provide adequate support of substrate prior to patching finishes.
- C. Refinish patched portion of painted or coated surfaces in manner which produces uniform color and texture to entire surface.
- D. When existing surface finish cannot be matched, refinish entire surface to nearest change of plane exceeding 45 degrees.

1.10 CLEANING

- A. Perform periodic and final cleaning as specified in Section 01500, Temporary Facilities and Controls, and Section 01770, Closeout Procedures.

- B. Clean Owner-occupied areas daily.
- C. Clean spillage, overspray and heavy collection of dust in Owner-occupied areas immediately.
- D. At completion of each portion of Work, clean area and make surfaces ready for successive portions of Work.
- E. At completion of alterations in each area, provide final cleaning and return space to condition suitable for use by Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01410
PERMITS AND REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. While not intended to be inclusive of all Permits or Regulations for which Contractor may be responsible the following Permits are listed for the convenience of Contractor:
1. Washington County Land Use Permit
 - a. Casefile 15-026-MOD to original Casefile13-385-D (INS)
 - b. Land Use District: INS (Institutional District)
 - c. Assessor Map#: 1S2 09
 - d. Lot#: 1400
 - e. Site Size: 66.80 acres
 - f. Address: 3235 SW River Road
 2. Washington County Grading Permit
 - a. Grading Permit #
 3. Washington County Demolition Permit
 - a. Demolition Permit #
 4. Washington County Building Services
 - a. Project #
 - 1) Building Permit #
 - 2) Building Permit #
 - 3) Building Permit #
 5. Washington County Mechanical Permit
 - a. Project #
 - 1) Mechanical Permit #
 - 2) Mechanical Permit #
 - 3) Mechanical Permit #
 6. Washington County Electrical Permit
 - a. Project #
 - 1) Electrical Permit #
 - 2) Electrical Permit #
 - 3) Electrical Permit #
 7. Washington County Plumbing Permit
 - a. Project #
 - 1) Plumbing Permit #
 - 2) Plumbing Permit #
 - 3) Plumbing Permit #
 8. Oregon Environmental Quality NPDES 1200 C Erosion Control Permit, Erosion and Sediment Control Permit #
 - 9.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The Contractor shall construct the Work in accordance with the Contract Documents and the referenced portions of those referenced codes, standards, and specifications.
- B. References herein to “Building Code” or “Uniform Building Code” shall mean the International Building Code including State of Oregon Amendments. The latest edition of the code as adopted shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.
- C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.
- D. References herein to “OSHA Regulations for Construction” shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- E. References herein to “OSHA Standards” shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- F. Applicable Standard Specifications: References in the Contract Documents to “Standard Specifications” or SSPWC shall mean the Standard Specifications for Public Works Construction, 1997 Edition.

1.03 PERMITS

- A. The Contractor shall keep fully informed of all local ordinances, as well as state and federal laws, which in any manner affect the Work. At all times the Contractor shall comply with said ordinances, laws, and regulations, and protect and indemnify the Owner and its officers and agents against any claim or liability arising from or based on the violation of such laws, ordinances, or regulations.
- B. The Contractor shall abide by the conditions of all permits and shall obtain proof of satisfaction of conditions from issuers of permits prior to acceptance of the Work by the Owner.
- C. The Contractor shall comply with all conditions attached to applicable local, state and federal permits.

- D. The Contractor is responsible for installation, maintenance, and discharge of all water from dewatering operations in accordance with all regulatory requirements.
- E. The Owner has applied for, and has paid, or will pay for the following permits with the Washington County Building Services. The Contractor is responsible for obtaining the permits following completion of the Contractor's details within the appropriate sections of the permits. The Contractor shall abide by all regulations and conditions of the permits and shall obtain indications of acceptable satisfaction of conditions prior to acceptance of the Work by the Owner. Such regulations, conditions and requirements are made a part of these Specifications as fully and completely as though the same were fully set forth herein.
- F. Contractor shall be responsible for acquiring and paying for any additional permits including a Right-of-Way (ROW) street closure permits.
- G. Permits and Easements Obtained After Bid Submittal: If, after the Bid submittal date, the Owner obtains any permits or easements which require changes to the Work hereunder and thereby cause an increase or decrease in the cost of, or the time required for, the performance of the Work under this Contract, the Contractor shall submit information sufficient for the Owner's Representative to determine the extent of the effects on the cost and/or schedule. If the Owner's Representative agrees the cost and/or schedule will be affected by such changes, such effects will be handled in accordance with the General Conditions. The Owner's Representative will provide the Contractor with a copy of any such permits or easements. Comply with all applicable terms and conditions contained in such permits or easements.
- H. Posting Permits and Easements: Post permits and easements, as required, at the site of the Work.

1.04 REGULATIONS RELATED TO HAZARDOUS MATERIALS

- A. The Contractor shall be responsible that all Work included in the Contract Documents, regardless if shown or not, shall comply with all DEQ, EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products. Also see Section 01560, Temporary Environmental Controls.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01424 ABBREVIATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Abbreviations and meanings.

1.02 INTERPRETATIONS

- A. Interpret abbreviations by context in which abbreviations are used.
- B. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.03 ABBREVIATIONS

- A. Abbreviations used to identify Reference Standards:

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Air Balance Council
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ADC	Air Diffusion Council
ABMA	American Bearing Manufacturers' Association (formerly AFBMA, Anti-Friction Bearing Manufacturers' Association)
AFBMA	Ant-Friction Bearing Manufacturer's Association, Inc.
AFPA	American Forest Products Association
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturers' Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association

AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air Conditioning and Refrigeration Institute
ASAH	American Society of Architectural Hardware Consultants
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	ASTM International (Former name American Society for Testing and Materials. Still used in specifications.)
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWSC	American Welding Society Code
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BSI	Building Stone Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPSC	U.S. Consumer Product Safety Commission
CRA	California Redwood Association
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards
CSI	Construction Specifications Institute
CTI	Ceramic Tile Institute
DHI	Door and Hardware Institute
EIFS	Exterior Insulation and Finish System
EJCDC	Engineers Joint Contract Documents Committee
FGMA	Flat Glass Marketing Association
FIA	Factory Insurance Association
FM	Factory Mutual
FS	Federal Specifications
FTI	Facing Tile Institute

GA	Gypsum Association
IAPMO	International Association of Plumbing and Mechanical Officials
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
MAG	Maricopa Association of Governments
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
NAAMM	National Association of Architectural Metal Manufacturers
NAPA	National Asphalt Pavement Association
NBHA	National Builders Hardware Association
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NETA	International Electrical Testing Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIST	National Institute of Standards and Technology
NMWIA	National Mineral Wood Insulation Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturer's Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDCA	Paint and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard
RTI	Resilient Tile Institute
SAE	Society of Automotive Engineers
SCPA	Structural Clay Products Association
SDI	Steel Door Institute

SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Society for Protective Coatings-Steel Structures Painting Council
TCA	Tile Council of America
UBC	Uniform Building Code (ICBO)
UL	Underwriters Laboratories, Inc.
UNS	Unified Numbering System
USDA	United States Department of Agriculture
VA	Vermiculite Association
WCLA	West Coast Lumberman's Association
WCLIB	West Coast Lumber Inspection Bureau
WPA	Western Pine Association
WPOA	Western Plumbing Officials Association
WRC	Welding Research Council
WSCPA	Western States Clay Products Association
WWPA	Western Wood Products Association

B. Abbreviations used in Specifications:

a	year or years (metric unit)
A	ampere or amperes
am	ante meridian (before noon)
ac	alternating current
ac-ft	acre-foot or acre-feet
atm	atmosphere
AWG	American Wire Gauge
bbl	barrel or barrels
bd	board
bhp	brake horsepower
bil gal	billion gallons
BOD	biochemical oxygen demand
Btu	British thermal unit or units
Btuh	British thermal units per hour
bu	bushel or bushels
C	degrees Celsius
cal	calorie or calories
cap	capita
cd	candela or candelas

cfm	cubic feet per minute
Ci	curie or curies
cm	centimeter or centimeters
cmu	concrete masonry unit
CO	carbon monoxide
Co.	Company
CO ₂	carbon dioxide
COD	chemical oxygen demand
Corp.	Corporation
counts/min	counts per minute
cu	cubic
cu cm	cubic centimeter or centimeters
cu ft	cubic foot or feet
cu ft/day	cubic feet per day
cu ft/hr	cubic feet per hour
cu ft/min	cubic feet per minute
cu ft/sec	cubic feet per second
cu in	cubic inch or inches
cu m	cubic meter or meters
cu yd	cubic yard or yards
d	day (metric units)
day	day (English units)
db	decibels
DB	dry bulb (temperature)
dc	direct current
diam	diameter
DO	dissolved oxygen
DS	dissolved solids
emf	electromotive force
fpm	feet per minute
F	degrees Fahrenheit
ft	feet or foot
fc	foot-candle or foot candles
ft/day	feet per day
ft/hr	feet per hour
ft/min	feet per minute
ft/sec	feet per second
g	gram or grams
G	gravitational force
gal	gallon or gallons
gal/day	gallons per day
gal/min	gallons per minutes
gal/sec	gallons per second

gfd	gallons per square foot per day
g/L	grams per liter
gpd	gallons per day
gpd/ac	gallons per day per acre
gpd/cap	gallons per day per capita
gpd/sq ft	gallons per day per square foot
gph	gallons per hour
gpm	gallons per minute
gps	gallons per second
h	hour or hours (metric units)
ha	hectare or hectares
hp	high point
hp	horsepower
hp-hr	horsepower-hour or horsepower-hours
hr	hour or hours (English units)
Hz	hertz
ID	inside diameter
ihp	indicated horsepower
Inc.	Incorporated
inch	inch
inches	inches
inches/sec	inches per second
J	joule or joules
JTU	Jackson turbidity unit or units
k	kips
K	kelvin
K	thermal conductivity
kcal	kilocalorie or kilocalories
kcmil	thousand circular mils
kg	kilogram or kilograms
km	kilometer or kilometers
kN	kilonewton or kilonewtons
kPa	kilopascal or kilopascals
ksi	kips per square inch
kV	kilovolt or kilovolts
kVA	kilovolt-ampere or kilovolt-amperes
kW	kilowatt or kilowatts
kWh	kilowatt hour
L	liter or liters
lb/1000 cu ft	pounds per thousand cubic foot
lb/acre-ft	pounds per acre-foot
lb/ac	pounds per acre

lb/cu ft	pounds per cubic foot
lb/day/cu ft	pounds per day per cubic foot
lb/day/acre	pounds per day per acre
lb/sq ft	pounds per square foot
lin	linear, lineal
lin ft	linear foot or feet
lm	lumen or lumens
log	logarithm (common)
ln	logarithm (natural)
lx	lux
m	meter or meters
M	molar (concentration)
mA	milliampere or milliamperes
max	maximum
mCi	millicurie or millicuries
meq	milliequivalent
μF	microfarad or microfarads
MFBM	thousand feet board measure
mfr	manufacturer
mg	milligram or milligrams
mgd/ac	million gallons per day per acre
mgd	million gallons per day
mg/L	milligrams per liter
μg/L	micrograms per liter
μm	micrometer or micrometers
mile	mile
mil. gal	million gallons
miles	miles
min	minimum
min	minute or minutes
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter or millimeters
mol wt	molecular weight
mol	mole
Mpa	megapascal or megapascals
mph	miles per hour
MPN	most probable number
mR	milliroentgen or milliroentgens
Mrad	megarad or megarads
mV	millivolt or millivolts
MW	megawatt or megawatts
N	newton or newtons
N	normal (concentration)

No.	number
Nos	numbers
NRC	noise reduction coefficient
NTU or ntu	nephelometric turbidity unit
oc	on center
OD	outside diameter
ORP	oxidation-reduction potential
OT	ortho-tolidine
OTA	ortha-tolidine-arsenite
oz	ounce or ounces
oz/sq ft	ounces per square foot
Pa	pascal or pascals
pl	plate or property line
pm	post meridiem (afternoon)
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
pr	pair
psf/hr	pounds per square foot per hour
psf	pounds per square foot
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PVC	polyvinyl chloride
qt	quart or quarts
R	radius
R	roentgen or roentgens
rad	radiation absorbed dose
RH	relative humidity
rpm	revolutions per minute
rps	revolutions per second
s	second (metric units)
S	Siemens (mho)
SDI	sludge density index or silt density index
sec	second (English units)
SI	International System of Units
sp	static pressure
sp gr	specific gravity
sp ht	specific heat
sq	square
cm ² or sq cm	square centimeter or centimeters
sq ft	square feet or foot

sq inch	square inch
sq inches	square inches
km ² or sq km	square kilometer or kilometers
m ² or sq m	square meter or meters
mm ² or sq mm	square millimeter or millimeters
sq yd	square yard or yards
SS	suspended solids
STC	Sound Transmission Class
SVI	sludge volume index
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TLM	median tolerance limit
TOC	total organic carbon
TOD	total oxygen demand
TOW	top of weir
TS	total solids
TSS	total suspended solids
TVS	total volatile solids
U	U Factor/U Value
U	Coefficient of Heat Transfer
U	heat transfer coefficient
UNS	Uniform Numbering System
US	United States
V	volt or volts
VA	volt-ampere or volt-amperes
W	watt or watts
WB	wet bulb
wg	water gauge
wk	week or weeks
wt	weight
yd	yard or yards
yr	year or years (English unit)

C. Abbreviations used on Drawings: As listed on Drawings or in Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01450 QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Specific quality control requirements for the Work are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the Work beyond furnishing of manufactured products. The term “Quality Control” includes inspection, sampling and testing, and associated requirements.
- B. The requirements of this Section are in addition to those included as part of the Statement of Special Inspection Plan on the Drawings and Section 01455, Special Inspection, Observation, and Testing.

1.02 INSPECTION AT PLACE OF MANUFACTURE

- A. The presence of the Engineer at the place of manufacture, however, shall not relieve the Contractor of the responsibility for providing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer.
- B. The Engineer and Owner, their assistants, inspectors, consultants and other employees of the Owner, shall at all times and for any purpose have access to the Work and the premises used by the Contractor, Subcontractors and Suppliers, and the Contractor, Subcontractors and Suppliers shall provide safe and proper facilities therefore. Furthermore, the Owner and the Engineer shall, at all times, have immediate access to all places of manufacture where machinery, equipment or materials are being manufactured, produced or fabricated for use under the Contract Documents, and shall have full facilities for determining that all such machinery, equipment or materials are being made strictly in accordance with the Contract Documents.
- C. Contractor shall notify the Engineer and Owner in writing of testing to occur at the place of manufacture no less than 30 days before the test commence.

1.03 SAMPLING AND TESTING

- A. Unless otherwise indicated, all sampling and testing will be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the Engineer will assure the

Owner that the quality of the workmanship is in full accord with the Contract Documents.

- B. Any waiver by the Owner of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the testing or other quality assurance requirements originally indicated, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the Engineer reserves the right to make independent investigations and tests, and failure of any portion of the Work to meet any of the requirements of the Contract Documents, shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such Work in accordance with the General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Inspection: The Contractor shall inspect materials or equipment upon the arrival on the Job Site and immediately prior to installation, and reject damaged and defective items.
- B. Measurements: The Contractor shall verify measurements and dimensions of the Work, as an integral step of starting each installation.
- C. Manufacturer's Instructions: Where installations include manufactured products, the Contractor shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

END OF SECTION

SECTION 01455
SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2024 International Building Code and is in addition to and supplements requirements included in Statement of Special Inspections (Plan) shown on Drawings.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:

1. American Society of Civil Engineers (ASCE): 7-16, Minimum Design Loads for Buildings and Other Structures.
2. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.03 DEFINITIONS

- A. Agencies and Personnel:

1. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
2. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the Project is to be constructed.
3. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of the building official for inspection of a particular type of construction or operation requiring Special Inspection.

- B. Special Inspection:

1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.

2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work is being performed.
3. Special Inspection, Periodic: Part-time or intermittent observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work has been or is being performed, and at the completion of the Work.

C. Structural Systems and Components:

1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of a diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to the plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.

D. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to the structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to the structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical Component Supports: Structural members or assemblies which transmit loads and forces from mechanical equipment to the structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

E. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections (Plan) provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Statement of Special Inspections (Plan): Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

1.04 SUBMITTALS

- A. Informational Submittals: Contractor's Statement of Responsibility: Form shall be completed by each contractor responsible for construction of a main seismic-force-resisting system. Refer to Article Supplement located at end of section.

1.05 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1707: See Drawings for basic lateral load resisting systems for each structure and other designated seismic systems.
2. Wind-force-resisting systems designated under IBC Section 1706 1705. None required.
3. Architectural, Mechanical, and Electrical Components subject to Special Inspection and testing under IBC Section 1707 for Seismic Resistance: None required.

- B. Statement of Special Inspections (Plan): As included in Drawings and in support of the building permit application, the Project specific plan was prepared by the registered design professional in responsible charge. The

following identifies elements of the inspection, observation, and testing program to be followed in construction of the Work:

1. Designated seismic systems and main seismic force resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.
 2. Special Inspection and testing required by IBC Section 1704 and Section 1708, and other applicable sections and referenced standards therein.
 3. Type and frequency of Special Inspection required.
 4. Type and frequency of testing required.
 5. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
 6. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
 7. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.
- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency. Owner will secure and pay for the services of the agency to perform Special Inspection and associated testing.
- D. Owner's plan for code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections (Plan) on Drawings and further provided in this section, is for the sole benefit of Owner and does not:
1. Relieve Contractor of responsibility for providing adequate quality control measures.
 2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
 3. Constitute or imply acceptance.
 4. Affect continuing rights of Owner after acceptance of completed Work.
- E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.
- F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor, and Special Inspectors and Professional Observer are on Site but not able to provide contracted services.

- G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required due to rejection of materials of in place Work that cannot be made compliant to Contract Document without additional Site visits or testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Provide access to Shop or Site for Special Inspection and Testing and Professional Observation.
- B. Notify Engineer in advance of required Special Inspection and Professional Observation no later than 48 hours prior to date of Special Inspection and Professional Observation.
- C. Materials and systems, inclusive, shall be inspected during placement where Continuous Special Inspection is required.
- D. Materials and systems shall be inspected during or at completion of their placement where Periodic Special Inspection is allowed.
 - 1. Periodic Special Inspection shall be performed so that Work inspected after, but not during, its placement can be corrected prior to other related Work proceeding and covering inspected Work.
 - 2. Periodic Special Inspection does not allow sampling of a portion of the Work. All Work shall be inspected.

3.02 SUPPLEMENT

- A. The supplement listed below, following “End of Section,” is a part of this Specification:
 - 1. Contractor’s Statement of Responsibility.

END OF SECTION

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

(Project)

(Name of Contracting Company)

(Business Address)

(_____) _____
(Telephone)

(_____) _____
(Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing and Professional Observation requirements contained in Contract Documents for this Project for seismic force-resisting systems as listed in Statement of Special Inspections (Plan) on Drawings, and that:

1. I, (We) are responsible for implementation of the Statement of Special Inspections (Plan) for the construction of the following systems:

Facility	Lateral Force-Resisting System
Complete per Drawing S2	

2. Control of this Work will be exercised to obtain conformance with the Contract Documents approved by the building official.
3. Procedures to be used for exercising control of the Work, the method and frequency of reporting, and distribution of reports required under the Statement of Special Inspections (Plan) for this Project are attached.
4. I, (We) will provide 48-hour notification to Engineer and approved agency as required for structural tests and Special Inspection for this Project.

5. The following person is hereby identified as exercising control over the requirements of this section for the Work designated above:

Name: _____

Qualifications: _____

(Print name and official title of person signing this form)

Signed by: _____

Date: _____

Project Name: _____

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project sign, field offices and sheds, and removal after construction.

1.02 GENERAL REQUIREMENTS

- A. Types: The types of utility services which may be required for general temporary use at the Site include the following:
 - 1. Water service (fire protection and potable for certain uses).
 - 2. Storm drain.
 - 3. Sanitary sewer.
 - 4. Electric power and lighting service.
 - 5. Internet service.
 - 6. Gas service.

1.03 JOB CONDITIONS

- A. Scheduled Uses: The Contractor shall, in conjunction with establishment of job progress schedule, establish a schedule for implementation and termination of service for each temporary utility at the earliest feasible time, and when acceptable to Owner and Engineer, change over from use of temporary utility service to permanent service.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The Contractor shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided by utility company, the Contractor shall provide the remaining portion with matching and compatible materials and equipment and shall comply with recommendations of utility company.

2.02 FIELD OFFICES AND SHEDS

A. Contractor's Field Office:

1. Maintain on Project site weathertight space in which to keep copies of Contract Documents, progress schedule, Shop Drawings, and other relevant documents.
2. Provide field office with adequate space to examine documents, and provide lighting and internet service in that space.

2.03 CONSTRUCTION AIDS

- A. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.
- B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities of ample size and capacity to adequately support and move loads.
- C. Design temporary supports with adequate safety factor to assure adequate load bearing capability.
1. When requested, submit design calculations by professional registered engineer prior to application of loads.
 2. Submitted design calculations are for information and record purposes only.
- D. Accident Prevention:
1. Exercise precautions throughout construction for protection of persons and property.
 2. Observe safety provisions of applicable laws and regulations.
 3. Guard machinery and equipment, and eliminate other hazards.
 4. Make reports required Contract Documents, authorities having jurisdiction, and permit safety inspections of the Work.
 5. Before commencing construction Work, take necessary action to comply with provisions for safety and accident prevention.
- E. Barricades:
1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations. Barriers shall be a minimum 4-foot tall, orange construction fence with green steel fence T-posts. Where steel T-posts cannot be installed, provide 42-inch tall portable delineator tubes with two rows of caution barricade tape strung between each delineator tube.

2. Provide barriers with flashing lights after dark.
 3. Keep barriers in place until excavations are entirely backfilled and compacted.
 4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.
- F. Warning Devices and Barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers.
1. Devices shall conform to minimum requirements of OSHA and state agency which administers OSHA regulations where Project is located.
- G. Hazards in Public Right-of-Way:
1. Mark at reasonable intervals, trenches and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours.
 - a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.
 2. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades.
 - a. During hours of darkness, provide warning lights at close intervals.
- H. Hazards in Protected Areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.
- I. Above Grade Protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.
- J. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.
- K. Fences:

1. Enclose site of the Work with fence adequate to protect the Work against acts of theft, violence and vandalism.
2. Enclose temporary offices and storage areas with fence adequate to protect temporary facilities against acts of theft, violence and vandalism.
3. When entire or part of site is to be permanently fenced, permanent fence may be built to serve for both permanent and temporary protection of the Work site, provided that damaged or defaced fencing is replaced prior to Substantial Completion.
4. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons. Bear responsibility for protection of plant and material on site of the work when openings in existing fences are not closed.
5. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
6. Fence temporary openings when openings are no longer necessary.

2.04 SECURITY

- A. Make adequate provision for protection of the Work area against fire, theft, and vandalism, and for protection of public against exposure to injury.

2.05 ACCESS ROADS

A. General:

1. Contractor may use existing plant roads. All roads must be kept in service and accessible by the Owner at all times.
2. Build and maintain dust free roads which are suitable for travel at 20 miles per hour.

B. Onsite Access Roads:

1. Protect buried vulnerable utilities under temporary roads with steel plates, wood planking, or bridges.
2. Maintain on-site access roads free of mud. Under no circumstances shall vehicles leaving the site track mud off the site onto the public right-of-way.

2.06 PROJECT CONSTRUCTION ENTRANCE SIGNS

- A. Provide and maintain one Construction Entrance signs consisting of painted 8-foot wide by 4-foot high exterior grade plywood and minimum 10-foot long 4 by 4 lumber posts, set in ground at least 3 feet, with exhibit lettering by professional sign painter using no more than 5-sign colors.
 1. Provide text as defined by the Engineer.

2. Erect sign where directed by Owner or Engineer.
- B. Provide minimum of one additional sign to direct delivery and forces as required. Erect Project identification sign where directed by Owner or Engineer.

PART 3 EXECUTION

3.01 INSTALLATION OF TEMPORARY UTILITY SERVICES

- A. General: Owner will provide Contractor temporary connection for the duration of the project. Contractor shall make and maintain temporary connection as required by the Owner.
- B. Approval of Electrical Connections: Temporary connections for electricity shall be subject to approval of the Engineer and the Owner and shall be removed in like manner at the Contractor's expense prior to final acceptance of the Work.
- C. Separation of Circuits: Unless otherwise permitted by the Engineer, circuits used for power purposes shall be separate from lighting circuits.
- D. Construction Wiring: Wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. Electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

3.02 INSTALLATION OF POWER DISTRIBUTION SYSTEM

- A. Power: The Contractor shall provide and maintain all temporary power lines required to perform the Work in a safe and satisfactory manner. The Contractor shall pay for all costs for installation and removal of the temporary power service.
- B. Temporary Power Distribution: Coordinate with Owner.

3.03 INSTALLATION OF LIGHTING

- A. Construction Lighting: Work conducted at night or under conditions of deficient daylight shall be suitably lighted to ensure proper Work and to afford adequate facilities for inspection and safe working conditions.
- B. Temporary Lighting: The Contractor shall provide a general, weatherproof, grounded temporary lighting system in every area of construction work, to provide sufficient illumination for safe work and traffic conditions. Run circuit wiring generally overhead, and rise vertically in locations where it will

be least exposed to possible damage from construction operations on grade, floors, decks, or other areas of possible damage or abuse.

3.04 WATER SUPPLY

- A. General: The Contractor shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes.
- B. The Contractor shall provide and operate all pumping facilities, pipelines, valves, hydrants, storage tanks, and all other equipment necessary for the adequate development and operation of the water supply system. Water used for domestic purposes shall be free of contamination and shall conform to the requirements of the State and local authorities for potable water. The Contractor shall be solely responsible for the adequate functioning of its water supply system and shall be solely liable for any claims arising from the use of same, including discharge or waste of water therefrom.
- C. Water Connections: The Contractor shall not make connection to or draw water from any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the affected water system. For each such connection made, the Contractor shall first attach to the fire hydrant or pipeline a valve and a meter, if required by the said authority, of a size and type acceptable to said authority and agency. The Contractor shall pay all permit and water charges.

3.05 INSTALLATION OF SANITARY FACILITIES

- A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of Contractor's employees. Toilets at construction job sites shall conform to the requirements of Subpart D, Section 1926.51 of the OSHA Standards for Construction. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the Site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto. The Contractor shall provide and pay for all costs associated with any temporary sanitary service.

3.06 INSTALLATION OF FIRE PROTECTION

- A. Fire Protection: The construction plant and all other parts of the Work shall be connected with the Contractor's temporary water supply system and shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, or other sufficient means shall be provided for fighting fires in the temporary structures and other portions of the Work, and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The

Contractor's fire protection program shall conform to the requirements of Subpart F of the OSHA Standards for Construction.

3.07 INSTALLATION OF GAS SERVICE

- A. Gas Service: If desired by Contractor for heating, the Contractor shall install gas service and distribution piping of size adequate for temporary heating of enclosed construction Work, construction offices, toilets, fabrication shops and similar temporary facilities requiring heat.

3.08 INSTALLATION OF COMMUNICATIONS

- A. Internet Services: The Contractor shall provide and maintain at all times during the progress of the Work at its own field construction office on the Site.

3.09 OPERATIONS AND TERMINATIONS

- A. Inspections: Prior to placing temporary utility services into use, the Contractor shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.
- B. Protection: The Contractor shall maintain distinct markers for underground lines, and protect from damage during excavating operations.
- C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the Contractor shall promptly remove installation unless requested by Engineer to retain it for a longer period. The Contractor shall complete and restore Work which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.
- D. Remove temporary buildings and furnishings before inspection for Final Completion or when directed.
- E. Clean and repair damage caused by installation or use of temporary facilities.
- F. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.
- G. Restore existing facilities used during construction to specified or original condition.

END OF SECTION

SECTION 01505 MOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

- A. Mobilization shall include the obtaining of all permits; moving onto the site of all plant and equipment; furnishing and erecting temporary buildings, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the Work.
- B. Mobilization shall include the following principal items:
 - 1. Moving on to the site of all Contractor's equipment required for first month operations.
 - 2. Installing temporary construction power, wiring, and lighting facilities.
 - 3. Developing construction water supply.
 - 4. Providing all onsite communication facilities.
 - 5. Arranging for and erection of Contractor's work and storage yard.
 - 6. Obtaining all required permits.
 - 7. Having all OSHA required notices and establishment of safety programs as identified in the Contractor's Project Specific Safety Plan in accordance with Section 01329, Safety Plan.
 - 8. Completion of the Clean Water Services Safety Orientation for Contractor and Subcontractor personnel per Section 01329, Safety Plan.
 - 9. Having the Contractor's superintendent at the job site full time.
 - 10. Submitting Preconstruction Conference Submittals in accordance with Section 01330, Submittal Procedures.

1.02 PAYMENT FOR MOBILIZATION

- A. The Contractor's attention is directed to the condition that 1 percent of the total Contract Price will be deducted from any money due the Contractor as progress payments until all mobilization items listed above have been completed as specified. The aforementioned amount will be retained by the Owner as the agreed, estimated value of completing all of the mobilization items listed. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the Contractor as specified in Article 15 of the General Conditions of the Contract.

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01530
PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.
- B. Verify locations of utilities and facilities which may exist by consulting with the Contract Documents, Owner, Oregon811 (<http://digsafelyoregon.com/>) and locating service available in area of Project.
- C.

1.02 RESTORATION OF PAVEMENT, CURBS, SIDEWALKS, AND MOWSTRIPS

- A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base, and pavement. Temporary and permanent pavement shall conform to the requirements of the affected pavement owner. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.
- B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.
- C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

- D. Restoration of Curbs, Sidewalks, Mowstrips or Private Driveways: Wherever curbs, sidewalks, mowstrips or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary curbs, sidewalks, mowstrips or private roads promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the Contractor shall maintain said temporary curbs, sidewalks, mowstrips or private roads until the final restoration thereof has been made.

1.03 EXISTING UTILITIES AND IMPROVEMENTS

- A. General: The Contractor shall protect underground utilities and other improvements which may be impaired during construction operations, regardless of whether or not the utilities are indicated on the Drawings. The Contractor shall take all reasonable precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.
- B. Except where the Drawings indicate utilities have been field located during design or certain utility locations shall be exposed as part of the Work, the Contractor shall perform exploratory excavations as it deems necessary to determine the exact locations and depths of utilities which may interfere with its work. All such exploratory excavations shall be performed as soon as practicable after Notice to Proceed and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's progress. When such exploratory excavations show the utility location as shown on the Drawings to be in error, the Contractor shall so notify the Engineer.
- C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.
- D. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
- E. Utilities to be Removed: Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility which is not indicated to be removed and/or relocated by the owner of the utility or other improvement which is indicated, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the

facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

- F. Owner's Right of Access: The right is reserved to the Owner and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.
- G. Underground Utilities Indicated: Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are exposed or constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor, unless otherwise repaired by the owner of the damaged utility. If the owner of the damaged facility performs its own repairs, the Contractor shall reimburse said owner for the costs of repair.
- H. Costs of locating and repairing damage not due to failure of the Contractor to exercise reasonable care, and removing or relocating such utilities not indicated or not indicated with reasonable accuracy in the Contract Documents, and for equipment on the Project which was actually working on that portion of the Work which was interrupted or idled by removal or relocation of such utilities, and which was necessarily idled during such work will be paid for as extra Work in accordance with the provisions of the Contract Documents.
- I. Approval of Repairs: All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.
- J. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.04 **LAWN AREAS**

- A. Lawn and landscaped areas damaged during construction shall be repaired to match the pre-construction condition to the satisfaction of the Owner.

1.05 **NOTIFICATION BY THE CONTRACTOR**

- A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 2 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01532
SITE CONDITIONS SURVEYS

PART 1 GENERAL

1.01 THE REQUIREMENTS

- A. The Contractor shall conduct thorough preconstruction and post-construction Site conditions surveys of the entire Project in the company of the Owner and Engineer. Site conditions surveys shall consist of the following:
 - 1. Photographs (.jpeg format)
 - 2. Video (.mp4 format)

1.02 CONTRACTOR SUBMITTALS

- A. Photographs, video, and other data of the preconstruction conditions shall be submitted to the Engineer for record purposes prior to, but not more than 3 weeks before, commencement of any construction activities.
- B. A complete set of all photographs and survey data of the post-construction conditions shall be completed and submitted prior to final completion.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PHOTOGRAPHS AND VIDEO RECORDINGS

- A. Contractor, as a minimum, shall document pre- and post-construction conditions by preparing videotape surveys of the following:
 - 1. Roadways used to access the Work or haul materials and equipment around the Site.
 - 2. Work areas, including actual work sites, materials processing and stockpiling areas, access corridors, and staging areas.
 - 3. Any work completed by other contractors at the Site that will be connected to or otherwise affected by the Work.
 - 4. Roads, curbs, driveways, sidewalks, and structures which might be affected by the Work.
- B. Photographs shall be digital .jpeg format.
- C. Video records shall be digital .mp4 format.

END OF SECTION

SECTION 01555
SITE ACCESS AND STORAGE

PART 1 GENERAL

1.01 HIGHWAY LIMITATIONS

- A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the Site of the Work. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations.

1.02 TEMPORARY CROSSINGS

- A. General: Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 300 feet shall be provided. The Contractor shall cooperate with parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.
- B. Temporary Bridges: Wherever necessary, to maintain vehicular crossings, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the Contractor shall secure the written consent of the responsible individuals or authorities to omit such temporary bridges or steel plates, which written consent shall be delivered to the Engineer prior to excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.
- C. Street Use: Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall conduct its operations to not interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the Engineer and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at

all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.

- D. Contractor shall maintain public access to the RV Dump Facility. See Section 01140, Work Restrictions.

1.03 CONTRACTOR'S WORK AND STORAGE AREAS

- A. The Owner will designate for the Contractor's use, portions of the Site for its exclusive use during the term of the Contract.
- B. Lands to be furnished by the Owner for storage, staging, construction operation, roads and other purposes are indicated. Should the Contractor find it necessary to use any additional land for its operations or for other purposes during the construction of the Work, it shall arrange for the use of such lands at its own expense and convenience.
- C. The Contractor shall construct and use a separate storage area for hazardous materials used in constructing the Work.
 - 1. For the purpose of this paragraph, hazardous materials to be stored in the separate area are all products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.
 - 2. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.
 - 3. The Contractor shall develop and submit to the Engineer a plan for storing and disposing of the materials above.
 - 4. The Contractor shall obtain and submit to the Engineer a single EPA number for wastes generated at the Site. Also comply with Article Hazardous Waste Disposal in Section 01560, Temporary Environmental Controls.
 - 5. The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials.
 - 6. All hazardous materials which are delivered in containers shall be stored in the original containers until use. Hazardous materials which are

delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

- D. The Contractor shall construct and use a separate areas or constructed areas to complete the Work. The Contractor shall keep and maintain construction trailers on-site until Final Completion of the Project.

1.04 PARKING

- A. The Contractor shall maintain traffic and parking areas in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The Contractor shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01560
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.01 DUST ABATEMENT

- A. The Contractor shall prevent its operation from producing dust in amounts causing a nuisance to persons living in or occupying buildings in the vicinity onsite.
- B. The Contractor shall provide its own source of water or other materials for dust abatement.
- C. The Contractor shall not use waste oil or other similar materials that may cause damage to the environment for dust abatement.
- D. The Contractor shall be responsible for any damage resulting from dust originating from its Work operations. This will include, but not limited to, the following:
 - 1. Manufacture's authorized representative cleaning of Electrical MCCs, Switchgear, and Control Panels.
 - 2. Manufacture's authorized representative cleaning VFD's, harmonic filters, and PLC control panels.
 - 3. Manufacture's authorized representative cleaning turbo blower equipment and replacement of inlet filters.
 - 4. Manufacture's authorized representative cleaning electrical motors
 - 5. Manufacture's authorized representative replacement of HVAC filters
- E. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

1.02 RUBBISH CONTROL

- A. During the progress of the Work, the Contractor shall keep the Site and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish.
- B. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Site, and shall establish and maintain weekly intervals of collection and disposal of such materials and waste.
- C. The District may request that the Contractor fully clean up the Site within a reasonable timeframe. If Contractor fails to clean up to the District's

satisfaction by the agreed upon completion date, the District may do so and the cost of such clean up shall be charge back to the Contractor.

- D. The Contractor shall also keep plant roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.
- E. Contractor shall not use Owner's dumpsters or other rubbish containers unless specifically authorized.

1.03 CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

1.04 HAZARDOUS WASTE DISPOSAL

- A. It is the goal of the Owner to maintain category "Conditionally Exempt, Small Quantity Generator" regarding generation of Hazardous Waste. The pounds of waste generated by Contractor during construction activities shall be charged against the Contractor's EPA ID number and not against the local site EPA ID number. This will require the Contractor to remove materials that meet Oregon's definition of Hazardous Waste from Owner's property as frequently as practical. Removal shall be done before consolidation, manifesting, or shipping of the waste, preferably by each workday's end. Recycling or proper disposal of such waste shall be the responsibility of the Contractor or its agent.

1.05 EXPLOSIVES AND BLASTING

- A. The use of explosives on the Work will not be permitted.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01570
EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 THE REQUIREMENTS

- A. The purpose of erosion and sediment control is to improve water quality by reducing pollutants in stormwater discharges and soil erosion from the construction site. The Erosion and Sediment Control Plan (ESCP) has been prepared to meet requirements of the Department of Environmental Quality 1200-C Permit and is detailed in the Contract Drawings.
- B. The Contractor shall provide erosion control barriers, complete and in place, in accordance with the Contract Documents, the 1200-C Permit requirements, and Chapter 6 of Clean Water Services' Design and Construction Standards (December 2019).
- C. The Contractor shall provide erosion protection including fertilizing, seeding, and mulching for all disturbed areas, including stockpiled berms in accordance with the Contract Documents.

1.02 CONTRACT DOCUMENT SUBMITTALS

- A. Contractor shall provide and identify an erosion control inspector and contact in an action plan to be submitted by the Owner.
- B. Upon award of Contract, Contractor shall assume all responsibilities for all sediment control and 1200-C Permit requirements.
- C. Submittals shall be in accordance with Section 01330, Submittal Procedures.

PART 2 PRODUCTS

2.01 GENERAL

- A. See Section 02370, Soil Stabilization.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01600
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

- A. The word “Products,” as used in the Contract Documents, is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for the Project or taken from Contractor’s stock of previously purchased products. The word “Materials” is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form Work. The word “Equipment” is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including “specialties,” “systems,” “structure,” “finishes,” “accessories,” “furnishings,” special construction,” and similar terms, which are self-explanatory and have recognized meanings in the construction industry.
- B. Neither “Products” nor “Materials” nor “Equipment” includes machinery and equipment used for preparation, fabrication, conveying, and erection of the Work.

1.02 ANCHORAGE AND BRACING

- A. The design of nonstructural products, materials, and equipment to be incorporated into the Work shall comply with the design and performance requirements specified in Section 01612, Anchorage and Bracing.

1.03 QUALITY ASSURANCE

- A. Source Limitations: To the greatest extent possible for each unit of Work, the Contractor shall provide products, materials, and equipment of a singular generic kind from a single source.
- B. Compatibility of Options: Where more than one choice is available as options for Contractor’s selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.04 PRODUCT DELIVERY AND STORAGE

- A. The Contractor shall deliver and store the Work in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and overcrowding of construction spaces. In particular, the Contractor shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

1.05 TRANSPORTATION AND HANDLING

- A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.
- B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.
- C. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.06 STORAGE AND PROTECTION

- A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.
- B. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.
- C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- D. Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure products are undamaged and are continuously maintained under required conditions.
- E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.07 MAINTENANCE OF PRODUCTS IN STORAGE

- A. Stored products shall be periodically inspected on a scheduled basis. The Contractor shall maintain a log of inspections and shall make the log available on request.
- B. The Contractor shall comply with manufacturer's product storage requirements and recommendations.
- C. The Contractor shall maintain manufacturer-required environmental conditions continuously. This may require energizing panel and motor heaters or periodic rotation of gear train or motors. Contractor shall comply with maintenance intervals and provide power and conductors as required.
- D. The Contractor shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.
- E. For mechanical and electrical equipment, the Contractor shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.
- F. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to final acceptance by the Owner in accordance with the Contract Documents.

1.08 PROPOSED SUBSTITUTIONS

- A. The procedure for review by the Engineer will be as set forth in the General Conditions and will include the following:
 - 1. If the Contractor wishes to provide a substitution item, the Contractor shall make written application to the Engineer on the "Substitution Request Form."
 - 2. Unless otherwise provided by law or authorized in writing by the Engineer, the "Substitution Request Form(s)" shall be submitted within a 35-day period after Notice to Proceed.
 - 3. Wherever a proposed substitution item has not been submitted within said 35-day period, or wherever the submission of a proposed substitution material or equipment has been judged to be unacceptable by the Engineer, the Contractor shall provide the material or equipment indicated in the Contract Documents.
 - 4. The Contractor shall certify by signing the form that the list of paragraphs on the form are correct for the proposed substitution.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01612 ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the ICC 2024 International Building Code (IBC) as amended by the 2025 Oregon Structural Specialty Code (OSSC), for seismic, wind, gravity, soil, and operational loads.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Institute of Steel Construction (AISC): 360, Specification for Structural Steel Buildings.
 - 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
 - 3. International Code Council (ICC): International Building Code (IBC).
 - 4. National Fire Protection Association (NFPA): 13, Standard for the Installation of Sprinkler Systems.
 - 5. State of Oregon: 2025 Oregon Structural Specialty Code (OSSC).

1.03 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.0.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General:
 - 1. Anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of Oregon.

2. Design anchorage into concrete including embedment in accordance with ACI 318-14, Chapter 17 (or other industry standard approved by Engineer), and Project Specifications.
3. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this Section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
4. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
5. Design seismic anchorage and bracing for modified existing architectural, mechanical, or electrical systems where code requirements would dictate design for similar new components.
6. Piping and ductwork, whether exempt or not exempt for this Section, shall be anchored and braced so that lateral or vertical displacement does not result in damage or failure to essential architectural, mechanical, or electrical equipment.
7. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
8. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
9. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
10. Design anchorage and bracing for:
 - a. Equipment and components that weigh more than 400 pounds and are mounted 4 feet or less above adjacent finished floor.
 - b. Equipment weighing more than 20 pounds that has a center of mass located more than 4 feet above adjacent finished floor.
 - c. Mechanical and electrical components that are not provided with flexible connections between components and associated ductwork, piping, or conduit.
 - d. Distribution systems that weigh more than 5 pounds per foot that are mounted more than 4 feet above adjacent finished floor.
11. Design seismic anchorage and bracing for Designated Seismic Systems regardless of weight or mounting height.
 - a. Component Important Factor:
 - 1) I_p equals 1.0, unless noted otherwise.
 - 2) I_p shall be taken as 1.5 if any of the following conditions apply:
 - a) Component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems and egress stairways.
 - b) Component contains hazardous materials.

- c) Component is in or attached to Risk Category IV structure and is needed for continued operation of facility or its failure could impair continued operation of facility.
- 12. For components exempted from design requirements of this Section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.

B. Design Loads:

- 1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
- 2. Wind: Design anchorage and bracing for wind criteria provided on General Structural Notes on Drawings for exposed architectural components and exterior and wind-exposed mechanical and electrical equipment. Alternately, manufacturer certification may be provided for components such as roofing and flashing to verify attachments meet Project-specific design criteria.
- 3. Operational:
 - a. For loading supplied by equipment manufacturer for IBC required load cases.
 - b. Loads may include equipment vibration, torque, thermal effects, effects of internal contents (weight and sloshing), water hammer, and other load-inducing conditions.
 - c. Locate braces to minimize vibration to or movement of structure.
 - d. For vibrating loads, use anchors meeting requirements of Section 05500, Metal Fabrications, for anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.
- 4. Hydraulic: Design of anchorage for submerged gates and other mechanical equipment shall include hydrostatic and hydrodynamic loads determined in accordance with Section 15.7 of ASCE 7-16.
- 5. Seismic:
 - a. In accordance with 2024 IBC, Section 1613, and Chapter 13 of ASCE 7.
 - b. Design anchorage and bracing for design criteria listed on General Structural Notes on Drawings.
 - c. Design seismic attachments, braces, and anchorages for parts or elements of architectural, mechanical, and electrical systems in accordance with provisions of IBC and following Site-specific seismic criteria, unless noted otherwise on Drawings:
 - 1) Site-Specific Spectral Response Coefficients:
 - a) Short Period Mapped Risk-Targeted Maximum Considered Earthquake Spectral Response Acceleration, 5 Percent Damped: S_s equals 0.962 g.

- b) 1 Second Period Mapped Risk-Targeted Maximum Considered Earthquake Spectral Response Acceleration, 5 Percent Damped: S_1 equals 0.420 g.
 - c) Short Period Design Spectral Response Acceleration, 5 Percent Damped: S_{DS} equals 0.715 g.
 - d) 1 Second Period Design Spectral Response Acceleration, 5 Percent Damped: S_{D1} equals 0.442 g.
- 2) Site Class: D.
- 3) Seismic Design Category (SDC): D, unless noted otherwise. Same as supporting structure's SDC, as shown on Drawings.
- 4) Risk Category: III, unless noted otherwise. Anchorage and bracing Risk Category shall be same as that for supporting structure as shown on Drawings.
- d. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2, or IBC Section 1905.1.9, as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

- 1. Nonstructural Components: Design as nonbuilding structures for components with weights greater than or equal to 25 percent of effective seismic weight of overall structure.
- 2. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component I_p equals 1.5.
- 3. The following are exempt from requirements for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment:
 - a. Furniture, except storage cabinets and bookshelves over 6 feet tall.
 - b. Temporary or movable equipment.
- 4. Fire protection sprinkler systems designed and constructed in accordance with NFPA 13 shall be considered to meet requirements of Chapter 13 of ASCE 7.
- 5. Support drawings and calculations for electrical distribution components shall be provided if any of the following conditions apply:
 - a. I_p is equal to 1.5 and conduit diameter is greater than 2.5-inch trade size.
 - b. I_p is equal to 1.5 and the total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
 - c. Supports are cantilevered up from floor.
 - d. Supports include bracing to limit deflection and are constructed as rigid welded frames.
 - e. Attachments utilize spot welds, plug welds, or minimum size welds as defined by AISC.

6. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph shall require same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
7. Other seismic design and detailing requirements identified in ASCE 7, Chapter 13 are required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.
 - b. Manufacturers' engineered seismic hardware product data.
 - c. Seismic attachment assemblies' drawings; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
 - d. List of existing architectural, mechanical, and electrical equipment or components to be modified in Project requiring Contractor-designed anchorage and bracing in final retrofitted condition.
 - e. Seismic attachment assemblies' drawings; include connection hardware, braces, and anchors or anchor bolts for modified, nonexempt existing components, equipment, and systems where combination of new and existing systems or components' final condition would require anchorage or bracing under this Specification for new equipment.
 - f. Submittal will be rejected if proposed anchorage method would create an overstressed condition of supporting member. Revise anchorages and strengthening of structural support so there is no overstressed condition.

B. Informational Submittals:

1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil or structural engineer registered in the State of Oregon.
2. Manufacturer's hardware installation requirements.

C. Deferred Submittals:

1. Submitted seismic anchorage drawings and calculations are identified as IBC deferred submittals and will be submitted to and accepted by AHJ prior to installation of component, equipment or distribution system.
2. Submit deferred action submittals such as shop drawings with supporting deferred informational submittals such as calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.

1.06 SOURCE QUALITY CONTROL

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections on Drawings and Section 01455, Special Inspection, Observation, and Testing.
- B. All other specified, regulatory required, or repair verification inspection and testing that are not listed in Statement of Special Inspections, are to be provided by Contractor and shall meet requirements of Section 01450, Quality Control.
- C. Source Quality Control shall be in accordance with Section 05500, Metal Fabrications.

PART 2 PRODUCTS

2.01 GENERAL

- A. Attachments and supports transferring seismic loads to structure shall be designed and constructed of materials and products suitable for application and be in accordance with design criteria shown on Drawings and nationally recognized standards.
- B. Provide anchor bolts and concrete and masonry anchors for anchorage of equipment to concrete or masonry in accordance with Section 05500, Metal Fabrications. Size of anchor bolts and anchors, required minimum embedment, and spacing shall be based on calculations submitted by Contractor.
- C. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for nonvibration isolated mechanical equipment rated over 10 horsepower.

PART 3 EXECUTION

3.01 GENERAL

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.
- B. Overall seismic anchorage system shall provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Components mounted on vibration isolation systems shall have snubbers in each horizontal direction and vertical restraints where required to resist overturning.
- D. Anchor piping in such a manner as to ensure piping system has adequate flexibility and expansion capabilities at flexible connections and expansion joints.
 - 1. Piping and ductwork suspended more than 12 inches below supporting structure shall be braced for seismic effects to avoid significant bending of hangers and their attachments, unless high-deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet.
- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

3.02 INSTALLATION

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01455, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY CONTROL

- A. In accordance with Section 05500, Metal Fabrications.

- B. Contractor responsibilities to accommodate Owner-furnished special inspections and testing are provided in Project's Statement of Special Inspections on Drawings and Section 01455, Special Inspection, Observation, and Testing.
- C. Any other specified, regulatory required, or repair verification inspection and testing that are not listed in Statement of Special Inspections, are to be provided by Contractor and shall meet requirements of Section 01450, Quality Control.

END OF SECTION

SECTION 03900 CONCRETE REPAIRS

PART 1 GENERAL

1.01 SUMMARY

- A. This specification describes the repair of concrete cracks, spalls, and other miscellaneous defects using a repair mortar and epoxy coating system.

1.02 DEFINITIONS

- A. Structural Defects: Concrete condition or characteristic that detracts from strength, life expectancy, or durability of concrete, or determined by the ENGINEER.
 - 1. Structural defects may occur in the following areas:
 - a. Areas exposed to highly corrosive environments
 - b. Areas subject to structural loading.
 - c. Areas subject to heavy wear.
 - d. Interior of clarifier structure.
 - e. Below grade structure.
 - f. Display defects or parts of defect that extend into concrete and deemed by ENGINEER as structural defect.

1.03 SUBMITTALS

- A. Product data sheets for each material supplied for vertical and overhead concrete repairs.
- B. Drawings or photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location in new concrete.
- C. Epoxy and/or Mortar Repair System:
 - 1. Manufacturer's preparation and installation instructions.
- D. Written description of equipment proposed for hydrodemolition for surface preparation.
- E. Certifications:
 - 1. Manufacturer's Certificate of Compliance that proposed repair product system meets or exceeds specified performance criteria when tested in accordance with Article Field Quality Control.
- F. Statements of Qualification:

1. Epoxy and/or Mortar system manufacturer's representative.

1.04 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American Concrete Institute (ACI):
 - a. 503R, Use of Epoxy Compounds with Concrete.
2. ASTM International (ASTM):
 - a. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - b. C39, Standard Test Method for Compressive Strength of cylindrical Concrete Specimens
 - c. C78, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
 - d. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
 - e. C267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes
 - f. C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
 - g. C496, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
 - h. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - i. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - j. D4259, Standard Practice for Abrading Concrete.
3. International Concrete Repair Institute (ICRI):
 - a. 310.1R, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
 - b. 310.2, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

1.05 QUALITY ASSURANCE

- A. Prior to purchasing repair materials or installing concrete repairs, the CONTRACTOR shall submit details for each unique proposed repair to the ENGINEER for review. Repairs that are similar in nature are classified as one unique repair. The items to be included in the submittal shall include as a minimum the following items:
1. Repair location.
 2. Methods to be used for removal of defective or unsound concrete.
 3. Cleaning and surface condition just prior to repair material application.
 4. Repair materials, installation, and curing.
 5. Qualifications as listed below.

- B. Qualifications:
 - 1. Epoxy and/or Mortar System Applicator:
 - a. Experienced applicator endorsed by product/system manufacturer.
- C. CONTRACTOR qualifications: CONTRACTOR shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. CONTRACTOR shall maintain qualified personnel who have received product training by a manufacturer's representative.
- D. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.06 PRE-REPAIR CONFERENCE

- A. Required Meeting Attendees:
 - 1. CONTRACTOR, including Contractor's Quality Control Representative.
 - 2. Repair Subcontractor.
 - 3. Technical representative for repair material manufacturer.
 - 4. ENGINEER.
 - 5. Special Inspectors.
- B. Schedule and conduct prior to incorporation of respective products into Project. Notify ENGINEER of location and time.
- C. Agenda shall include:
 - 1. Review of field conditions. Conduct field observations of Work to be performed.
 - 2. Based on above observations, repair material manufacturer's technical representative shall make material selection and repair method recommendations for vertical, and overhead applications.
 - 3. Technical representative for repair material manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
 - 4. Other specified requirements requiring coordination.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package products in moisture-resistant containers.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

PART 2 MATERIALS & EQUIPMENT

2.01 HYBRID GEOPOLYMER REPAIR MORTAR (VERTICAL AND OVERHEAD REPAIRS)

- A. Hybrid geopolymer mortar, fiber-reinforced, low shrinkage, working time of 60-70 minutes:
 - 1. Minimum Slant Shear Bond Strength: 2,000 psi at 3 days in accordance in with ASTM C882 test method modified with no bonding agent.
 - 2. Compressive Strength, ASTM C39 at 28 days: minimum 7,500 psi.
 - 3. Flexural Strength, ASTM C78 at 28 days: minimum 800 psi.
 - 4. Chemical Resistance to Sulfuric Acid (pH 1.0), ASTM C267: <1.0% mass loss
 - 5. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 500 psi minimum.
 - 6. Drying Shrinkage, ASTM C157 at 28 days: maximum 0.07 percent.
- B. Manufacturers and Products:
- C. For all locations: SIKA MONOTOP-4500 GEO HYBRID, Sika Corp., Lyndhurst, NJ.

2.02 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Epoxy resin concrete cement adhesive, specifically formulated for bonding plastic mortar to hardened portland cement concrete.
 - 1. Mixed Bonding Agent Properties:
 - a. Pot Life: 90 minutes.
 - b. Contact Time: 24 hours.
 - c. Concrete Color: Gray.
 - 2. Cured Epoxy Resin Portland Cement Adhesive Properties:
 - a. Splitting Tensile Strength, ASTM C496/C496M at 28 days: 600 psi minimum.
 - b. Flexural Strength, ASTM C348: 1,250 psi minimum.
 - c. Slant Shear Bond Strength, ASTM C882/C882M:
 - 1) 2-hour Open Time: 2,800 psi minimum.
 - 2) 24-hour Open Time: 2,600 psi minimum.
 - 3. Bonding agent shall not produce a vapor barrier.
 - a. Compatible with mortar system.
- B. Manufacturers and Products:
 - 1. SIKA ARMATEC-110 EPOCEM, Sika Corp., Lyndhurst, NJ.

2.03 ANTI-CORROSION COATING

- A. Three component, solvent free, moisture tolerant, epoxy modified, cementitious material.
- B. Manufacturers and Products, for work not in contact with potable water:
 - 1. SIKA ARMATEC-110 EPOCEM, Sika Corp., Lyndhurst, NJ
 - 2. Or acceptable equivalent product.

2.04 EPOXY COATING AGENT

- A. High-build, 100% solids epoxy coating, resistant to harsh chemicals, solvent-free, odor-free epoxy coating.
- B. Manufacturers and Products:
 - 1. For all locations: SIKAGARD-170 CR , Sika Corp., Lyndhurst, NJ
 - 2. Or acceptable equivalent product.

2.05 REINFORCING MATERIALS

- A. Reinforcing Bar (rebar): ASTM A615 and as follows below
- B. Stirrups and Ties Grade 60
- C. All other Uses Grade 60

PART 3 EXECUTION

3.01 CONCRETE PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques and review proposed extent of repair with ENGINEER.
- B. For patch areas 1/4 inch or deeper, follow ICRI 310.1R of ICRI 310.2.
- C. Remove loose, unsound, honeycombed, deteriorated, or otherwise defective concrete from work areas by saw cutting or 16,000 psi to 20,000 psi high-pressure water blasting machine capable of removing concrete surfaces to a minimum amplitude roughness of 3/16-inch roughness when measured with a straightedge, CSP 6-9 in accordance with ICRI 310.2, in accordance with ASTM D4259.
 - 1. Remove all loose material up to 1 inch past any corroded reinforcing or corroded metal surfaces. Do not penetrate into concrete further than required to remove loose material.
 - 2. Remove all dirt, oil, or other foreign material from the area of repair.

- D. For concrete surface “rust bloom” abrasive based or abrasive blast surface back to “white metal” condition.
- E. Do not use power-driven jackhammers and chipping hammers, unless water blasting is not practical or may cause other damage.
 - 1. In such cases where chipping hammers are required, limit size of chipping hammer to reduce formation of microfracture of substrate concrete surface.
 - 2. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.
 - 3. Perform surface pH testing as directed by construction documents to test for compromised concrete. Concrete with $\text{pH} < 10$ shall be considered compromised. Remove additional concrete and retest. Repeat procedure until tests show $\text{pH} \geq 10$.
 - 4. Remove unsound concrete to satisfaction of ENGINEER. Notify ENGINEER when removal of unsound concrete is completed but prior to application of mortar.
- F. To avoid tapered shoulders or feathered edges, square edges of patch areas by sawing or chipping. Avoid cutting embedded reinforcing steel. Roughen polished saw-cut edge by high pressure water blasting or abrasive blasting.
- G. Collect and dispose water from removal operations in manner and location acceptable to OWNER. Do not dispose via drainage or stormwater systems.
- H. Inform ENGINEER if the following surface conditions exist:
 - 1. 50 percent or more of reinforcing bar surface is exposed during removal of concrete.
 - 2. 25 percent or more of reinforcing steel surface is exposed during removal of concrete and extent of reinforcing bar corrosion is such that more than 25 percent of material is lost.
- I. Clean exposed reinforcing steel of rust to “white metal” and concrete per recommendations of repair material manufacturer and in accordance with ASTM D4258 and recommendations of ICRI 310.1R. Coat exposed reinforcing steel with appropriate repair product:
- J. Replace deteriorated reinforcing with new reinforcing equivalent in cross-sectional area to original reinforcing. Place new bars adjacent to existing reinforcement when and as directed by ENGINEER.
- K. Keep areas from which concrete has been removed free of dirt, dust, and water blasting slurry. Remove laitance and other bond inhibiting contaminants from prepared areas.

3.02 SHORING

A. Shoring

1. Provide shoring in accordance with the shoring locations and loading, as indicated on the structural drawings, prior to performing work to brace the substrate structure temporarily while repair work is proceeding. Shoring must be designed, documented, and stamped by an Oregon Licensed Professional Engineer. Shoring designs must be submitted to and approved by the ENGINEER prior to work commencing.
2. Leave formwork and shoring in place to support existing loads, construction loads and weight of repair material in beams, slabs, and other structural members until in-place strength of repair material determined in accordance with the Contract Documents. When shores and other supports are arranged to allow removal of form-facing material without allowing structural slab or member to deflect, form-facing material and its horizontal supporting members may be removed at an earlier age.

3.03 CONCRETE REPAIRS

A. CORROSION, SPALLING, AND SURFACE REPAIR

1. Preparation
 - a. Identification of Extent of Concrete Removal
 - 1) Configure geometry of removal area to maximize the use of right-angle geometry, avoiding reentrant corners, and to obtain uniformity of depth. Determine the depth, location, and size of reinforcing bars prior to removal of concrete.
 - 2) Perform visual inspection and hammer tapping, chain drag sounding, or other methods acceptable by the ENGINEER to identify cracked, delaminated, spalled, disintegrated, and otherwise unsound concrete for removal. Mark boundaries of repair area before concrete removal.
 - 3) Inspect the marked boundaries with the ENGINEER prior to commencing with the concrete removal. Revise the repair area boundaries as instructed by the ENGINEER.
 - b. Shoring
 - 1) Provide shoring per the paragraph titled Shoring.
 - c. Concrete Removal
 - 1) Remove concrete from repair areas to indicated depth and profile. Notify ENGINEER if additional delaminated, fractured, or unsound concrete is present.
 - 2) Do not damage embedded reinforcing and adjacent concrete. The removal methods must produce minimal microcracking (bruising) of the prepared substrate surfaces. Avoid directly striking reinforcing steel with impact tools used for concrete removal.

- 3) Provide perpendicular edges at perimeter of repair area. The perimeter of the repair areas must be saw cut to a depth of min 1 in . For vertical surfaces, provide 45-degree slope at repair boundaries to facilitate air and rebound escape. Do not cut or damage embedded reinforcement or other embedded items. If embedded reinforcing steel or other embedded items are too close to the surface to provide the perpendicular edge cut, notify the ENGINEER for direction before proceeding.
 - 4) Extend concrete removal along the corroded reinforcing steel to a point where there is no further delamination, concrete cracking, or reinforcing steel corrosion, and where the reinforcement is bonded to the surrounding concrete.
 - 5) Remove concrete around the exposed layer of reinforcement to a uniform depth beyond within the repair areas to provide a minimum clearance between exposed reinforcing steel and surrounding concrete of 0.75 in., or at least 0.25 in. larger than the maximum nominal size of the coarse aggregate in the repair material.
- d. Preparation of Concrete Substrate Surface
- 1) Confirm perpendicular edges at repair area perimeter, and reinstate if damaged by concrete removal process. Remove loosely bonded concrete, bruised or fractured concrete, and bond-inhibiting materials such as dirt, concrete slurry, or any other detrimental materials from the concrete substrate using approved methods. Where concrete has been removed by impact methods, abrasive blasting must be used to prepare the surface and remove bruised concrete.
 - 2) Provide substrate surface profiles as specified in the Contract Documents.
 - 3) Visually inspect and sound substrate surface to confirm that no further delaminations or otherwise unsound concrete remains. If encountered, notify the ENGINEER.
 - 4) Clean the substrate per the paragraph titled Concrete preparation.
2. Application & Execution
- a. Existing Reinforcement Preparation
- 1) Clean existing reinforcement that will remain. Remove corrosion and/or other laitance and notify the ENGINEER if section loss is greater than 25% by cross-sectional area.
 - 2) If applicable, replace coating on reinforcement per ASTM A780 (galvanized bar), ASTM A775 (epoxy coated bar), or ASTM A934 (epoxy coated bar). Exposed areas must not exceed 2 percent of surface area in each linear foot of each bar.
 - 3) Permit evaluation of existing reinforcement and placement of new reinforcement by the ENGINEER.
- b. Placement of New Reinforcement

- 1) Placement of new reinforcement to replace or strengthen existing reinforcement is like new construction. Placement, splicing, and handling of new reinforcement must meet the following requirements specified in paragraph 2.05.
 - 2) Reinforcement must be free of materials deleterious to bond. New reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.
- c. Placement of Mortar
- 1) A bonding agent must be used. See section 2.02 for bonding agent requirements.
 - 2) Apply corrosion inhibitors to rebar in repair area. See section 2.02 for bonding agent requirements.
 - 3) Consolidate the repair material after placement with a vibrating screed or internal vibrator.
 - 4) Finish the surface to match surface finish and texture requirements. Screed, float and trowel the repair material or broom the surface for non-slip texture.
- d. Placement of Other Repair Materials
- 1) Equilibrate repair material(s) and substrate to the temperature, cleanliness of substrate and reinforcement, and moisture requirements of the repair material manufacturer's requirements.
 - 2) Comply with the repair material manufacturer's requirements for batching, mixing, placing and curing repair materials.
 - 3) Review consistency of the mixed repair material(s) relative to the parameters documented in the repair material manufacturer product data sheet. If non-conforming, adjust consistency in compliance with the repair material manufacturer's requirements.
 - 4) Apply or install repair material(s) within the application time frame (pot life) requirements of the repair material manufacturer's requirements, and place and consolidate to provide well-compacted repair.
 - 5) Finish and tool repair materials, finished in accordance with the repair material manufacturer's written instructions and as indicated in Contract Documents.
 - 6) Protect installed repair material(s) from damage, exposure to environmental conditions that are detrimental to the uncured or cured properties of the material. Cure in accordance with the requirements of the repair material manufacturer's requirements.
- e. Termination
- 1) Conform to manufacturer's instructions

- 2) For coatings exposed to wastewater, terminate leading edges in beveled saw cuts 1/4" wide x 1/4" deep or as required by the manufacturer. Prime and extend coating into the saw cut.
- f. Quality Control
 - 1) Protect concrete surfaces, beyond limits of surfaces receiving bonding agent adhesive, against spillage. Immediately remove any bonding agent adhesive that has spilled beyond desired area. Perform cleanup with material designated by bonding agent adhesive manufacturer. Avoid contamination of work area.
 - 2) The bond strength between the existing concrete and the repair material must be a minimum of 250 psi per ASTM C1583. Test a minimum of 3 specimens at locations no greater than 500 square yards of prepared surface.

3.04 PROTECTION

- A. Protect adjacent surfaces from over application of bonding agent. Promptly remove bonding agent applied beyond repair area.
- B. Protect adjacent surfaces, and equipment, from being damaged by overshooting, rebound, and dust, as applicable for repair mortar system used, from shotcrete mortar or low- pressure spray mortar.

3.05 TESTS AND INSPECTIONS:

- A. Special Inspection, Testing, and Professional Observation shall be provided by the OWNER.
- B. See Section 3.03 Concrete Repairs for individual repair method's Testing Requirements.

3.06 FIELD QUALITY CONTROL

- A. Sounding for Hollow Areas:
 1. See Section 3.03 Concrete Repairs for Inspection and Testing.
 2. Where lab testing is not required, light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
 3. Mark hollow areas for removal and replacement.
 4. Saw cut hollow sounding areas to a new square edge, and reapply mortar as specified.
- B. Remove and replace unacceptable Work.

3.07 CLEANING

- A. Remove overshot mortar and rebound materials as Work proceeds. Remove from Work waste materials, unsound material from concrete surfaces, material chipped from walls, and water used in preparation of application and finishing.

END OF SECTION

SECTION 05500 METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. The extent of metal fabrications work is shown on the Drawings and includes items fabricated from stainless steel plates and bars which are not a part of structural steel or other metal systems in other sections of these specifications.
- B. Section Includes:
 - 1. Shop-fabricated metal items.
 - 2. Anchor bolts.
 - 3. Miscellaneous fabrications, framing, and supports.

1.02 REFERENCE STANDARDS

- A. American Welding Society:
 - 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 - 2. AWS D1.1 - Structural Welding Code - Steel.
 - 3. AWS D1.6 - Structural Welding Code - Stainless Steel.
- B. ASTM International:
 - 1. ASTM A193 - Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High Temperature or High-Pressure Service and Other Special Purpose Applications.
 - 2. ASTM A194 – Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 3. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 4. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 5. ASTM A967/A967M-17 – Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
 - 6. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 - 7. ASTM F594 – Standard Specification for Stainless Steel Nuts

1.03 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.

- B. If foregoing special inspections on shop fabricated items, per Oregon Structural Specialty Code (OSSC) Section 1704.2.5.1, provide certification and credentials of the steel fabrication facility, where work is to be performed, which document that the steel fabricator is a 'Certified Building Fabricator (BU)' or 'Metal Component Manufacturer (CPT)' as defined by the American Institute of Steel Construction (AISC) Standard 207 – Standard for Certification Programs, or alternate documentation to satisfy OSSC Section 1704.2.5.1, to the building official for approval.
- C. Manufacturer's Data: For information only, submit copies of manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in miscellaneous metal work, including paint products.
- D. Stainless Steel Fabrication Certification: Fabricators shall include a letter certifying that all stainless steel has been cleaned and passivated in accordance with ASTM A967/A967M-17.
- E. Shop Drawings:
 - 1. General: Submit copies of shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work which are not completely shown by the manufacturer's data sheets.
 - a. Include plans, elevations and details of sections and connections and fabricators proposed shop coat paint or galvanizing specifications.
 - b. Show anchorage and accessory items.
 - c. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete construction.
 - d. Indicate welding procedures that comply with applicable AWS standards. Welding procedures shall be submitted for review along with manufacturer and make of weld filler material.
 - e. Indicate welded connections using standard AWS A2.4 welding symbols.
 - f. Indicate net weld lengths.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Transporting, handling, storing, and protecting products shall be in accordance with manufacturer's requirements.
- B. Inspection: Accept metal fabrications on-site in labeled shipments. Inspect for damage.

- C. Protect metal fabrications from damage by exposure to weather or by ground contact.

1.05 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to preparation of Shop Drawings and fabrication. Indicate field measurements on Shop Drawings.
 - 1. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication.

PART 2 PRODUCTS

2.01 GENERAL

- A. For the fabrication of miscellaneous metal work items which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, roughness and defects which impair strength, durability, and appearance. Remove such blemishes by grinding or by welding and grinding prior to cleaning, treating and application of surface finishes including zinc coatings.

2.02 ANCHOR BOLTS

- A. All anchors shall be epoxy anchors as shown in the Drawings.
- B. Materials:
 - 1. As shown in the Drawings.
 - 2. For wetted atmospheric conditions
 - a. Type 316 stainless steel for bolts and threaded rods.
 - 3. Threaded rod, nuts, bolts, and washers:
 - a. Material matching anchor insert type.
- C. Types:
 - 1. Thread rod:
 - a. Stainless Steel, F593.
- D. Manufacturers:
 - 1. Hilti, Inc.
 - 2. Simpson Strong-Tie Co., Inc.
 - 3. DeWalt, Inc.
 - 4. Proprietary products as named in the Drawings.

2.03 MISCELLANEOUS FABRICATIONS, FRAMING AND SUPPORTS

- A. Provide miscellaneous steel framing and supports required to complete the Work.
- B. Fabricate miscellaneous units to the sizes, shapes and profiles shown in the Drawings or, if not shown, of the required dimensions to receive adjacent grating, plates doors, or other work to be retained by the framing.
- C. Except as otherwise shown, fabricate from structural steel shapes and plate and steel bars, all welded construction using mitered corners, welded brackets and splice plates and a minimum number of joints for field connection.
- D. Cut, drill, and tap units to receive hardware and similar items to be anchored to the work.
- E. Equip units with integrally welded anchors for casting into concrete, bolting to structural steel or building into masonry. Furnish inserts if units must be installed after concrete is placed.
- F. Galvanize all miscellaneous fabrications unless otherwise noted.

2.04 MATERIALS

- A. Materials listed below shall be provided unless otherwise noted in the Drawings or other sections of these specification.
- B. Stainless Steel:
 - 1. Bars and Shapes: ASTM A276; Type 316.
 - 2. Plate, Sheet, and Strip: ASTM A240; Type 316.
 - 3. Bolts: ASTM F593, Group 2-CW2, Type 316
 - 4. Nuts, and Washers: ASTM F594, Group 2-CW2, Type 316.
 - 5. Threaded Rod Anchors: ASTM F593 Grade B8M, Type 316 Anchor Nuts, and Washers: ASTM A194 Grade 8M, Type 316
 - 6. Welding Materials: AWS D1.6; type required for materials being welded.

2.05 FABRICATION

- A. Workmanship:
 - 1. Use materials of the size and thicknesses shown in the Drawings or, if not shown, of the required size and thickness to produce adequate strength and durability in the finished product for the intended use as approved by the Engineer.
 - 2. Work to the dimensions shown in the Drawings or accepted on Shop Drawings, using proven details of fabrication and support.
 - 3. Use the type of materials shown in the Drawings or specified for the various components of work.

4. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
 5. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise shown in the Drawings.
 6. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the Work.
- B. Fit and shop-assemble items in largest practical sections for delivery to Site.
- C. Fabricate items with joints tightly fitted and secured.
- D. Continuously seal join members by means of continuous welds in accordance with the recommendations of AWS, unless otherwise noted or approved.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small, uniform radius.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Miscellaneous Steel Trim:
1. Provide shapes and sizes for profiles shown in the Drawings.
 2. Except as otherwise indicated, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges.
 3. Use concealed field splices wherever possible.
 4. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.
- H. Fabrication Tolerances:
1. Squareness: 1/8-inch maximum difference in diagonal measurements.
 2. Maximum Offset between Faces: 1/16-inch.
 3. Maximum Misalignment of Adjacent Members: 1/16-inch.
 4. Maximum Bow: 1/8-inch in 48 inches.
 5. Maximum Deviation from Plane: 1/16-inch in 48 inches.

2.06 FINISHES

- A. Stainless Steel:
1. All structural stainless steel shall undergo pickling and passivation in accordance with ASTM A967/A967M following welding and/or fabrication.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive Work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where Site welding is required.
- B. Furnish setting drawings, diagrams, templates, instructions, and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections. Coordinate delivery of such items to the project Site.
- C. Concrete shall be prepped in accordance with the Specifications and repair sequence listed in the drawings.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, and free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment until permanent bracing and attachments are installed.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
- D. Fit exposed connections accurately together to form tight hairline joints.
- E. Grind joints smooth and touch-up shop paint coat.
- F. Do not weld, cut, or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication and are intended for bolted or screwed field connections.
- G. Field-weld components indicated on Drawings and Shop Drawings.
- H. Perform field welding according to AWS D1.6 with regards to procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work.
- I. Obtain approval of Engineer prior to Site cutting or making adjustments not scheduled.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/4-inch per story or for every 12 feet in height, whichever is greater, non-cumulative.
- B. Maximum Variation from Level: 1/16-inch in 3 feet and 1/4-inch in 10 feet.
- C. Maximum Offset from Alignment: 1/4-inch.
- D. Maximum Out-of-Position: 1/4-inch.

3.05 FIELD QUALITY CONTROL

- A. Welding: Inspect welds according to AWS D1.6.
- B. Replace damaged or improperly functioning hardware.
- C. After erection, touch up welds, abrasions, and damaged finishes with prime paint to match shop finishes.
 - 1. For galvanizing repair, repair any damaged areas by heat and stick method as may be required.
- D. Touch up factory-applied finishes according to manufacturer-recommended procedures.

3.06 ADJUSTING

- A. Adjust operating hardware and lubricate as necessary for smooth operation.

END OF SECTION

CLEAN WATER SERVICES

INVITATION TO BID

ROCK CREEK CLARIFIERS NO. 1 – 3 CONCRETE
LAUNDER REPAIRS PROJECT NO. 7297

PROJECT SPECIFICATIONS