PART III

Special Provisions to the Oregon Standard Specifications

CITY OF BEND

Project Name

City Project No. #####

Technical and Supplemental Specifications

City of Bend
710 NW Wall Street, Bend, Oregon 97703

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TECHNICAL SPECIFICATIONS

Boiler Plate changes from ODOT to 2021 Oregon Standard Specifications for construction are considered Special provisions when Added to Volume II Bidding and Contract Documents.

2021 Oregon Standard Specifications for Construction

Available from the ODOT website:

https://www.oregon.gov/odot/Business/Pages/Standard_Specifications.aspx

EXHIBIT A

Special Provisions for the Technical Specifications for the 2021 Oregon Standard Specifications for the Construction (OSS) – Technical Specifications

CITY OF BEND

SPECIAL PROVISIONS

FOR

(Fill in the blanks. Remove underlines, parentheses, and all instructions when finished.)

_____ (Project Name)_____
City Project No. (######)

PROFESSIONAL OF RECORD CERTIFICATION:

<table>
<tr><td>Seal w/signature</td><td rowspan="2">I certify the Special Provision Section(s) listed below are applicable to the design for the subject project for __(list specific design elements, i.e. "Bridge XYZ" or "Traffic Signals")__ . Modified Special Provisions were prepared by me or under my supervision.

Section(s) _____(fill in section number(s) here)_____</td></tr>
<tr><td>Date Signed: _____</td></tr>
</table>

(To add more POR signature sheets do the following:

1. ***Complete the project information above the Professional of Record Certification.***
2. ***Turn off Track Changes and turn on "Show/Hide" by selecting ¶ from the toolbar above.***
3. ***Highlight the entire text from the page, including the "Section Break" and the ¶ from the next page then select "copy".***
4. ***Go to the last POR page and place the cursor at the ¶ line then select "paste".***
5. ***Continue the paste process until you have enough POR signature sheets.***
6. ***Turn Track Changes back on then complete the signature page.)***

SP00200 (Special Provisions for the 2021 Book) (Last updated: January 2022)

PART 00200 – TEMPORARY FEATURES AND APPURTENANCE

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00210 - Mobilization

Comply with Section 00210 of the Standard Specifications.

End of Section

Section 00215 – Utility Conflict Resolution

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00215, which is not a Standard Specification, is included in the Project by Special Provision.

Description

00215.00 Scope – This work consists of extra work and delay caused by unanticipated utilities not shown in the plans and not marked through the Oregon Utility Notification Center that impacts construction progress. This section also covers extra work necessary to meet the requirements of OAR 333 where minimum water and sanitary sewer separation cannot be met. This work is to resolve unforeseen utility conflicts, including the removal, relocation, or mitigation of utility conflicts, manmade buried objects, or other unforeseen items, as approved by the Engineer.

Construction

00215.40 Utility Conflict Resolution – Notify the Engineer upon identification of any unanticipated utility conflicts prior to performing work requiring additional payment. Work performed prior to notifying the Engineer will not be subject to payment.

Measurement

00215.80 Measurement – No measurement of quantities will be made for Utility Conflict Resolution.

Payment

00215.90 Payment – The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Utility Conflict Resolution	Force Account

Item (a) will be paid on a Force Account basis in accordance with Section 00197 up to the contract allowance price and will include full compensation for furnishing all labor, materials, permits, tools and equipment required to complete the Work, as directed by the Engineer, and no additional compensation will be allowed therefor.

No separate or additional payment will be made for extra work for temporary facilities to meet the requirements of OAR 333.

End of Section

Section 00220 - Accommodations for Public Traffic

Comply with Section 00220 of the Standard Specifications modified as follows:

(Use the following subsection .02(a) when any of the following bullets are included in the project special provisions. Delete "(s)" or parentheses, as applicable.)

00220.02(a) General Requirements –

Replace the bullet that begins “Do not stop or hold vehicles…” with the following:

(The stop or hold duration may be increases up to 20 minutes with approval from the Engineer. 5 minutes is the default unless otherwise approved.)

- Do not stop or hold vehicles within the work zone for durations longer than allowed in the approved traffic control plan.

Add the following bullet*(*s*)* to the end of the bullet list:

- Notify the Engineer a minimum of 7 Calendar Days prior to activating any traffic control changes. Include contact information for the TCS and Site Manager in the notice.

- Temporary steel plating is not allowed between November 1st and March 1st. Removal all steel plates 24-hours prior to a forecasted snow event of greater than 1 inch.

(Use the following bullet when the pre-construction speed is greater than 35 mph and there is trench excavation or other excavation work to be performed.)

- When performing trench excavation or other excavation across or adjacent to a Traffic Lane on a roadway having a pre-construction posted speed greater than 35 mph, backfill the excavation, install surfacing, and open the roadway to traffic by the end of each work shift. Install a "BUMP" (W8-1-48) sign approximately 100 feet before the backfilled area and a "ROUGH ROAD" (W8-8-48) sign approximately 500 feet ahead of the "BUMP" sign. If this requirement is not met, maintain all necessary lane or shoulder closures and provide additional TCM, including flagging, at no additional cost to the Agency. Do not use temporary steel plating to reopen the roadway.

(Use the following bullet when any of the following apply:

  - ***A new temporary or permanent STOP sign is installed at an intersection.***
  - ***Modifications are made to lane configurations, lane assignments or roadway geometry that affects traffic patterns.***
  - ***A permanent traffic signal is being installed or modified.***

- Before activating a modified traffic signal, revising lane usage, implementing new roadway geometry, or removing a "STOP" sign, protect traffic by installing "NEW

TRAFFIC PATTERN AHEAD" (W23-2) signing according to 00222.40. Keep the signs in place for 30 Calendar Days after completing the modifications.

(Use the following bullet when excavation or paving creates an abrupt edge.)

- When excavation or paving operations create an abrupt edge, protect traffic by installing "ABRUPT EDGE" (CW21-7) signs every 500 feet.

(Use the following bullet any time traffic queues are expected to develop within proximity of a railroad crossing. Include Standard Drawing TM850.)

- When flagging operations may extend traffic queues onto the railroad crossing, protect traffic at the intersection of _____ and _____ by providing an additional flagger. Position additional flagger signs according to the "Advance Flagger for Extended Traffic Queues" configuration shown on the Standard Drawings. Do not allow traffic to stop on the railroad crossing.

00220.02(b) Temporary Pedestrian Accessible Route Plan –

Delete the bullet that begins “For intersection Work…”

Replace the bullet that begins “Limit pedestrian detour…” with the following:

- Limit pedestrian detour lengths to the shortest available accessible route.

Add the following bullet:

- Limit closure of pedestrian facilities to the duration established in the pre con schedule.

(Use the following subsection .03(b) when public access(es) to a floatable natural waterway has been identified. Originated from HB2835 (2019). Delete "(s)" or parentheses, as applicable.)

00220.03(b) Closures - Add the following bullet*(*s*)* to the end of the bullet list:

- **Floatable Natural Waterway** - A minimum of 35 Calendar Days before restricting or closing the public access site(s), listed below:

(Fill in the blank with the appropriate public access location(s) information and include “as shown” if the access is shown on the Plans. Repeat the bullet as necessary to list all locations. Delete parentheses and the words in the parentheses as needed.)

  - **Public Access Location** - _____ *(*as shown*)*.

Submit to the Engineer, in writing, when the closure(s) or restriction(s) have ended.

00220.03(b) Closures –

Replace the bullet that begins "**Pedestrian Facilities –** A minimum of 14 Calendar Days…" with the following bullet:

- **Pedestrian Facilities** - A minimum of 72 hours before closing a sidewalk, Multi-Use Path, or other pedestrian facility. After receiving written approval, provide 48 hours' public notification before the closure.

Replace the bullet that begins "**Bicycle Facilities –** A minimum of 14 Calendar Days…" with the following bullet:

- **Bicycle Facilities** - A minimum of 72 hours before closing a bicycle lane. After receiving written approval, provide 48 hours' public notification before the closure.

Add the following paragraph to the end of the subsection:

Provide a minimum of 48 hours' notice to occupants of properties fronting a street where more than half the street will be closed to vehicular traffic. Coordinate street closure with all affected individuals and public agencies.

(Use the following subsection .40(e)(1) only when modifying closed lane restrictions. Fill in the blanks with the street name to be closed followed by the closure limits. Copy and paste the paragraph and bullet list as necessary for additional roads.)

00220.40(e)(1) Closed Lanes - Replace this subsection, except for the subsection number and title, with the following:

One or more Traffic Lanes may be closed on _____ between _____ and _____ when allowed, shown, or directed during the following periods of time except as specified in 00220.40(e)(2):

- _____

00220.40(e)(2) Opened Lanes – Replace the sentence that begins "Keep all Traffic…" with the following paragraph:

Maintain two-way traffic at all times unless otherwise allowed. Streets shall remain open for two-way traffic at all times when the Contractor is not performing work unless otherwise allowed. Maintain access to approaches to all properties except for short periods necessary for the progress of the construction. Keep all Traffic Lanes and pedestrian facilities open during the following periods:

(Use the following subsection .40(e)(2)(b) to list special events. List the names, times, and dates of the events.)

00220.40(e)(2)(b) Special Events - Add the following to the end of this subsection:

The following special events will occur during this Project:

- _____

(Use the following lead-in paragraph and subsection .40(f) when blasting, erecting bridge girders, erecting sign structures, or conducting other short duration work that can be done in periods not exceeding 20 minutes. Add applicable items and delete non-applicable items in the first sentence. Do not change the subsection alpha character (keep it "(f)".)

Add the following subsection:

00220.40(f) Limited Duration Road Closure - The Contractor will be permitted to close all Traffic Lanes for periods not to exceed 20 minutes in duration during blasting or erecting Bridge girders and sign structures over the Traffic Lanes or _____. This Work will only be permitted between the hours of _____ and _____ on ___(street name)___.

Succeeding roadway closures will not be allowed until traffic clears from a preceding closure.

(Use the following subsection .60(a)(1) when construction is anticipated in winter months)

00220.60(a)(1) Contractor Responsibility – Add the following paragraph and bullets to the end of the subsection:

Provide snow and ice removal for all streets with traffic control or channeling devices deployed within a travel lane and all streets where the existing pavement has been disturbed according to the following:

- Maintain a map showing snow removal boundaries and submit the map to the Engineer a minimum of 24-hours prior to a forecast showing snow accumulation exceeding 2 inches.
- When directed, provide snow and ice removal when accumulations exceed 2 inches on arterial and collector streets and 6 inches on local streets.
- Plow streets from curb to curb, or edge of pavement to edge of pavement where no curbs exist. Use equipment designed for such plowing including road graders, front end loaders, truck-mounted plows. Provide lights and beacons and appropriate signage for operating on public roads. Broadcast crushed basalt traction material on post-plowed surfaces in accordance with current City standards. Keep storm drains clear of snow and ice.
- Push the snow toward the side of the street. Minimize blocking of driveways and burying sidewalks. Do not push snow into natural surface bodies of water.
- Damage to public or private property caused by the Contractor's snow removal will be repaired at the Contractor's expense.

00220.90 Payment – Replace this subsection, except subsection number and title, with the following:

The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Snow Removal	Force Account

Item (a) will be paid on the Force Account basis in accordance with Section 00197 up to the contract allowance price and will include full compensation for furnishing all labor, materials, permits, tools and equipment required to complete the Work. Snow removal must be directed by the Engineer. Work performed without written authorization may not be subject to payment.

End of Section

Section 00221 - Common Provisions for Work Zone Traffic Control

Comply with Section 00221 of the Standard Specifications modified as follows:

(Use the following subsection .06 when traffic is anticipated to be stopped or held under flagging. Work with the City PM to determine the appropriate duration based on traffic volumes and site conditions. In no case shall the duration exceed 20 minutes.)

00221.06 Traffic Control Plan – Add the following sentences after the sentence that begins "The Contractor will…":

Traffic will be permitted to be stopped or held under flagging for ___ minutes within the work zone.

00221.40 General – Add the following paragraph to the end of the subsection:

In addition to the roles having authority per Section 00150, the City of Bend Street Maintenance Supervisor and uniformed police officers, have authority to orally temporarily suspend work for failure to maintain traffic control devices.

(Work with the City PM to determine the appropriate measurement and payment method for the project. Generally, Method "A" is best suited for projects with complex, multiphase, traffic control plans that are likely to require adjustment during construction. Method "B" is best suited for projects with well-defined traffic control plans at a single location. Method "C" is best suited for projects with minor traffic controls impacts not affecting lanes of travel or requiring pedestrian detours.)

End of Section

Section 00222 – Temporary Traffic Control Signs

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00222 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00222 of the Standard Specifications modified as follows:

(Use the following subsection .40(e) when adding any of the following temporary signs.)

00222.40(e) Temporary Sign Placement - Add the following to the end of the bullet list:

(Use the following bullet when it is necessary to reduce the overall roadway width between positive barriers [for example: concrete barrier, guardrail, and falsework] to less than 19 feet.)

- When the horizontal clearance for the Roadway is less than 19 feet, install horizontal clearance (CW21-12-48) signs, identifying the narrowest width of the Roadway. Locate these horizontal clearance signs as shown or as directed.

(Use the following bullet when it is necessary to reduce the overall vertical clearance to less than 15 feet 6 inches.)

- When the vertical clearance is less than 15 feet 6 inches, install low clearance (W12-2-48) and (OW12-2-36) signs. The clearance shown on the signs shall be 4 inches less than the shortest height of the opening. Locate these low clearance signs as shown or as directed.

(Use the following bullet on urban projects where there is an existing bike lane, designated "Bicycle Route", or when a significant volume of bicycle traffic can be expected and is required to use the travel lane.)

- When construction requires bicycles to use the Traffic Lanes, install a "Bicycle ON ROADWAY" (CW11-1) symbol sign on 1/2 mile spacing through the affected area. Keep the signs in place until completion of the Shoulder or bikeway final surface.

End of Section

Section 00223 - Work Zone Traffic Control Labor and Vehicles

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00223 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00223 of the Standard Specifications modified as follows:

00223.23 Automated Flagger Assistance Device - In the sentence that begins "Submit the following information…", replace the words "21 Calendar Days" with the words "14 Calendar Days ".

00223.80(b)(1) Flaggers – Add the following paragraph to the end of the subsection:

Flaggers not approved by the Engineer or included on the approved traffic control plan and schedule will not be measured for payment.

End of Section

Section 00224 - Temporary Traffic Channelizing Devices

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00224 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00224 of the Standard Specifications modified as follows:

(Use the following subsections, .47 and .80, when spare traffic channelizing devices are required to be kept on-hand for traffic control adjustments. Include quantity of spare items in the applicable bid item.)

Add the following subsection:

00224.47 Spare Devices – Stockpile the following quantity of spare temporary traffic channelizing devices on site to allow for quick traffic control adjustments:

(Add bullets as necessary to identify all spare devices.)

- ***(***Insert device type***)*** - ***(***quantity***)***

Spare devices must remain on site for the entire project duration.

00224.80 Measurement – Add the following to the end of the bullet list:

- Spare devices identified in 00224.47 in addition to the bullets above. Spare device quantity will be measured upon delivery to the project site.

End of Section

Section 00225 - Temporary Pavement Markings

Comply with Section 00225 of the Standard Specifications.

End of Section

Section 00226 - Temporary Roadside Barriers and Impact Attenuators

Comply with Section 00226 of the Standard Specifications.

End of Section

Section 00228 - Temporary Pedestrian and Bicyclist Routing

Comply with Section 00228 of the Standard Specifications modified as follows:

00228.00 Scope - Replace this subsection, except subsection number and title, with the following:

In addition to the requirements of Section 00221, this Work consists of furnishing, installing, operating, maintaining, inspecting, and removing temporary devices for accommodating pedestrians and bicyclists through a work zone.

00228.80(a) Length Basis - Replace this subsection, except subsection number and title, with the following:

Pedestrian channelizing devices and bicycle channelizing devices will be measured on the length basis upon delivery to the Project. The quantities will be limited to those in the approved TCP.

End of Section

Section 00231 - Temporary Access Road

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general do not re-number or re-letter subsections when item(s) are deleted.)

Section 00231, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00231.00 Scope - This Work consists of constructing, maintaining, and removing temporary, unpaved access roads for the use of Contractor and Agency Equipment and personnel as needed, shown, or directed.

Materials

00231.11 Geotextile - Furnish subgrade geotextile, embankment geotextile, or riprap geotextile, at the Contractor's option. Geotextile shall meet the requirements of Section 02320, with documentation according to 02320.10(c).

00231.12 Road Material - Furnish crushed Aggregate Base, stone embankment, or other suitable granular material capable of supporting the weight of Equipment intended to use the temporary access road.

Construction

00231.41 Clearing - Clearing brush and vegetation for temporary access roads is allowed in the areas shown or where directed. Preserve and protect trees as shown or directed.

00231.42 Temporary Access Road - Construct temporary access roads to the width, grade, profile, and depth of base sufficient to support the weight of Equipment using the road.

00231.43 Not for Public Traffic - Do not direct or allow Public Traffic to use temporary access roads constructed according to this Section.

(Use the following subsection .44 when it is anticipated that the ground occupied by a temporary access road will later support permanent embankment. Check with the designer.)

00231.44 Verification of Subgrade - In areas where permanent earthwork construction is required on ground that has been occupied by a temporary access road, rework or replace unstable Materials to avoid and correct, according to 00330.40(c), excessive stress or strain that could be detrimental to the subgrade.

00231.45 Verification of Original Ground – Perform a proof roll on the original ground, in the presence of the Engineer, before beginning construction of the temporary access road and after removing it. If the post-removal proof roll indicates the original ground has been weakened by construction activities, or the presence or use of the temporary access road,

correct the deficient condition in an approved manner and at no additional expense to the Agency.

Maintenance

00231.60 Surface Maintenance - Maintain temporary access roads so that the road surfaces remain firm, smooth, free of ruts or standing water, and are graded to prevent concentrations of runoff water. Promptly remove accumulations of mud or debris.

Finishing and Cleaning Up

00231.70 General - When a temporary access road is no longer needed, do the following:

- Remove all Materials.
- Restore areas occupied by the temporary access road to the original ground contours or as directed.
- Apply permanent seeding to the area occupied by the temporary access road according to Section 01030.
- Dispose of excess materials according to 00330.41(a)(5).

Measurement

00231.80 Measurement - Except for landscape restoration, no measurement of quantities will be made for Work performed under this Section.

Landscape restoration will be measured according to 01030.80 or 01040.80 as applicable.

Payment

00231.90 Payment - The accepted quantities of Work performed under this Section, except for permanent seeding work, will be paid for at the Contract Lump Sum amount for the item "Construct and Remove Temporary Access Road".

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for maintenance, removing and disposing of temporary access road materials, or for restoring the areas to original ground contours.

Landscape restoration Work will be paid for according to 01030.90 or 01040.90 as applicable.

End of Section

Section 00270 - Temporary Fences

Comply with Section 00270 of the Standard Specifications.

End of Section

Section 00280 - Erosion and Sediment Control

(This Section is not required for projects with no ground disturbance. Include this Section for all other projects.)

Comply with Section 00280 of the Standard Specifications modified as follows:

(Use the following subsection .00 on ODOT projects that involve one acre of ground disturbance or more.)

00280.00 Scope - Add the following two paragraphs to the end of this subsection:

When applicable, obtain an NPDES 1200-C Permit from the authorizing local jurisdiction for the Project or phase.

When applicable, comply with the WPCF UIC Permit or rule authorization requirements in its absence. Copies of any local or state agency/government permit(s) are available from the permitted agency/government and may be more stringent than these Specifications.

00280.05 Erosion and Sediment Control Plan on Non-Agency Controlled Lands – Replace the bullet that begins "A Contractor-developed ESCP…" with the following bullet:

- A Contractor-developed ESCP for each unique site covered under applicable Federal, state, or local permits or regulations.

(Use the following subsection .15(f)(1) when compost filter socks are required. Fill in the blank with the diameter of the filter sock. Obtain information form the Erosion Control Designer.)

00280.15(f)(1) Filter Sock Material - Add the following sentence to the end of this subsection:

Furnish filter sock material with a diameter of ____ inches.

00280.16(a) Construction Entrances – Replace the "Aggregate" bullet with the following bullet:

- **Aggregate** – Furnish 3-6 inch aggregate for construction entrances. If tracking of aggregate onto the street is of concern, 6-8 inch stone can be used. Material will be visually accepted in the field.

00280.30 Erosion and Sediment Control Manager –

Replace the bullet that begins "Monitor water quality…" bullet with the following bullet:

- Monitor water quality in receiving streams and UICs in the vicinity of the Project Site.

Add the following paragraph after the paragraph that begins "Provide the ESCM name…":

The ESCM, or designee, must be able to respond to the site within 90 minutes of notification during storm events. Include the storm response plan in the ESCP.

00280.41(c) Wet Season Work and Temporary Work Suspension – Add the following paragraph to the end of the subsection:

Wet season work is defined as work between October 1 and June 30.

00280.42(a) Soil Exposure Limitations – Replace this subsection, except for the subsection number and title, with the following:

- **East of the Cascades (October 1 through June 30)** – Stabilize all other areas within 5 days of exposure.
- **East of the Cascades (July 1 through September 30)** – Stabilize construction areas within 10 days of exposure.

00280.42(b) Temporary Stabilization –

Replace the first bullet with the following:

- Every 5 days (October 1 through June 30), every 10 days (July 1 through September 30), or more frequently as needed or directed.

Delete the bullet that begins “Upon approval, active…”.

00280.63(c) Paved Areas – Add the following sentence to the end of the subsection:

Street washing is not permitted.

00280.70 Removal – Add the following paragraph to the end of the subsection:

The cost of damage to public right-of-way or private property resulting from not removing erosion control materials will be at the Contractor’s expense.

End of Section

Section 00290 - Environmental Protection

(Modify these subsections only for site specific conditions.)

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00290 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00290 of the Standard Specifications modified as follows:

(Use the following subsection .20(c)(2) only when Section 00294 is included in the Special Provisions.)

00290.20(c)(2) Clean Fill - Add the following paragraph to the end of this subsection:

Manage all excavated soil that does not meet the definition of clean fill according to Section 00294.

00290.20(c)(3)(a) Burnable Materials – Delete this subsection.

00290.20(c)(3)(b) Woody Matter – Delete this subsection

00290.30(a)(1) General – Replace the bullet that begins "Comply with the…" with the following bullet:

- Comply with the erosion prevention and sediment control requirements of Section 00280, local requirements, and all applicable DEQ NPDES 1200 Permit requirements.

(Use the following lead-in paragraph and subsection .30(a)(7) when there is work in, adjacent to, or over a Regulated waterway, even if there is no direct in-water work. Modify as needed for site-specific circumstances and project-specific permit conditions. Obtain information from the Environmental Coordinator.)

Add the following subsection:

00290.30(a)(7) Water Quality:

- Do not discharge contaminated or sediment-laden water, including drilling fluids and waste, or water contained within a work area isolation, directly into any waters of the State or U.S. until it has been satisfactorily treated (using a best management practice such as a filter, settlement pond, bio-bag, dirt-bag, or pumping to a vegetated upland location).
- Do not use permanent stormwater quality treatment facilities to treat construction runoff unless prescribed by an ESCP approved under Section 00280.

- If construction discharge water is released using an outfall or diffuser port, do not exceed velocities more than 4 feet per second, and do not exceed an aperture size of 1 inch.
- Do not use explosives under water.
- Implement containment measures adequate to prevent pollutants or construction and demolition materials, such as waste spoils, fuel or petroleum products, concrete cure water, silt, welding slag and grindings, concrete saw cutting by-products and sandblasting abrasives, from entering waters of the State or U.S.
- Implement containment measures adequate to prevent flowing stream water from coming into contact with concrete or grout within the first 24 hours after placement.
- Do not end-dump riprap into the waters of the State or U.S. Place riprap from above the ordinary high water line.
- Cease Project operations under high flow conditions that may result in inundation of the Project area, except for efforts to avoid or minimize resource damage.
- The Engineer retains the authority to temporarily halt or modify the Work in case of excessive turbidity or damage to natural resources.
- If Work activities violate permit conditions or any requirement of this subsection, stop all in-water work activities and notify the Engineer.

(Add the following bullet if turbidity monitoring is not required.)

- Do not cause a visible sediment plume in waters of the State or U.S.

(Use the following lead-in paragraph and subsection .30(a)(8) when turbidity monitoring is required during in-water work. Use one of the following three options as instructed below. Delete the options that do not apply. This subsection must be modified for consistency with applicable regulatory approvals including but not limited to: Clean Water Act Section 401 water quality certification, a programmatic or individual biological opinion, and any applicable local approvals. If necessary, check with Regional Environmental Coordinator for correct one to use.)

Add the following subsection:

[Option 1 - Use the following subsection when visual turbidity monitoring is required during in-water work, but the project does not have a Clean Water Act 401 water quality certification.]

00290.30(a)(8) Visual Turbidity Monitoring - In addition to any turbidity monitoring required by 00280.62(c) to comply with NPDES 1200 series requirements, monitor turbidity visually during in-water work according to the following:

- Before beginning Work, make up-current and down-current in stream turbidity observations.
- Every four hours, make observations at an up-current location outside the influence of the Project, and at a down-current location that indicates any turbidity caused by the Project.
- Document all turbidity monitoring observations including date, time, and location on form 734-2755, “Turbidity Monitoring Form” or another form approved by the Agency.

Submit reports to the Engineer weekly during in-water work and keep copies of the reports at the Project Site.

- If a down-current turbidity plume is observed, modify work procedures and repair or implement in-water best management practices (BMP). If a turbidity plume is still observed at the next four-hour observation, stop all in-water work and repair or implement additional BMP. Resume in-water work when there is no longer a visible turbidity plume.

[End Option 1]

[Option 2 - Use the following subsection when meter turbidity monitoring is required during in-water work by a Clean Water Act 401 water quality certification.]

00290.30(a)(8) Meter Turbidity Monitoring - In addition to any turbidity monitoring required by 00280.62(c) to comply with NPDES 1200 series requirements, monitor turbidity using a turbidity meter every two hours during in-water work according to the following:

- Use a turbidity meter that has been maintained and calibrated according to the manufacturer's specifications.
- Measure stream turbidity before beginning each day's in-water work to establish pre-construction turbidity levels.
- Measure up-current and down-current turbidity at two-hour intervals during in-water work and perform work based on turbidity measurements according to the following:
  - Take up-current samples at a location representative of background turbidity approximately 100 feet from the in-water work area.
  - Take down-current samples at a location approximately 100 feet from the in-water work area at approximately mid-depth of the water body and within any visible turbidity plume.
  - If the down-current reading is less than 5 nephelometric turbidity units (NTU) higher than the up-current reading, continue to work and take readings every two hours.
  - If the down-current reading is greater than or equal to 5 and less than 30 NTU higher than the up-current reading, modify work procedures and repair or implement best management practices (BMP), continue work, and continue to take readings every two hours. If after four hours the down-current reading is still greater than or equal to 5 NTU higher than the up-current reading, stop all in-water work and repair or implement additional BMP. Resume in-water work activities only after the down-current reading is less than 5 NTU above the up-current reading.
  - If the down-current reading is greater than or equal to 30 and less than 50 NTU higher than the up-current reading, modify work procedures, repair or implement BMP and continue work. If, at the subsequent two-hour reading, the down-current reading is still more than 30 NTU higher than the up-current reading, stop all in-water work and repair or implement additional BMP. Resume in-water work activities only after the down-current reading is less than 5 NTU above the up-current NTU reading.
  - If the down-current reading is 50 NTU or more higher than the up-current reading, stop all in-water work, repair or implement additional BMP, and inform the Agency. Resume in-water work activities only after the down-current reading is less than 5 NTU above the up-current NTU, as determined by continued readings made at least every two hours, or the next day's initial turbidity reading.

- Document all turbidity monitoring observations on form 734-2755, “Turbidity Monitoring Report”, or another form approved by the Agency. Submit reports to the Engineer weekly during in-water work and keep copies of the reports at the Project Site.

[End Option 2]

[Option 3 - Use the following subsection when customized turbidity monitoring specifications are required that are not accommodated by the first two options, such as projects covered by a SLOPES or individual biological opinion, or an individual Clean Water Act 401 water quality certification with non-standard conditions.]

00290.30(a)(8) Turbidity Monitoring - In addition to any turbidity monitoring required by 00280.62(c) to comply with the NPDES 1200 series permit requirements, perform turbidity monitoring during in-water work according to the following:

(Insert permit turbidity monitoring frequency and requirements here. Only include project specific information. Use bullets to list information. Write in imperative mood and write in plain language.)

- _____
- _____

[End Option 3]

(Use the following subsection .34 when fish or fish habitat resources require protection. Modify as needed for site-specific conditions. Check to make sure applicable and consistent with project permit conditions. Obtain information from the Environmental Coordinator.)

00290.34 Protection of Fish and Fish Habitat - Add the following paragraph:

Meet with the Agency Biologist, Resource Representative, Engineer, and inspector on site, before moving equipment on-site or beginning any work, to ensure that all parties understand the locations of sensitive biological sites and the measures that are required to be taken to protect them.

(Use the following subsections .34(a) when regulated work areas are required. Fill in the blanks as necessary. Obtain information from the Environmental Coordinator.)

00290.34(a) Regulated Work Areas - Add the following to the end of this subsection:

(Use the following three options as instructed below. Delete any options that do not apply.)

[Option 1 - Use the following paragraph when the Agency will delineate the regulated work area on the plans]

The regulated work area is the area at or below the ordinary high water (OHW) elevation shown on the plans.

[Option 2 - Use the following paragraph when the Agency will identify and mark the regulated work area in the field.]

The regulated work area is defined as the area at or below the ordinary high water (OHW) elevation. The Engineer will identify and mark the regulated work area.

[Option 3 - Use the following paragraph when the Agency will NOT identify and mark the regulated work area in the field. Fill in the blanks. If the project has any gradient change through the project area, the elevation could be different from station to station. If gradient is significant this option should not be used.]

The regulated work area is the area at or below _____ feet elevation and between stations _____ and _____.

[End Options]

(Delete the following paragraph if it does not apply. Fill in the blanks with dates.)

Perform work within the regulated work area only during the in-water work period. The in-water work period is from ___(date)___ to ___(date)___.

(Delete the following paragraph if it does not apply. Fill in the blank.)

The total volume of material filled or discharged into waters of the State and waters of the U.S. shall not exceed ____ cubic yards.

(Delete the following paragraph if it does not apply. Fill in the blank.)

The total volume of material excavated from the waters of the State and waters of the U.S. shall not exceed _____ cubic yards.

Submit a schedule to complete all work within the regulated work area within the in-water work period at least 10 days prior to the preconstruction conference.

(Use the following subsection .34(b) when regulated work areas are required. Fill in the blanks as necessary. Delete what does not apply. Obtain information from the Environmental Coordinator.)

00290.34(b) Prohibited Operations - Add the following to the end of this subsection:

- Allow entry within the regulated work area or between stations _____ and _____.

(Use the following subsection .51 when there are known sensitive cultural sites on the project.)

00290.51 Protection of Sensitive Cultural Sites - Add the following to the end of this subsection:

(Fill in the blank with the number of sensitive cultural sites. Select either "sites were" or "site was" depending on the number of sites. Delete the language in orange parentheses that does not apply and delete all orange parentheses.)

There are sensitive cultural sites or areas of high probability for cultural resources on this Project. At the time of preparation of the Plans, _____ *(*sites were*) (*site was*)* identified.

(Use the following paragraph if an Inadvertent Discovery Plan is required for the project.)

An Inadvertent Discovery Plan (IDP) has been developed for this project. The IDP is available from the Engineer.

(Use the following paragraphs and bullet list when sensitive cultural sites require protection during construction.)

Meet with the Engineer at least 10 Calendar Days prior to beginning ground disturbing activities to discuss sensitive cultural sites on the Project. Required attendees include:

- The Contractor's supervisory personnel.
- Subcontractors, including contract archaeological monitors, and supervisory personnel who will be involved in ground disturbing activities.
- Engineer
- When applicable, tribal representative(s) or monitor(s).

Prior to beginning On-Site Work, install work zone fencing from section 00221.13 of the QPL, or lath and flagging, around no work zones, as shown or as directed.

(Use the following paragraph when Archaeological and/or Tribal Monitors are required during ground-disturbing activities. Delete the language in orange parentheses that does not apply and delete all parentheses.)

*(*Archaeological*)(* and *)(*Tribal*)* Monitors are required to be on-site during all ground-disturbing activities for this Project, unless otherwise notified. Notify the Engineer 10 Calendar Days before beginning ground-disturbing activities, or 14 Calendar Days if ground-disturbing activities are anticipated to occur simultaneously in more than two locations.

(Use the following six paragraphs when a monitoring report is required for the project)

Archaeological monitoring by a professional archaeologist will be provide by the Agency. Allow archaeologist access as necessary to perform monitoring requirements.

(Use the following subsection .90 when there are known sensitive cultural sites on the project, or when turbidity monitoring is required. Remove the parentheses in "paragraph(s)" when more than one paragraph below is used. Remove "(s)" when only the plastic mesh fencing paragraph is used.)

00290.90 Payment - Add the following paragraph(s) to the end of this subsection:

(Use the following paragraphs when turbidity monitoring is required.)

The accepted quantities of turbidity monitoring will be paid for at the Contract lump sum amount for the item "Turbidity Monitoring".

Payment for turbidity monitoring will be payment in full for furnishing and placing all Materials and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

(Use the following paragraph when there are known sensitive cultural sites on the project.)

No separate or additional payment will be made for work zone fencing.

End of Section

Section 00294 - Contaminated Media

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general do not re-number or re-letter subsections when item(s) are deleted.)

Section 00294, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00294.00 Scope - In addition to the requirements of Section 00290 and the Specifications, this Work consists of the following:

(Use the following bullet and table when disturbing contaminated soils.

Check with the geotechnical designer to evaluate slope stability before specifying that the Contractor can dispose of excess soil within the boundaries of the Project Site.

Include the pay item "Contaminated Soil Disposal" in the Schedule of Items, with a quantity matching the quantity entered in the table as "to be disposed of at landfill." In the table and in the Schedule of Items, exclude the quantity of contaminated soil that is expected to be reused on the project.)

- Excavate, segregate, stockpile, transport, and dispose of contaminated Soils, as defined by 00294.01, from the following locations:

(Fill in the table with the location, depth, quantity, and contents of soil contaminants.)

Contaminated Soil Location Table 00294-1

From Location/Station to Location/Station	Depth below grade (feet)	Approximate Quantity (cy)	Known Contaminants
Approximate Total Quantity		cy	
Quantity to be reused on Project		cy	
Quantity to be disposed at landfill		tons	

(Use the following bullet when removing contaminated soil.)

- In areas where excavation is not required, leave contaminated material and clearing and grubbing material in place.

(Use the following bullet and table when removing contaminated groundwater.)

- Pump, test, treat, and dispose of contaminated groundwater from the following locations in Table 00294-2:

(Fill in the table with the location, depth, and contents of groundwater contaminants.)

Table 00294-2

Location/Station	Depth below grade (feet)	Known Contaminants

(Use the following bullet when a HASP is required.)

- Prepare a Health and Safety Plan (HASP) for work within the contaminated areas of the Project.

(Fill in the blanks with the date and name of report that will be available from the Engineer.)

The _____ report, titled _____ documenting the contaminated media identified within the Project, is available from the Engineer.

(Use the following bullet when contaminated shoulder soil is the only material being excavated and lead is present in the shoulder soil.)

- Prepare a written lead compliance plan for work within contaminated areas of the Project.

00294.01 Definitions:

Contaminated Soil - Soil that does not meet the DEQ definition of "Clean Fill", as defined by OAR 340-093-0030(18). This contaminated Soil is a regulated waste, subject to OAR 340-093-0005 through OAR 340-093-0290. If the grubbing material has been determined to be contaminated, it will be considered and treated as contaminated Soil for the purposes of this Section.

00294.02 Testing of Contaminated Soil and Groundwater - When additional testing of contaminated Soil or groundwater is required to characterize the material for reuse, recycle, or disposal, conduct the tests according to 00290.20(c).

Use analytical methods meeting DEQ's Clean Fill Guidance Screening Levels for each analyte. Contaminated Soil and groundwater sampling must be conducted by an Oregon

Registered Geologist or Professional Engineer who has experience characterizing contaminated media.

(Use the following paragraph and bullet list when contamination is known and additional sampling by the Contractor is required for making a waste management or disposal decision. Add or delete test methods that will be required for the project.)

Collect at least 3 composite Soil samples and submit for the following required testing:

- TPH-Gx and TPH-Dx by Northwest methods.
- The following volatile organic compounds (VOCs) by EPA Method 8260.
  - Benzene, toluene, ethylbenzene, xylenes.
  - Iso-propylbenzene and n-propylbenzene.
  - 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene.
  - Ethylene dibromide (EDB), ethylene dichloride (EDC), and Methyl tert-butyl ether MTBE.
- Polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270SIM.
- Total metals (RCRA 8) by EPA 6000 and 7000 series.
- One TCLP lead by using EPA Method 1311.

00294.03 Submittals - Submit the following documents:

(Use the following HASP language when a HASP is required.)

- A site specific HASP at least 10 Calendar Days before the pre-construction conference.

(Use the following two bullets when a qualified health and safety professional is required. A qualified health and safety professional is required when the contamination is something other than petroleum, is highly toxic, is a risk to workers, or is unusually complex.)

- The site specific HASP, completed and signed by a qualified health and safety professional meeting the requirements of 00294.30.
- The name and qualifications of the qualified health and safety professional.

Submit all modifications to the HASP that are requested by the Engineer or the qualified health and safety professional within 7 Calendar Days of the request.

[End HASP language]

- Current employee training certificates and medical surveillance information before beginning Work within the contaminated areas.

Submit the following documents within 48 hours of removal of contaminated media:

- Permits, permit applications, and documentation of compliance.

- All reuse, recycled, and disposal receipts.
- Final quantities of Soil ***(***and groundwater***)*** reused, recycled, and disposed and their final location.
- All analytical test results.

(Use the following bullet when contaminated soil will be used under the requirements of ODOT BUD No. BUD-20181204.)

- Documentation of final disposition of any reused Soil material that is reused under ODOT's Beneficial Use Determination.

(Use the following subsection .05 when contamination exceeds applicable DEQ cleanup levels or the site is listed by DEQ as a cleanup site or a leaking underground storage tank site.)

00294.05 Health and Safety Plan - Prepare a site-specific HASP that meets or exceeds the requirements of 29 CFR 1910.120 and include a personnel and equipment decontamination plan that details how decontamination media will be contained and disposed.

Maintain a copy of the HASP on site at all times and readily available to employees and inspectors during construction activities. If additional information becomes available regarding the site-specific conditions, revise the HASP and submit the revised version to the Engineer. Review or acknowledgment of the HASP by the Engineer is not an indication or representation that the HASP is fully compliant with State or federal requirements. Compliance is the responsibility of the Contractor. Review by the Engineer will not impose liability upon the Agency or relieve the Contractor of any responsibilities under the Contract.

Do not begin Work in contaminated areas until the Engineer provides written acknowledgement of the HASP.

All personnel entering contaminated areas shall follow the requirements of the HASP.

Labor

00294.30 Personnel Qualifications - Provide employees meeting the following requirements:

(Use the following HAZWOPER and Supervisor bullets and sub-bullets when the contamination is known to be greater than the applicable published DEQ RBC or the contaminated area is listed as (or is adjacent to) a cleanup site and encountering contamination is likely.]

- Hazardous Waste Operations and Emergency Response (HAZWOPER) trained workers (29 CFR 1910.120) that:
  - Have completed a 40-hour HAZWOPER training course.
  - Have completed an 8-hour HAZWOPER refresher training course within the last 12 months.
  - Participates in the HAZWOPER Medical Surveillance Program.

- A Supervisor that:
  - Has at least 2 years of experience cleaning up and managing contaminated Soil or groundwater in Oregon.
  - Meets the HAZWOPER training requirements plus completed an 8-hour HAZWOPER supervisor training course.

(Use the following bullet and sub-bullets when the contamination is something other than petroleum, is highly toxic, is a risk to workers, or is unusually complex.)

- A qualified health and safety professional that:
  - Has at least 3 years' experience in hazardous waste site work.
  - Meets the HAZWOPER training requirements.

(Use the following bullet when contaminated media requires segregation or field decision making,)

- An Oregon Registered Geologist or Professional Engineer who has experience handling contaminated media.

Construction

00294.40 Contaminated Soil Excavation - Excavate and handle contaminated Soil from Project excavations according to the following:

- Notify the Engineer at least 3 Calendar Days before beginning excavation activities within contaminated areas.
- Allow the Agency to collect Soil ***(***and groundwater***)*** samples during excavation activities.

(Use one of the following options as instructed. Delete the option that does not apply. Delete both if neither apply.)

[Option 1 - Use the following two bullets when the Contractor will field screen the soil.]

- Field screen Soil using instrumentation capable of detecting the contaminants identified for this Soil.
- Segregate non-contaminated Soil from contaminated Soil during excavation activities, based on the field screening and the provided contaminated Soil location information.

[Option 2 - Use the following two bullets when the Agency will field screen the soil.]

- Allow Agency access to field screen Soils for contaminants during excavation.
- Segregate non-contaminated Soil from contaminated Soil during excavation activities, as directed.

[End Option 2.]

- Load contaminated Soil directly into trucks and transport directly to the recycling or disposal facility, or on-site reuse areas or, when approved by the Engineer, temporarily store contaminated Soil on-site.

(Use the following bullet when temporary storage of contaminated soil may be allowed on-site. Fill in the blank with the contaminated soil location(s) where contamination is known to be greater that the applicable published DEQ RBC or the contaminated area is listed as (or is adjacent to) a cleanup site.)

- Store contaminated Soil from (site specific location) in covered watertight containers or place contaminated Soil on minimum 6 mil thick polyethylene sheeting that has an impermeable berm around the edge. Cover the contaminated Soil with minimum 6 mil thick polyethylene sheeting. Do not allow precipitation run-off to enter the excavated contaminated Soil. Label all stored material with the type of material, the contaminants, and the dates of accumulation.
- Remove contaminated media from the exterior of all vehicles before they leave the Project Site
- Cover trucks transporting contaminated materials to prevent spillage during transit to the disposal facility according to OAR 340-093-0220.
- Where over excavation is required, backfill the excavation according to 00330.42.

00294.41 Contaminated Soil Management - Reuse, recycle, or dispose of contaminated Soil according to any of the following:

(a) Landfill Disposal:

- Obtain the Engineer's approval of the disposal facility before disposing of the contaminated Soil.
- Transport the contaminated Soil to a DEQ permitted municipal solid waste landfill or a permitted construction and demolition landfill for disposal. Dispose of temporarily stored contaminated Soils within 30 Days of beginning excavation work or before Second Notification, whichever occurs first.
- Complete and sign all manifests and bill-of-lading forms for handling, loading, transporting, and disposing of the contaminated Soil.
- Pay all filing and permit fees.

(Use the following "recycling" bullets when recycling contaminated soil is allowed.)

(b) Recycling:

- Obtain the Engineer's approval of the recycling facility before disposing of the contaminated Soil.
- Transport contaminated Soil to a DEQ permitted recycling facility or asphalt batch plant. Recycle temporarily stored contaminated Soils within 30 days of beginning excavation or before Second Notification, whichever occurs first.

- Complete and sign all manifests and bill-of-Lading forms for handling, loading, transporting, and recycling the contaminated Soil.

Measurement

00294.80 Measurement - Work performed under this Section will be measured according to the following:

(Use the following paragraph when Pay Items (a), (b), (c), or (f) are included in the Pay Item list below.)

No measurement of quantities will be made for the following:

(Use the following bullet when Pay Item (a) is included in the Pay Item list below.)

- HASP.

(Use the following bullet when Pay Item (b) is included in the Pay Item list below.)

- Lead compliance plan.

(Use the following bullet when Pay Item (c) is included in the Pay Item list below.)

- Segregate and stockpile contaminated Soil.

(Use the following paragraph when Pay Item (d) is included in the Pay Item list below.)

Soil sample and analytical testing will be measured on the unit basis for each sample submitted and tested according to 00294.02 when test results are submitted according to 00294.03.

(Use the following paragraph when Pay Item (e) is included in the pay item list below.)

The quantities of contaminated Soil disposed will be measured on the weight basis, based on weigh tickets from the recycling or disposal facility.

Clearing and grubbing will be measured according to 00320.80.

Payment

00294.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

(Delete Pay Item (s) from the list that are not included in the Schedule of Items, but do not change the alpha characters next to the Pay Items.)

Pay Item	Unit of Measurement

(a) Health and Safety Plan ..... Lump Sum
(b) Lead Compliance Plan..... Lump Sum
(c) Segregate and Stockpile Contaminated Soil ..... Lump Sum
(d) Soil Sample Collection and Analytical Testing ..... Each
(e) Contaminated Soil Disposal..... Ton

(Use the following paragraph when item (c) is included in the Pay Item list above.)

Item (c) includes segregating, handling, and stockpiling contaminated Soil within the Project Site for the purpose of analytical testing, on-site reuse, or disposal.

(Use the following paragraph when item (d) is included in the Pay Item list above.)

Item (d) includes mobilization, Soil sampling, testing, analyses, and preparation of reports for tests required in 00294.02. Additional testing beyond that listed in 00294.02 will only be paid if authorized by the Engineer.

(Use the following paragraph when item (e) is included in the Pay Item list above.)

Item (e) includes all costs involved with the disposal of contaminated Soil at a recycling or disposal facility.

No separate or additional payment will be made for the excavation or reuse of contaminated Soil or contaminated shoulder soil. Payment will be included in payment made for the appropriate items under which the excavation or reuse of contaminated Soils or contaminated shoulder soil is required.

Clearing and grubbing will be paid for according to 00320.90.

Payment will be payment in full for removing and disposing of all Materials, and for furnishing all Equipment, labor, Plans, test results, and Incidentals necessary to complete the Work as specified.

End of Section

Section 00299 - Decommission Underground Injection Control Systems

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general do not re-number or re-letter subsections when item(s) are deleted. This Section requires SP00294 when contaminated soil will be encountered.)

Section 00299, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00299.00 Scope - In addition to the requirements of Section 00290, decommission underground injection control (UIC) systems according to the following Specifications.

Decommission the UIC systems indicated in Table 00299-1 below:

(Fill in the table with the required location, depth, width, description, and former use information.)

Table 00299-1

Location/Station	DEQ UIC #	Well ID #	Depth (feet)	Width (feet)	Description	Former Use

00299.03 Submittals - Provide the Engineer with the following information and documents for contaminated soil generated on this project, within 48 hours of completing or receiving them:

- DEQ notifications, correspondence, permits and reports.
- Reuse, recycling, and disposal receipts or other related documentation for the UIC systems.
- Sample data and analytical results.

Labor

00299.30 Personnel Qualifications - Provide contractors and workers meeting the following requirements:

- An Oregon Registered Geologist (RG) or Professional Engineer (PE) who has experience decommissioning UIC systems and handling contaminated media.

(Use this bullet when the UIC system contains contamination that is known or likely to exceed DEQ cleanup standards (for example: automotive UIC systems).)

- Workers meeting the HAZWOPER training requirements of 00294.30.

Construction

00299.40 Underground Injection Control System Decommissioning - Decommission UIC systems according to OAR 340-044-0040 and the following:

- Sample UIC contents and bottom materials and characterize for disposal and DEQ UIC closure requirements, based on past use, according to 00290.20(c).
- At least 30 Days before decommissioning, complete, sign and submit to DEQ and the Engineer, DEQ's UIC Registration Pre-Closure Notification Form, along with the UIC content analytical results and, if required by DEQ, a pre-closure plan stamped by a PE or RG.
- Pay all UIC decommissioning fees to DEQ.
- Obtain written approval from DEQ and proceed with decommissioning the UIC within the time frame specified in DEQ's approval.

(Use the following bullet when the UIC system is removed.)

- Remove the UIC by excavation and backfill according to 00330.42.

Use the following two bullets when the UIC system is left in place.)

- Obtain approval from DEQ and fill the UIC in place, using DEQ approved fill materials.
- Backfill the excavation according to 00330.42.

- Complete a closure report, signed and stamped by a PE or RG, and submit it to DEQ and the Engineer within 30 Days of finishing decommissioning work or before Second Notification whichever occurs first.

Information for decommissioning underground injection control systems is available on DEQ's Fact Sheet titled *Closure of an Injection System*.

(Use the following subsection .43 when contaminated soil will be encountered.)

00299.43 Contaminated Media - Excavate, transport, and dispose of contaminated media according to Section 00294.

Measurement

00299.80 Measurement – No measurement of quantities will be made for Work performed under this Section.

(Use the following paragraph when contaminated soil or groundwater will be encountered.)

Excavating, transporting, and disposing of contaminated media will be measured according to 00294.80.

Payment

00299.90 Payment – No separate or additional payment will be made for Work performed under this Section. Work performed under this section is incidental to 00310.

(Use the following paragraph when contaminated soil or groundwater will be encountered.)

Excavating, transporting, and disposing of contaminated media will be paid for according to 00294.90.

End of Section

SP00300 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00300 – ROADWORK

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00305 - Construction Survey Work

Comply with Section 00305 of the Standard Specifications modified as follows:

00305.00 Scope – Replace this subsection, except for the subsection number and title, with the following:

Provide construction survey work according to the current edition on the date of Advertisement, of the ODOT *Construction Surveying Manual for Contractors* with the following exceptions:

(Review the ODOT Construction Surveying Manual for Contractors and modify the bullets below accordingly.)

1.5 Agency Responsibilities: delete the following bullets:

- Perform a Pre-Construction Survey in accordance with Chapter 7 of this manual.
- Perform measurements and calculations for pay quantities.
- Perform final "as constructed" measurements.

1.6 Contractor Responsibilities: add the following bullets:

- Perform a Pre-Construction Survey in accordance with Chapter 7 of this manual.
- Perform measurements and calculations for pay quantities.
- Perform final "as constructed" measurements.

Staking is required when using Automated Machine Guidance.

Add the following subsection:

00305.40 Construction Staking:

(a) General - All survey work shall be conducted by or under the supervision of a Registered Professional Land Surveyor, licensed in the State of Oregon. The Contractor will be responsible for providing all construction staking as required to complete the Work.

(b) Stakes – Conspicuously mark construction and reference point stakes for construction. Inform employees and subcontractors of the importance and the necessity to preserve and protect construction staking.

Provide the following information on construction stakes:

- Engineer's station (on back)
- Offset from line (underlined)
- Offset from control point (circled)
- Cut or fill to grade
- Distance right or left from centerline on curb stakes (on back)

(c) Flagging Code - A color code may be established during the course of the project indicating specific colors for the various kinds of stakes to be set.

(d) Staking Frequency:

(1) Street - Prior to commencing construction, clearing limits shall be established.

a. Provide staking for roadway centerline at 50-foot intervals on tangents and 25-foot intervals on curves.

b. Where a significant (greater than 3-foot) cut or fill is required for sub grade, provide slope stakes and construction staking for sub grade.

c. Stake curb line by means of an offset line no more than 6 feet from the face of curb, show the cut or fill to the finish grade. Protect and save curb stakes for a period of 5 working days after construction of curbs to allow Inspector to review alignment and grade. Provide additional stakes at catch basins, curb inlets, points of curvature and tangency, and ends of curb radii.

(Delete (d) for projects where grade verifications points will be provided by the Contractor and reviewed by the Engineer.)

d. Stake base rock by painting an appropriate target on the curb and providing construction stakes (blue tops). On streets of 48 feet or greater width, provide blue tops at the quarter points as well as centerline. At intersections, provide blue tops along the centerline and gutter lines of the intersecting road.

(2) Sewer – Provide offset staking for line and pipe invert for gravity and pressure sewer lines at 50-foot intervals.

a. Provide finish grade as required.

b. Stake manholes with two reference points (swing-ties) indicating the center of the manhole, flow invert elevation, and finish grade. Upon the completion of sub grade, stake the top of the manhole with the finish grade and elevation by means of four offset stakes in a cross pattern so that the street slope and cross slope will be matched.

c. Stake services as required by the Engineer.

d. Agency reserves the right to increase staking to 25-foot intervals if grades sewer grades are not being met.

(3) Water – Provide offset staking for waterline line and grade at 50-foot intervals.

a. Stake two reference points (swing-ties) for fire hydrants indicating the center of the fire hydrants. Stake finish grade as required.

b. Stake services as required by the Engineer.

(4) Structures – Stake line and grade for all structures as shown on the plans or as directed by the Engineer.

Add the following subsection:

00305.41 Construction Stakes, Lines, and Grades:

(Use the following .41(a) for Private Development projects.)

(a) General – No work shall be performed until the Engineer inspects and approves stakes, lines, and grades. Work performed without field controls will be subject to removal at the contractor's expense.

(Use the following .41(a) for Capital Improvement projects.)

(a) General – No work shall be performed until stakes, lines, and grades have been established. Work performed without field controls will be subject to removal at the contractor's expense.

(b) Agency Responsibilities – The Engineer shall inspect Contractor's established lines, grades, Slopes, Cross Sections, and curve super-elevations for roadwork.

(c) Contractor Responsibilities – The Contractor shall:

- Lay out and set construction stakes and marks to establish the lines, grades, slopes, cross sections, and curve super-elevations for roadwork.
- Provide a set of construction stakes for line and grade for each phase of the Work.
- Set benchmarks and stakes for centerline of Bridges and bents.
- Calculate and provide finish deck grades.
- Inform the Engineer when stakes are available for inspection.
- Coordinate construction to provide sufficient area for performing surveying work efficiently and safely.
- Perform work in a manner as to preserve stakes and marks.
- Set any reference lines for automatic control from the control stakes.

End of Section

Section 00310 - Removal of Structures and Obstructions

(Note: Include Pay Item for "Removal of Concrete Barrier" when removal of concrete barrier work is included on the Project. Use either Lump Sum or Length unit of measurement. If Section 00820 "Remove and Reinstall Concrete Barrier" is also included in the project, do not include that quantity of barrier removal in this Section.)

Comply with Section 00310 of the Standard Specifications.

(Add the following subsection .45 when removal of underground injection control systems is required.)

Add the following subsection:

00310.45 Remove and Decommission Drywell and Drill Hole – Remove and decommission existing drywells and drill holes in accordance with Section 00299.

(Add the following pay items and paragraphs when removal of underground injection control systems is required.)

00310.92 Separate Item Basis - Add the following Pay Items to the Pay Item list:

(i) Removal of Drywells……..Each
(j) Removal of Drill Holes……..Each

Items (i) and (j) include soil sampling and UIC decommissioning per DEQ requirements.

Contaminated soil removal will be paid for according to 00294.90.

Work completed according to Section 00299 shall be incidental to this Section.

End of Section

Section 00320 - Clearing and Grubbing

Comply with Section 00320 of the Standard Specifications modified as follows:

00320.40(b)(3) Vegetation and Materials to be Saved – Add the following to the end of this subsection:

Where the plans call for the preservation of trees, provide a tree preservation plan a minimum of 7 Calendar Days prior to beginning clearing and grubbing. Include, at a minimum, the following in the tree preservation plan:

- Method of protecting each tree
- Trimming procedure
- Watering schedule
- Root cutting procedure

The Contractor shall routinely water the preservation zone to keep the area moist

As soon as possible, but not more than two weeks prior to any required construction in a preservation zone per the exceptions above, thoroughly saturate the preservation zone with water.

When necessary to excavate or trench through a preservation zone, trim all roots exposed by the excavation. Do not tear or pull roots from the ground with construction equipment but cleanly saw them immediately when exposed by the equipment. An exception shall be rock saws. However; however, rock saws shall be operated to minimize the shattering of roots.

Backfill trenches in a preservation zone as soon as possible to minimize the drying of exposed roots. Where trenches need to be open longer than six hours, cover with burlap and keep moist exposed roots on the trench wall sides.

(Use the following subsection .42 when salvaging of vegetation or natural materials is required.)

00320.42 Disposal of Matter - Replace this subsection, except for the subsection number and title, with the following:

Dispose of all matter and debris according to 00290.20. Open burning of materials is prohibited within the City limits.

00320.42 Ownership and Disposal of Matter - Vegetation and natural material designated for preservation and salvage are the property of the Agency. All other matter and debris accumulated from clearing and grubbing operations become the Contractor's property at the place of origin. Dispose of all matter and debris according to 00290.20.

End of Section

Section 00330 - Earthwork

Comply with Section 00330 of the Standard Specifications modified as follows:

00330.14 Selected Granular Backfill - Delete the sentence that begins "Reclaimed glass meeting the requirements of Section 02695…"

00330.15 Selected Stone Backfill - Delete the sentence that begins "Reclaimed glass meeting the requirements of Section 02695…"

00330.41(a)(4) Excess Materials - Replace this subsection, except for the subsection number and title, with the following:

If the quantities of excavated materials are greater than required to construct embankments and to do all filling and backfilling, the Contractor may use the remaining materials to uniformly widen embankments or to flatten slopes in a manner satisfactory to the Engineer.

00330.43(b) Moisture-Density Testable Materials – Add the following to the end of the subsection:

> **(3)** Place moisture-density testable material in nearly horizontal layers with thickness as necessary to meet the requirements of Section 00330.43(b)(2)(b) but not more than 18 inches.

(Use the following subsection .80 when earthwork quantities are less than 100 cubic yards and payment will be on the lump sum basis. Insert approximate quantity of earthwork in the blank.)

00330.80 Measurement – Add the following bullet:

- Lump sum basis, no measurement of quantities will be made. Approximately ____ Cubic Yards of earthwork will be required on this project.

00330.92 Kinds of Incidental Earthwork - Add the following bullet***(***s***)*** to the end of the bullet list:

- Excess material used to widen embankments or flatten slopes according to 00330.41(a)(4).

(Use the following bullet on projects with light grading, especially on urban projects, and when requested by the Project Leader, to eliminate separate measurement and payment for earthwork for driveways and road approaches. Do NOT use on projects involving driveways or road approaches with significant earthwork quantities.)

- Earthwork required for driveways and road approaches. Earthwork for driveways and road approaches will be that which is outside the Neat Line limits shown on the typical sections.

(Use the following subsection .95 when earthwork quantities are less than 100 cubic yards and payment will be on the lump sum basis.)

Add the following subsection:

00330.95 Earthwork Lump Sum Basis Payment – Earthwork will be paid for at the Contract lump sum amount for the item “Earthwork”.

End of Section

Section 00331 - Subgrade Stabilization

Comply with Section 00331 of the Standard Specifications.

End of Section

Section 00333 - Aggregate Ditch Lining

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00333, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00333.00 Scope - This Work consists of furnishing and placing aggregate ditch lining at locations shown or directed.

Materials

00333.10 Aggregate Ditch Lining - Provide hard durable rock or gravel with a moisture binder of clay material that provides a tight, erosion-resistant surface meeting the following grading requirements:

Sieve Size Passing	Percentages (by Weight)
6"	100
4"	30 - 50
2"	20 - 30
No. 200	15 - 25

Construction

00333.40 General - Place the aggregate material to the lines and grades established and as shown.

Measurement

00333.80 Measurement - The quantities of aggregate ditch lining will be measured on the area basis of the actual surface area of the wetted perimeter of the lined ditch.

Ditch excavation will be measured according to 00330.80 and 00330.81.

Payment

00333.90 Payment - The accepted quantities of aggregate ditch lining will be paid for at the Contract unit price, per square yard, for the item "Aggregate Ditch Lining".

Payment will be payment in full for furnishing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

Ditch excavation will be paid for according to 00330.90, 00330.91, and 00330.93.

End of Section

Section 00340 - Watering

Comply with Section 00340 of the Standard Specifications modified as follows:

00340.10 Water – Add the following to the end of this subsection:

For a charge, the City can provide water from a fire hydrant or similar source within the City's water service area. Application for a hydrant meter permit is available through the City Permit Center.

00340.80 Measurement – Replace this subsection title with the following:

Measurement, Method "A"

Add the following subsection:

00340.81 Measurement, Method "B" – Under this method, no measurement of quantities will be made.

00340.90 Payment – Replace this subsection title with the following:

Payment, Method "A"

Add the following subsection:

00340.92 Payment, Method "B" – Lump Sum Basis – Watering will be paid for at the Contract lump sum amount for the item "Watering".

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for obtaining permits, water rights, or any other costs related to complying with the "Oregon Water Laws".

When the Contract Schedule of Items does not indicate payment for Work performed under this Section, no separate or additional payment will be made. Payment will be included in payment made for the appropriate items under which this Work is required.

End of Section

Section 00350 - Geosynthetic Installation

Comply with Section 00350 of the Standard Specifications.

End of Section

Section 00390 - Riprap Protection

Comply with Section 00390 of the Standard Specifications.

End of Section

SP00400 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00400 – DRAINAGE AND SEWERS

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00405 - Trench Excavation, Bedding, and Backfill

(This Section requires SP00330 when Trench Foundation is required.)

Comply with Section 00405 of the Standard Specifications modified as follows:

00405.02 Definitions –

Common Excavation - Replace the definition with the following definition:

The removal of all material including excavation of rock that may require removal drilling and blasting, wedging, sledging, barring or breaking up with power tools.

Rock Excavation – Delete this definition

(The Agency does not differentiate between Common Excavation and Rock Excavation)

00405.12 Bedding - Replace this subsection, except for the subsection number and title, with the following:

For all pipes, unless otherwise directed, furnish ¾" – 0 base Aggregate conforming to 02630.10.

00405.13 Pipe Zone Material - Replace this subsection, except for the subsection number and title, with the following:

For all pipes, unless otherwise directed, 1"-0 of ¾" – 0 base Aggregate conforming to 02630.10.

> ***(Use the following subsection .14(a) when additional material sources may be available outside of the project limits. Material must be density testable, and the contractor must prove the material is appropriate for the anticipated loading.)***

00405.14(a) Class A Backfill – Add the following sentence to the end of the paragraph:

Material must be moisture-density testable.

00405.14(d) Class D Backfill – Replace this subsection, except for the subsection number and title, with the following:

Use native or common material that, in the opinion of the Engineer, meets the characteristics required for the specific loading or other criteria of the backfill zone. Material shall not exceed

3" in size with a minimum density of 90 pounds per cubic foot and must be moisture-density testable.

(Use the following subsection .41(a) when the open excavation method for installing pipes transversely is not permitted.)

00405.41(a) Within Paved Areas to be Preserved - Add the following to the end of this subsection:

Do not use the open excavation method for installing pipes transversely.

00405.42 Rock Excavation – Delete this subsection

(The Agency does not differentiate between Common Excavation and Rock Excavation)

00405.46(c)(2) Class A, B, C, or D Backfill – Add the following paragraphs to the end of the subsection:

Trench backfill shall be tested at one passing test for each 3 feet of fill and 100 LF of trench (e.g., 12-foot to 15-foot depth class shall require four to five tests per 100 LF or as directed by the Engineer. Passing test shall meet the requirements for trench compaction in that segment of trench backfill. Sampling locations shall be determined by the City of Bend. All results, including failing tests, shall be submitted to the City of Bend prior to any subgrade inspection.

All compaction testing shall be completed in the presence of a City of Bend representative. Where trench depths or conditions preclude density testing at deeper elevations because of worker safety concerns, the placement and compaction of backfill will be observed and documented on a full-time basis by contractor's qualified and approved personnel until backfill reaches an elevation at which density testing can commence. Establish compaction method and level of effort by compacting a test strip in an area that can be density tested.

Compaction testing shall remain current with the work being performed. Submit compaction reports within 7 Calendar Days of performing the test.

(The following paragraph may be deleted on projects that will have a full-time City of Bend Inspector)

All sampling and testing, including material certifying tests shall be performed by an independent testing laboratory.

00405.80 Measurement – Add the following paragraph to the end of the subsection:

No measurement will be made for rock or boulder excavation.

00405.81 Rock Excavation and Boulder Excavation – Delete this subsection

(The Agency does not differentiate between Common Excavation and Rock Excavation)

(Use the following subsection .90 when no Pay Items are included in the Schedule of Items for Section 00405.)

00405.90 Payment –

Delete pay items (a) and (b)

Add the following bullet to the list under the heading that begins “No separate or additional…”

- Rock or boulder excavation

Add the following paragraph to the end of this subsection:

When the Contract Schedule of Items does not indicate payment for Work performed under this Section, no separate or additional payment will be made. Payment will be included in payment made for the appropriate items under which this Work is required.

End of Section

Section 00412 - Cured-In-Place Pipe Lining

Comply with Section 00412 of the Standard Specifications modified as follows:

00412.01 Submittals – Replace this subsection, except for the subsection number and title, with the following:

Submit the following at least 10 Calendar Days before the preconstruction conference:

(a) Certification - Certification by the lining system manufacturer that the installer is licensed and certified as competent to perform the Work.

(b) Documentation showing the installer meets the qualifications listed in 00412.30, and a list of the key qualified personnel who are assigned to Work on this Project.

(c) Test Reports - Certification of test results confirming that the exact CIPP liner system to be used for this project meets the requirements for initial structural properties (performed in accordance with ASTM F1216, ASTM D638, and ASTM D790 or equivalent as approved) and chemical resistance (per ASTM F1216-Appendix X2). Submit calculations that provide extrapolated long-term test results per ASTM D2990 to support long-term flexural modulus per the design parameters listed in 00412.03. The initial data between time “0” and “1,000” hours must be excluded. If the architecture of the CIPP is such that the physical properties vary depending on the direction of testing (i.e., axial versus circumferential), submit test data on both directions in accordance with the test methods listed above in this paragraph.

(d) Technical Data - Catalog data, and manufacturer's technical data showing complete information on material composition, chemical and physical properties, and dimensions of system components of the tube and resin system. Include manufacturer's recommendation for allowable mixing, impregnation, and handling times, transportation and storage, insertion pressures, curing, trimming, finishing, data on the maximum allowable stresses and elongation of the tube, and repair of damaged liner. Specify resin color to be used.

(e) Calculations - Stamped design of the proposed liner according to 00150.35 and 00412.02 identifying the design methodology, assumptions, design criteria, safety factor and material properties.

(f) Resin Volume - Calculations for the volume of resin to be used for each segment and detailed description of the wet-out process. Include the tube and resin manufacturer's wet-out recommendations including the roller gap, material feed speed and vacuum requirements for each liner size and thickness. The volume calculations must be based on required finished liner characteristics and should account for tube void space, the structural condition of the host pipe, and predicted changes in the resin’s physical and chemical characteristics due to polymerization.

(g) End Seals - End seal material to be used, and method of installation. If a grout sealing method is proposed or suggested, provide certification from the grout manufacturer or supplier that the grout material for sealing structures and service laterals

is compatible with the proposed resin and liner system and is suitable for use in aqueous environments.

(h) Sampling and Testing Plan – Provide a sampling and testing plan for physical properties according to ASTM F1216 and ASTM F1743, including name and location of independent third-party laboratory performing testing on installed liner system. Provide certification that the independent third-party laboratory has the appropriate accreditation for each specified tests to be performed. Include proposed methods, locations, and proposed chain-of-custody process for sample delivery to the City's Construction Manager. Refer to requirements in Specification Section 00412.72. Chain of Custody Form is provided at the end of this Specification Section.

(i) Installation Plan - Description of the pipe lining and curing process including staging and insertion locations (typically includes an incomplete cure log for each shot). The plan must also include specific curing times and pressure specific to each liner segment and address project design parameters and site conditions. If possible, include a contingency curing cycle in the event temperatures fall over or under the liner system manufacturer's recommendations. Identify in the description the type of temperature sensors that will be used, their proposed locations, and recording method and/or equipment. Include in the overall installation plan the method and sequence of lateral reinstatement, including the method for addressing lateral protrusion.

Include a control protocol for each installation. The control protocol must include certification of approval by the liner manufacturer, including the following minimum information:

(1) Date and time
(2) Length of liner
(3) Location of installation
(4) Curing Speed
(5) Inner air or water pressure
(6) Exothermic (curing) temperature

(j) Shot Schedule - Include a schedule detailing when the work is to begin and the order of locations to be completed.

(Use the following subsection .01(k) when allowing the use of resins containing styrene. Resins containing styrene are commonly used and less expensive, but styrene is regulated as a carcinogen. There are best management practices that can be used during installation to mitigate exposure. The other option is to require the use of styrene-free resins. Styrene-free resins tend to be more expensive, can increase installation costs, and are not as widely used. In most cases, resins containing styrene are recommended for use. However, when lining a pipe with sewer services connected to a hospital, healthcare facility, nursing home, or any location where you may have people with compromised respiratory systems, the use of styrene-free resin is recommended.)

(k) Styrene Control Plan – When resins containing styrene are proposed for use, include a detailed description of the styrene mitigation plan for reducing the styrene concentrations in all discharged process water to 2.5 mg/L or less. Plan shall also provide details for the water sampling methods and analytical analysis procedures to demonstrate

compliance with this requirement. In addition, provide a plan for controlling the airborne concentration of styrene to below OSHA and NIOSH limits.

(l) Pipe Access - Identify all required manhole, structure or pit access for CIPP installation. Identify required modifications to existing facilities and describe proposed preparation, modification, preservation, and restoration activities. Include sketches, shop drawings and/or engineered repair drawings as required. Include locations of intermediate pipe access and proposed repair plan that meets the requirements of the Contract.

(m) Lateral Reinstatement Plan - Include method, materials and personnel assigned to do the work.

(n) Liner Repair Plan - Contingency repair plan including methods and equipment to be used to repair or replace unacceptable liner defects identified in 00412.73. Liner Repair Plan approval is required prior to making each repair.

Submit the following for review, during construction:

(o) Wet Out Logs - Document resin volumes used and provide logs upon delivery of liner system to project site. Provide certification by the person responsible that the entire wet out process, including handling and delivery to the site, followed the defined procedures.

(p) Cure Logs – Record installation data and submit cure log upon completion of the installation.

(Use the following subsection .01(q) when allowing the use of resins containing styrene.)

(q) Air Test for Styrene Logs – When resins containing styrene are proposed for use, document gas levels as required in 00412.47 during the installation and curing process.

(Use the following subsection .02 to list the CIPP design parameters. Obtain the parameter information from the Designer. For pipe ovality, 2% is recommended for pipes less than 24-inches in diameter and 5% for pipes 24-inches or larger diameter. Designer to consider whether to represent Long-Term Flexural Strength and Modulus of Elasticity as shown below ([percent of ASTM D790] or in psi. For example, short-term flexural modulus and long-term modulus when tested in accordance with ASTM D790 for Standard Polyester would be specified as 250,000 psi and 125,000 psi, respectively. Short-term flexural modulus and long-term modulus when tested in accordance with ASTM D790 for Enhanced Polyester would be specified as 400,000 psi and 200,000 psi, respectively. Also note that this specification is specific to lining gravity sewer piping. Designer will need to reevaluate the liner material and strength being specified if CIPP lining methods are to be used for lining pressure piping [e.g. sewer forcemain, water].)

00412.02 Design Parameters – Replace the following parameters for the conditions in the table:

Condition	Parameter

Pipe Ovality…….. 2%
Long-Term:
Flexural Strength ……..…… 90%* of Initial (ASTM D790)
Modulus of Elasticity……..… 50%* of Initial (ASTM D790)
Groundwater Elevation above invert……. _____

*Unless long-term test results are provided that substantiate a greater retainage.

Add the following to the end of this subsection:

Condition	Parameter
Poisson's Ratio ……	0.3
Service Temperature Range ……..……	140 degrees

00412.10 Tube –

Add the following to the end of the bullet list:

- Before inversion, tubing is coated with an impermeable, flexible material on the outside layer of the tube.

Add the following paragraph to the end of the subsection:

Fabricate the tube to a size that when installed, conforms to the internal circumference and length of the host pipe. Make allowance for circumferential or longitudinal stretching during inversion.

(The OSSC specification allows the use of polyester, vinyl ester, or epoxy resin. Polyester is styrene-based, vinyl ester can be styrene-based or styrene-free, and epoxy is styrene-free. Additional edits to subsection .11 may be required by the Designer if a particular type of resin is specified for use [styrene vs. styrene-free].)

00412.11 Resin – Add the following paragraph to the end of the subsection:

The curing initiation temperature shall be as recommended by the resin manufacturer. No onsite or mobile impregnation is allowed.

Add the following subsection:

00412.13 Pipe Liner End Seals – The hydrophilic end seals completely seal the liner from any annular space leakage between the liner and the host pipe. Hydrophilic end seals must be one of the following:

(a) Bands that are 20 mm wide and 5 mm high, with a double bump on one side and flat on the other side. Product shall be Hydrotite Style DS-0520-3.51 or approved equal.

(b) Tubular hydrophilic sleeve, 2 mm in thickness and 3.5 inches in length, with a mechanical fastener with worm gear expander. Product shall be Insignia End Seal by LMK Technologies, or approved equal.

Add the following subsection:

00412.14 Temperature Monitoring Equipment - Provide full-length monitoring equipment that takes continuous temperature readings with sensors placed a minimum of 10 feet between sensors for the entire length of the pipe being lined for pipes 24-inches and larger. Use equipment that includes both the software and the hardware necessary to operate and monitor the system. Provide certified, hardcopy of temperature monitoring results to the Agency.

00412.30 Personnel Qualifications – Replace this subsection with the following:

(Designer shall discuss with City Procurement whether prequalification of Contractors is necessary for the Project or whether minimum qualifications shall be stated in the Qualifications section below (modify as needed). Prequalification is recommended in most cases unless due to pipe size, contract size (cost), and/or criticality of pipe(s) being lined are deemed to not be of high enough risk to the City to warrant prequalification. Note that there is a requirement for the Contractor to submit an Affidavit of Qualifications as a part of their bid forms certifying that they meet the minimum requirements listed in the specification. Coordinate with City Procurement to include the Affidavit of Qualifications form in the Bid Documents. If prequalification is desired in lieu of Affidavit of Qualifications, City Procurement can provide a template for prequalification.

For small diameter installations [less than 24-inches in diameter] consider removal of requirements for large diameter piping listed in sections (a), (b), and (c) below.)

00412.30 Qualifications – Contractor shall submit an Affidavit of Qualifications included in the Bid Submittal Forms at the time of bid certifying the following minimum qualifications are met:

(a) CIPP System Manufacturer: The CIPP system must have a minimum proven performance record of 1,000,000 linear feet installed of the exact name-brand product bid in the United States, with a minimum of 20,000 linear feet in diameters 24-inch or larger over the last five years. In addition, a minimum of 10,000 linear feet of 36-inch diameter or larger, of the exact name brand product must have been installed in the United States.

(b) Installer Experience: The Installing Contractor for the cured-in-place reconstruction of sewers must have a minimum of five years of experience using the exact named product proposed and have installed at least 300,000 linear feet of the exact named proposed product including at least 20,000 feet of 24-inch diameter or larger cured-in-place product. Documentation along with contact names and telephone numbers from the last ten projects shall be submitted.

(c) On-Site Field Superintendent: The Superintendent must have a minimum of five years of experience with cured-in-place pipe products. In addition, the Superintendent must have supervised jobs in which at least 20,000 feet of pipe has been reconstructed using the exact named product proposed including a minimum of 5,000 feet of 24-inch diameter or larger cured-in-place product. The Contractor shall submit information to document this requirement. The Superintendent for the Project shall be on-site during all phases of the work involving any pre- and post-installation video inspection, sewer cleaning or insertion and processing of the CIPP.

Add the following subsection:

00412.31 Labor Requirements – Crews and key personnel are not to work more than a maximum of 12 hours per 24-hour day, or as otherwise approved.

Staff the project with the key individuals as specified, and who will be available for the project duration.

00412.40 General – Add the following to the end of the subsection:

(a) Water and Electric Service - Furnish and supply generators or obtain temporary power to provide all electric power required for installation. Obtain a permit and pay all fees required for use of any hydrant per Specification Section 00340.

(b) Diversion of Flow - Furnish, install, maintain and operate a flow diversion system as needed, and in accordance with Section 00490.

(c) Receiving and Insertion Locations - Locate all manholes or pits to suit the pipe lining operation. Use existing manholes where practical. Remove manhole flattops and cones, inverts, benches, and channels to permit access for installation equipment, if required. Enlarge the incoming and outgoing pipe openings, if required, to accommodate the maximum outside diameter size of the insertion equipment. Do not put undue stress on existing structures. In areas where existing manholes are not available, intermediate access pits may be excavated and utilized at no additional cost to the City. Intermediate pipe repair and restoration must be done in accordance with the Drawings at no additional cost to the City. Manned entry in unlined pipe is not allowed. If manned intermediate access is required, an access pit must be dug at the required location.

(d) Customer Notifications

(1) The Contractor shall contact all residential and commercial customers whose service is to be interrupted by rehabilitation work or who may be affected by upstream or downstream rehabilitations. The customer shall be informed that they will be temporarily out of service. This notification shall be made a minimum of 48 hours prior to beginning rehabilitation work.

(2) For all residences the Contractor shall leave a door hanger detailing the service outage and providing contact information. Door hanger samples shall be submitted to the Engineer for review and approval. The Contractor shall also advise those customers against water usage until the mainline and lateral are back in service. After completing the necessary work on the main line and lateral to allow their reuse, the Contractor shall advise those customers that the sewer is back in service.

(3) All customer notification documentation and procedures shall meet the requirements of the Owner.

(e) Service Interruption Duration - Should a condition arise that the Contractor cannot restore service within 12 hours of service interruption; the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

00412.41 Pipe Cleaning – Replace this subsection, except for the subsection number and title, with the following:

Refer to Section 00415.40(c) for pipe cleaning requirements.

00412.43(a) General - Replace the sentence that begins “Do not allow…” with the following:

Do not allow the temperature of water discharged from processing liners to exceed 77 degrees Fahrenheit unless DEQ, upon the request of the City, approves alternate temperature limits not to exceed 125 degrees Fahrenheit.

00412.43(b) Pipe Liner End Seal - Replace the sentence that begins “Install an end seal…” and replace with the following:

Install a continuous or properly trimmed end seal between the ends of the new pipe liner and the host pipe connection. Insert end seals at each structure opening approximately 3 inches max, 2 inches min from inside of structure wall to the inside edge of the end seal. For bands, butt-up trimmed end seal edges against each other at the crown of the pipe using a miter cut. Seals that have any gap between the ends will be rejected and repaired with an internal joint seal, or as approved, at no additional cost to the City.

00412.43 Installation - Add the following to the end of the subsection:

(c) Wet Out - Impregnate ("wet out") the tube with resin using distribution rollers and vacuum, or other approved method, to thoroughly saturate the tube prior to its dispatch. Transport and store the impregnated liner in a refrigerated truck or container until installation in such a manner that it will not be damaged, exposed to direct sunlight, or result in any public safety hazard.

Use a sufficient quantity of resin to fill air voids and include additional allowance for polymerization and for any migration of resin into cracks and joints in the host pipe.

The City reserves the right to check, verify or inspect all phases of production including manufacturing, shipping, wet-out, installation, cure, and/or finished product. Any departure from the submitted procedures may be cause for rejection.

(d) Transport and Storage - Transport and store the impregnated tube at the site in such a manner that it will not be damaged, exposed to direct sunlight, or result in any public safety hazard. Inspection and review of all materials will be conducted prior to installation.

The City reserves the right to check, verify or inspect all phases of production and testing of materials from manufacturing, shipping, installation, cure, to finished product. Any departure from the submitted procedures will be cause for rejection.

(e) Insertion - Prior to insertion mark the exterior of the manufactured tube along its length at regular intervals not to exceed five (5) feet. Use the marks to measure elongation during insertion. The tube will be rejected and replacement required if the overall elongation of a tube reach exceeds five percent (5%), or as otherwise approved.

Maintain the pressure required to hold the flexible tube tight against the host pipe, per the manufacturer's recommendations, until curing is complete. No other depressurization outside of the range required by the manufacturer for curing is permitted until the tube is fully cured and cooled. Capture and clean up all escaped resin.

(f) Curing - Use a suitable source of hot water or steam and a recirculation system capable of delivering the required amount of heat uniformly throughout the segment for a complete cure of the resin.

Fit the heat source with monitors to gauge the temperature of the incoming and outgoing heat supply. Install full-length temperature monitors prior to installing the liner. Additionally, place remote sensing devices (such as thermocouples) between the impregnated tube and the invert and crown of the host pipe at each manhole to determine the temperatures during the resin cure process. Modify the curing process if curing temperatures are above or below the resin manufacturer's recommendations, as approved.

(g) Cool Down - Use a controlled cool-down process to cool the hardened pipe to a temperature in accordance with resin manufacturer's recommendation. Obtain the recommended cool temperature before relieving the static head or pressure in the lined pipe and returning normal flow back to the system. Take measures to release the pressure so that a vacuum will not develop and damage the newly installed CIPP system.

(h) Pollutant Control – Water, condensate, or any other material must not have a styrene concentration greater than 2.5 mg/L for discharge into downstream pipes that are carrying live sanitary flows. No water can be discharged until water chemistry compliance is met. Contractor can utilize available downstream sewer, prior to live waste streams, for short term (48 hour) storage of water utilized in CIPP installation. Water, condensate, or any other material that exceeds this concentration must be captured or treated prior to discharge into the City's sanitary sewer system. The use of styrene reducing agents will be allowed upon approval by the engineer. Styrene mitigation controls must be approved and fully operational prior to any lining work being completed.

Set up containment barrier to capture the release of any inversion, cure, steam condensate, cool-down, or flushing water. All inversion, cure, cool down, flush water and steam condensate that does not meet the requirements listed in the previous paragraph must be treated prior to discharge or contained and shipped off-site for disposal at an approved disposal facility.

Sample process water and submit to a third-party laboratory for analysis of VOCs. Submit all chain-of-custody forms to the Engineer. Analytical results demonstrating compliance with the maximum styrene concentrations must be provided within 24 hours following the initial installation and prior to the discharge of any additional process water.

00412.44 Service Line Reconnection - Replace this subsection with the following:

00412.44 Lateral Service Line Reconnection - Internal

(a) After the CIPP has been cured, the existing service connections and laterals shall be reinstated. In general, reinstatement of service connections and laterals shall be accomplished internally, without surface excavation, using a remote control cutting device

equipped with a television monitor. Reopened services shall be wire brushed to the satisfaction of the Engineer. In some cases, remote reinstatement may not be possible. In these instances, reconnection by excavation as specified below is acceptable. All connections must be reinstated by at least 95-percent of the original opening. Holes cut outside the lateral opening or oversized cutting (more than 100%) must be repaired at the Contractor's expense per Specification Section 00412.73. Particular attention shall be given to the lower quadrant of the opening to ensure that no accumulation of solids or debris will occur at the service tie-in.

(b) All capped or factory plugged service connections shall not be opened unless otherwise directed by the Engineer.

(While rare, if the Contractor is unable to find a lateral location with the internal robotic cutter after lining the mainline pipe, digging up the service lateral may be required. Section 00412.45 discusses the process of reconnecting a lateral via excavation.)

Add the following subsection:

00412.45 Lateral Service Line Reconnection – By Excavation

(a) General - Sewer lateral house connections accomplished by excavation shall be connected to the pipe by dual-strapped saddles. The Contractor shall connect existing sewer house lateral service pipe to the saddle using a flexible coupling. After connection to the saddle, the sewer house connection pipe shall have a slope toward the newly lined sewer equal to the pre-existing on the lateral pipe or a minimum of two percent.

(b) Execution

(1) The Contractor shall excavate the area of the lateral connection so that the host pipe and existing connection is exposed. The host pipe shall be broken back or removed in such a manner that the new CIPP liner is exposed without causing damage to the liner.

(2) An appropriately sized hole acceptable to the Engineer shall be cut into the CIPP using a circular hole cutter. Hanging or loose cuttings shall be removed so that the newly opened hole is smoothed around its edges.

(3) A sealant compatible with CIPP and acceptable to the Engineer shall be liberally applied around the newly cut hole to form a watertight seal between the CIPP liner and PVC pipe saddle used to make the connection.

(4) A dual-strap PVC pipe saddle acceptable to the Engineer shall be secured to the CIPP in accordance with the manufacturer's recommendations.

(5) Before the service lateral pipe is connected to the saddle, the Contractor shall hand wipe a hydrogen sulfide resistant composite epoxy resin mixture inside the saddle where the saddle and CIPP surfaces meet to ensure a watertight seal.

(6) The Contractor shall connect the lateral service pipe to the saddle according to the manufacturer's recommendations and in a manner acceptable to the Engineer.

Add the following subsection:

00412.46 Manhole Restoration and Structure Connections - After the cool down is complete, perform final trimming and sealing of the liner at access structures to provide watertight pipe and structure seals. Neatly and smoothly trim the finished ends of the liner to within one inch of access structure wall. Provide a smooth transition between the existing structure channel invert and the liner using cementitious or other approved material to prevent settling of sediments or debris from catching on the liner or ponding of any standing water in the access structure. Seal all holes and voids in manhole and structure walls immediately surrounding the new liner with a chemical grout, compatible with the resin mixture of the liner.

Reinstall manhole cones, slabs, grade rings, frames, covers, inverts, and reconstruct benches and channels after each pipe liner installation. Internal rehabilitation of manholes is not permitted until after the liner is installed and accepted.

Repair intermediate access points in accordance with the Drawings.

(Include Section 00412.47 if resin containing styrene is used. Designer to note required monitoring locations on the Plans or modify language in section below as needed.)

Add the following subsection:

00412.47 Styrene Gas Emission Monitoring - Styrene gas emissions inherent in the CIPP installation process shall be monitored at the specified locations by the Contractor as required. OSHA standards provide a guideline for Recommended and Regulatory Limits for Styrene PPM in the OSHA Z-2 Table.

Styrene gas emission monitoring shall be performed at the manhole locations identified on the Plans. Readings shall be taken directly at 5 ft downwind, 15 ft downwind, and 30 ft downwind from the outlet with the highest release of steam from the system during the installation and curing process. The styrene gas emissions shall be recorded on the Styrene Gas Emissions Monitoring Form included at the end of this Specification Section for each test conducted.

00412.71 Post Installation Video Inspection - Replace this subsection, except for the subsection number and title, with the following:

After completing each segment of pipe liner installation, reconnecting service laterals, and final cleaning, perform video inspection of the completed work according to 00415.

00412.72 Material Sampling and Testing - Replace this subsection, except for the subsection number and title, with the following:

(It is recommended samples be kept/stored for the duration of the warranty period. The samples would typically be stored by the City. Designer to discuss with City.)

(a) Sample Preparation and Collection – For each installation, prepare at least two samples. Immediately deliver to the City one sample of each completed liner segment. Any sample removed from the project site without approval will be rejected. Obtain samples in accordance with ASTM 1216 and F1743. Send the second sample for testing per 00412.72(b).

Samples must large enough to provide five specimens for short-term flexural property tests. For flexural properties, the full wall thickness of the CIPP samples will be tested. Exterior film thickness will be subtracted from the measured thickness. The film will be physically removed from the specimen prior to testing. Determine sample size based on installed liner thickness, assuming a uniform non-reinforced felt tube, and ASTM D790 which requires use of a minimum 16:1 span-to-depth ratio plus 2 inches and a maximum 4:1 span-to-width ratio for each of the five specimens taken from the sample.

For each sample, individually label and fill out the Chain of Custody Form (provided at the end of this Specification Section) with the following information:

- Project number and name
- Name of contractor
- Name of person taking sample and their employer
- Sample number. Use a unique number for each sample.
- Manhole-to-Manhole segment number
- Initial cure start date and time, sampling date and time, and location of the sample within the manhole-to-manhole segment.
- Type of sample (restrained, plate or core)

Contractor shall provide the Chain of Custody Form to the Agency or City Project Representative along with sample.

(b) Plate Samples – Where creation of restrained samples are not possible, prepare plate samples from material taken from the same tube and resin/catalyst system used during the wet out. Cure plate samples in a clamped mold, placed either in the down tube when circulated heated water is used, or in the silencer when steam is used, and in accordance with the Inspection Practices section of ASTM F1216 or F1743.

(c) Testing – Send one sample per installation to a certified AL2A laboratory for testing according to ASTM D790. Submit signed, dated and timed copies of all test results to the City. Physical properties of the installed CIPP will be confirmed in accordance with ASTM F1216 and F1743 and pursuant to the following additional criteria:

(1) Thickness - Thickness will be measured in accordance with ASTM F1216, D5813, & D3567.

Ultrasonic pulse echo, per ASTM E797, may be used as an alternate method of measuring thickness, as approved and at no additional cost to the City. If ultrasonic pulse echo is used, use a minimum of 8 evenly spaced measurements around the internal circumference of the installed CIPP within the host pipe at a distance of 12 inches to 18 inches from the end of the pipe. Record a minimum of 16 evenly spaced measurements.

If the ultrasonic method is used, use the flaw detector with A-scan display and direct thickness readout, as defined in 6.1.2 of ASTM E797. Manufacture a calibration block from the identical materials used in the installed CIPP to calibrate sound velocity through the liner. Calibrate the transducer daily in accordance with the equipment manufacturer’s recommendations. Calculate the average thickness using all measured values and verify it meets or exceeds the minimum design thickness as agreed upon between purchaser and seller.

(2) Short-Term Flexural Properties – Submit test results for flexural strength and flexural modulus properties per ASTM D790.

If plate samples are used to determine initial flexural modulus according to 00412.72(a) then a reduction factor of 20% will be applied to the measured value (i.e. measured value x 0.80).

(d) Retesting – If any test fails, collect and deliver additional samples to the City's Construction Manager for re-testing. If the second samples fail, bring the liner into compliance by methods described in 00412.73.

00412.73 Repairs – Replace the bullet list with the following:

- Radially positioned (perpendicular to flow) wrinkles, fins or other discontinuities in the lower third of the pipe which exceed ½ inches in height.
- Radial wrinkles, fins or other discontinuities in the upper two-thirds of the pipe which exceed 1-inch in height, unless approved.
- Gouges, holes or tears.
- Areas of pin holes
- Soft spots
- Leakage through the liner.
- Separation of the liner from the existing pipe.
- Delamination of liner layers.

If an installed liner has unacceptable wrinkles, fins, discontinuities, leakage, delamination, pinholes, gouges, tears, soft spots, blisters, failed tests, or other defects, submit to the City's Construction Manager a repair plan to remedy the defect(s). The City reserves the right to require the installation of a second liner, removing and re-installing a full-thickness liner, constructing a full pipe replacement, or installing a liner repair, as approved. After remedial measures are performed to bring the liner system into compliance with conformance standards, conduct additional testing as required by the City per 00412.72.

00412.80 Measurement – Add the following at the end of the section:

Styrene gas emissions monitoring will be measured on a unit basis for each identified testing location.

00412.90 Payment –

Replace pay item "(b) Service Line Reconnections" with the following:

Pay Item	Unit of Measurement
(b) Service Line Reconnections - Internal	Each
(c) Service Line Reconnections - Excavation	Each
(d) Styrene Gas Emissions Monitoring	Each

Add the following to the end of the subsection:

Flow diversion will be paid for according to Section 00490.

No separate or additional payment will be made for:

- Temporary manhole modifications/repairs to provide access for performing the work.
- Installation of end seal material or addressing deficient end seals.
- Removal of protruding taps, tree roots, controlling leaks, and other cleaning activities during host pipe preparation process.
- Sampling and testing.
- Removal, repair, or replacement of CIPP liners the are determined to be noncompliant with 00412.73.
- Additional testing, cleaning, and video inspection required as a result of correction of unsatisfactory work.
- Internal reconnection of existing service laterals.
- Temporary manhole access ramp construction and removal.
- Intermediate pipe access and repair, backfill, and restoration.

Add the following subsection:

00412.91 Payment Deduction - Payment will be based upon the Contract Unit Price and test results acquired in accordance with 00412.72. Should test results fail to meet the specified design parameters for thickness and initial modulus of elasticity, yet comply with Conformance Standards in 00412.73, a payment deduction will be made according to the Payment Formula below.

Payment = Length Installed x Contract Unit Price x (Actual Safety Factor/Design Safety Factor)

The Actual Safety Factor will be calculated using the governing design equations (i.e. equations yielding the greatest minimum thickness) from ASTM F1216-Appendix X1. The measured thickness, measured flexural strength, and measured initial flexural modulus will be substituted for their respective design values while the remaining design parameters specified in 00412.03 are held constant. The Design Safety Factor is specified in 00412.03.

No additional payment is made for CIPP exceeding required design safety factor. The CIPP will be considered Defective Work if the actual safety factor is below 1.0. The City reserves the right to require the Contractor remove and replace Defective Work, at its sole discretion.

Styrene Gas Emissions Monitoring Form

Project: _____
COB#: _____

Styrene gas emission monitoring shall be performed at the manholes specified in the Plans. Contractor shall coordinate with the City of Bend to have a representative of the City or the Engineer present while the test is conducted.

Readings shall be taken directly at 5 ft downwind, 15 ft downwind, and 30 ft **downwind from the outlet with the highest release of steam from the system during off-gassing**.

Date of Test:	
Manhole No.:	
Name of Person Conducting the Test:	
Name of City Representative Present:	
Styrene Gas Emission Readings (PPM)	
5 ft Downwind	
15 ft Downwind	
30 ft Downwind	

The results of testing shall be submitted to the City as soon as they are available and not more than 3 days after the test is conducted.

Chain of Custody Form
CIPP Liner Test Samples

City Contract Number: Click here to enter text.

Project Name: _____

Client: _____

Sample ID: _____ (Must be a unique identification number.)

Sample Location: _____ (Manhole-to-Manhole Segment Number)

Sample Type: _____ (Restrained, flat plate)

Pipe Diameter (Inches): _____ Liner Thickness (mm): _____

Initial Cure Date and Time: Click here to enter a date. at _____ (AM/PM)

Date and Time Sample Taken: Click here to enter a date. at _____ (AM/PM)

Sample Taken by: _____ (Installer Signature)

Witnessed by: _____ (Inspector Signature)
Test results will not be accepted without inspector's signature.

Shipped By: _____ (Shipper Name) Shipment ID: _____

Testing Laboratory: _____ (Lab Name)
To be filled out by testing lab: (Or attach lab form)

Date Sample Received: Click here to enter a date.

Date Sample Tested: Click here to enter a date.

Tested By: _____ (Lab Technician Signature)

Comments: _____

Attach test results to this form and return to Owner at:

Test Results Received By: _____ (Owner Signature)

Date Results Received: Click here to enter a date.

End of Section

Section 00413 – GRP Cured-In-Place Pipe Lining & UV Care

Comply with Section 00413 of the Standard Specifications modified as follows:

00413.01 Submittals – Replace this subsection, except for the subsection number and title, with the following:

Submit the following at least 10 Calendar Days before the preconstruction conference:

(a) Certification - Certification by the lining system manufacturer that the installer is licensed and certified as competent to perform the Work.

(b) Documentation showing the installer meets the qualifications listed in 00413.30, and a list of the key qualified personnel who are assigned to Work on this Project.

(c) Technical Data - Manufacturer's technical data showing complete information on material composition, chemical and physical properties, and dimensions of system components of the tube and resin system. Include manufacturer's recommendation for allowable mixing, resin saturation, and handling times, transportation and storage times and storage requirements, insertion pressures, curing, trimming, finishing, and data on the maximum allowable stresses and elongation of the tube.

(d) Calculations - Stamped design of the proposed liner according to 00150.35 and 00413.02.

(e) Test Reports - Independent third-party certification of test results demonstrating that the exact resin/liner combination to be used for this project meets the requirements for initial structural properties (performed in accordance with ASTM F2019, ASTM F1216, ASTM D638, and ASTM D790 or equivalent as approved) and chemical resistance (per ASTM F1216-Appendix X2). Submit calculations that provide extrapolated long-term test results per ASTM D2990 to support long-term flexural modulus per the design parameters listed in 00413.03. The initial data between time “0” and “1,000” hours must be excluded. If the architecture of the UV-CIPP is such that the physical properties vary depending on the direction of testing (i.e., axial versus circumferential), submit test data on both directions in accordance with the test methods listed above in this paragraph.

(f) Resin Volume - Calculations for the volume of resin to be used for each segment including the calculated amount of excess resin necessary to achieve full saturation and detailed description of the resin impregnation (“wet out”) process. The volume calculations must be based on required finished liner characteristics and should account for tube void space, the structural condition of the host pipe, and predicted changes in the resin’s physical and chemical characteristics due to polymerization. Include the tube and manufacturer's resin impregnation (“wet out”) recommendations including the roller gap, material feed speed and vacuum requirements for each liner size and thickness. Upon liner system delivery, submit impregnation (“wet out”) logs documenting resin volumes used.

(g) Installation Plan - Detailed installation plan describing the pipe lining installation and curing process, project staging, insertion locations, liner shot plan and sequence, and the manufacturer’s standard procedures for liner installation. Include materials and

equipment (e.g., UV light train) to be utilized and list of tasks associated with each installation. The description must include the resin manufacturer's curing cycle with temperatures and pressure requirements measured continuously and recorded at intervals no less frequently than every 5 minutes. The curing cycle must be specific to each liner segment and address project design parameters and site conditions. If possible, include a contingency curing cycle in the event temperatures fall over or under the liner system manufacturer's recommendations. Identify in the description the type of temperature sensors that will be used, their proposed locations, and recording method and/or equipment. Include in the overall installation plan the allowable pulling forces, temperature monitoring plan, speed of the UV light train for proper curing of the installed liner, and method and sequence of lateral reinstatement, including the method for addressing lateral protrusion.

Include a control protocol according to Section 6.7 of ASTM F2019 for each installation. The control protocol must include certification of approval by the liner manufacturer, including the following minimum information:

(1) Date and time
(2) Length of liner
(3) Location of installation
(4) Curing speed
(5) Light sources and wattage
(6) Inner air pressure
(7) Exothermic (curing) temperature

(h) Shot Schedule - Liner shot and curing schedule for each installation and the order of locations to be completed. Include curing log and pressures at the upstream and downstream end of the pipe during the curing process.

(i) End Seals - End seal material to be used, and method of installation. Hydraulic cements and quick-set cement products are not acceptable.

(j) Pipe Access - Identify all required manhole, structure or pit access for CIPP installation. Identify required modifications to existing facilities and describe proposed preparation, modification, preservation, and restoration activities. Include sketches, shop drawings and / or engineered repair drawings as required. Include locations of intermediate pipe access and proposed repair plan that meets the requirements of the Contract.

(k) Lateral Reinstatement Plan - Include method, materials and personnel assigned to do the work.

(l) Sampling Plan - Field sampling and testing plan for physical properties according to ASTM F2019. Include proposed methods, locations, and proposed chain-of-custody process for sample delivery to the City's Construction Manager. Include the name and location of independent third-party laboratory performing testing on the installed liner system. Provide certification that the independent third-party laboratory has the appropriate accreditation for each specified tests to be performed. Refer to requirements in Specification Section 00413.72. Chain of Custody Form is provided at the end of this Specification Section.

(m) Liner Repair Plan - Contingency repair plan including methods and equipment to be used to repair or replace unacceptable liner defects identified in 00413.72. Include a detailed description of methods and materials required to repair typical and isolated minor liner damage, such as: installation tears less than 4 inches in length and no more frequent than one in one-hundred linear feet, discrete blisters, areas of pinholes, areas of dry tube, and soft spots. Include proposed method for repairing trimmed wrinkles and fins. Provide the liner system manufacturer's recommendations for liner repairs. Liner Repair Plan approval is required prior to making each repair.

Submit the following for review, during construction:

(n) Cure Logs - Record installation data and submit cure log upon completion of the installation.

(Use the following subsection .02 to list the GRP CIPP design parameters. Obtain the parameter information from the Designer. For pipe ovality, 2% is recommended for pipes less than 24-inches in diameter and 5% for pipes 24-inches or larger diameter. Designer to consider whether to represent Long-Term Flexural Strength and Modulus of Elasticity as shown below ([percent of ASTM D790] or in psi. For example, short-term flexural modulus and long-term modulus when tested in accordance with ASTM D790 for Standard Polyester would be specified as 250,000 psi and 125,000 psi, respectively. Short-term flexural modulus and long-term modulus when tested in accordance with ASTM D790 for Enhanced Polyester would be specified as 400,000 psi and 200,000 psi, respectively. Also note that this specification is specific to lining gravity sewer piping. Designer will need to reevaluate the liner material and strength being specified if CIPP lining methods are to be used for lining pressure piping [e.g. sewer forcemain, water].)

00413.02 Design Parameters –

Delete the following conditions in the table:

Condition	**Parameter**
Height of fill from invert	_____

Replace the following parameters for the conditions in the table:

Condition	**Parameter**
Groundwater Elevation above invert…….	_____
Pipe Ovality……..…..	2%
Long-Term:	
Flexural Strength ……..……	90%* of Initial (ASTM D790)
Modulus of Elasticity……..…	50%* of Initial (ASTM D790)

*Unless long-term test results are provided that substantiate a greater retainage.

Add the following to the end of this subsection:

Condition	**Parameter**
Service Temperature Range ……..……	140 degrees

00413.11 Resin – Add the following to the end of this subsection:

The City's Construction Manager may inspect fabrication of the liner and resin impregnation at the manufacturer's facility to ensure compliance with these specifications.

Add the following subsection:

00413.14 Pipe Liner End Seal - The hydrophilic end seals completely seal the liner from any annular space leakage between the liner and the host pipe. Hydrophilic end seals must be one of the following:

(a) Bands that are 20 mm wide and 5 mm high, with a double bump on one side and flat on the other side. Product shall be Hydrotite Style DS-0520-3.51, or approved equal.

(b) Tubular hydrophilic sleeve, 2 mm in thickness and 3.5 inches in length, with a mechanical fastener with worm gear expander. Product shall be Insignia End Seal by LMK Technologies, or approved equal.

00413.30 Personnel Qualifications – Replace this subsection with the following:

(Designer shall discuss with City Procurement whether prequalification of Contractors is necessary for the Project or whether minimum qualifications shall be stated in the Qualifications section below (modify as needed). Prequalification is recommended in most cases unless due to pipe size, contract size (cost), and/or criticality of pipe(s) being lined are deemed to not be of high enough risk to the City to warrant prequalification. Note that there is a requirement for the Contractor to submit an Affidavit of Qualifications as a part of their bid forms certifying that they meet the minimum requirements listed in the specification. Coordinate with City Procurement to include the Affidavit of Qualifications form in the Bid Documents. If prequalification is desired in lieu of Affidavit of Qualifications, City Procurement can provide a template for prequalification.

For small diameter installations [less than 24-inches in diameter] consider removal of requirements for large diameter piping listed in sections (a), (b), and (c) below.)

00413.30 Qualifications - Contractor shall submit an Affidavit of Qualifications included in the Bid Submittal Forms at the time of bid certifying the following minimum qualifications are met:

(a) CIPP System Manufacturer: The CIPP system must have a minimum proven performance record of 1,000,000 linear feet installed of the exact name-brand product bid in the United States, with a minimum of 20,000 linear feet in diameters 24-inch or larger over the last five years. In addition, a minimum of 10,000 linear feet of 36-inch diameter or larger, of the exact name brand product must have been installed in the United States.

(b) Installer Experience: The Installing Contractor for the cured-in-place reconstruction of sewers must have a minimum of five years of experience using the exact named product proposed and, have installed at least 300,000 linear feet of the exact named proposed product including at least 20,000 feet of 24-inch diameter or larger cured-in-

place product. Documentation along with contact names and telephone numbers from the last ten projects shall be submitted.

(c) On-Site Field Superintendent: The Superintendent must have a minimum of five years of experience with cured-in-place pipe products. In addition, the Superintendent must have supervised jobs in which at least 20,000 feet of pipe has been reconstructed using the exact named product proposed including a minimum of 5,000 feet of 24-inch diameter or larger cured-in-place product. The Contractor shall submit information to document this requirement. The Superintendent for the Project shall be on-site during all phases of the work involving any pre- and post-installation video inspection, sewer cleaning or insertion and processing of the CIPP.

Add the following subsection:

00413.31 Labor Requirements – Crews and key personnel are not to work more than a maximum of 12 hours per 24-hour day, or as otherwise approved.

Staff the project with the key individuals as specified, and who will be available for the project duration.

00413.40 General – Add the following to the end of the subsection:

(a) Water and Electric Service - Furnish and supply generators or obtain temporary power to provide all electric power required for installation. Obtain a permit and pay all fees required for use of any hydrant, per Section 00340.

(b) Diversion of Flow - Furnish, install, maintain and operate a flow diversion system as needed, and in accordance with Section 00490.

(c) Receiving and Insertion Locations - Locate all manholes or pits to suit the pipe lining operation. Use existing manholes where practical. Remove manhole flattops and cones, inverts, benches, and channels if required to permit access for installation equipment. Enlarge the incoming and outgoing pipe openings, if required, to accommodate the maximum outside diameter size of the insertion equipment. Do not put undue stress on existing structures. In areas where existing manholes are not available, intermediate access pits may be excavated and utilized at no additional cost to the City. Intermediate pipe repair and restoration must be done in accordance with the Drawings at no additional cost to the City. Manned entry in unlined pipe is not allowed. If manned intermediate access is required, an access pit must be dug at the required location.

(d) Customer Notifications

(1) The Contractor shall contact all residential and commercial customers whose service is to be interrupted by rehabilitation work or who may be affected by upstream or downstream rehabilitations. The customer shall be informed that they will be temporarily out of service. This notification shall be made a minimum of 48 hours prior to beginning rehabilitation work.

(2) For all residences the Contractor shall leave a door hanger detailing the service outage and providing contact information. Door hanger samples shall be submitted to the Engineer for review and approval. The Contractor shall also advise those

customers against water usage until the mainline and lateral are back in service. After completing the necessary work on the main line and lateral to allow their reuse, the Contractor shall advise those customers that the sewer is back in service.

(3) All customer notification documentation and procedures shall meet the requirements of the Owner.

(e) Service Interruption Duration - Should a condition arise that the Contractor cannot restore service within 12 hours of service interruption; the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

00413.41 Pipe Cleaning – Replace this subsection, except for the subsection number and title, with the following:

Refer to Section 00415.40(c) for pipe cleaning requirements.

00413.43(a) General – Add the following to the end of this subsection:

Where practicable, install liners in continuous runs through manholes where there are two or more continuous host pipe segments requiring lining. If manholes are lined through, remove crown of liner inside manhole flow channel.

00413.43(d) UV Curing Method – Replace this subsection with the following:

(d) Curing - Provide a UV light train that meets the following requirements:

- Minimum of one camera for UV-CCTV inspection of the liner,
- Size of the light train is appropriate for the pipe diameter,
- UV bulbs are in proper proximity to the liner wall all around the pipe circumference,
- Sensors to record the cure progress,
- Logged hours of individual UV Lights incorporated in the light train is less than 80% of the manufacturer's stated usage rate.

Maintain light train usage log on-site and submit to City's Construction Manager upon request.

Operate the ultraviolet curing lamps at a sufficient output and in a sufficient frequency range to ensure curing of the resin.

Optimize the multi-lamp ultraviolet curing lights and resin photo-initiator system for curing of the provided resin.

Assemble the UV light train according to the manufacturer's recommendations for the sewer pipe and liner diameter. Cure the liner according to the curing protocol, as approved. Maintain light train speed per the manufacturer's requirements, and to assure exothermic reaction has completed. Do not pull the UV light train in a downhill direction

during the curing process unless otherwise approved. Approval will not be given where pipe slopes are greater than or equal to 3.0%.

Collect curing data and UV-CCTV inspection records during the installation and curing process. Submit copies to the City for review. Where the curing data and the curing protocol differ, the City reserves the right to require additional “in pipe” sampling and testing at no additional cost.

00413.43 Installation – Add the following to the end of the subsection:

(e) Transport and Storage - Transport and store the impregnated tube at the site in such a manner that it will not be damaged, exposed to direct sunlight, or result in any public safety hazard. Inspection and review of all materials will be conducted prior to installation.

The City reserves the right to check, verify or inspect all phases of production and testing of materials from manufacturing, shipping, installation, cure, to finished product. Any departure from the submitted procedures will be cause for rejection.

Add the following subsection:

00413.44 Lateral Service Line Reconnection - Internal

(a) After the CIPP has been cured, the existing service connections and laterals shall be reinstated. In general, reinstatement of service connections and laterals shall be accomplished internally, without surface excavation, using a remote control cutting device equipped with a television monitor. Reopened services shall be wire brushed to the satisfaction of the Engineer. In some cases, remote reinstatement may not be possible. In these instances, reconnection by excavation as specified below is acceptable. All connections must be reinstated by at least 95-percent of the original opening. Holes cut outside the lateral opening or oversized cutting (more than 100%) must be repaired at the Contractor’s expense. Particular attention shall be given to the lower quadrant of the opening to ensure that no accumulation of solids or debris will occur at the service tie-in.

(b) All capped or factory plugged service connections shall not be opened unless otherwise directed by the Engineer.

(While rare, if the Contractor is unable to find a lateral location with the internal robotic cutter after lining the mainline pipe, digging up the service lateral may be required. Section 00413.45 discusses the process of reconnecting a lateral via excavation.)

Add the following subsection:

00413.45 Lateral Service Line Reconnection – By Excavation

(a) General - Sewer lateral house connections accomplished by excavation shall be connected to the pipe by dual-strapped saddles. The Contractor shall connect existing sewer house lateral service pipe to the saddle using a flexible coupling. After connection to the saddle, the sewer house connection pipe shall have a slope toward the newly lined sewer equal to the pre-existing on the lateral pipe or a minimum of two percent.

(b) Execution

(1) The Contractor shall excavate the area of the lateral connection so that the host pipe and existing connection is exposed. The host pipe shall be broken back or removed in such a manner that the new CIPP liner is exposed without causing damage to the liner.

(2) An appropriately sized hole acceptable to the Engineer shall be cut into the CIPP using a circular hole cutter. Hanging or loose cuttings shall be removed so that the newly opened hole is smoothed around its edges.

(3) A sealant compatible with CIPP and acceptable to the Engineer shall be liberally applied around the newly cut hole to form a watertight seal between the CIPP liner and PVC pipe saddle used to make the connection.

(4) A dual-strap PVC pipe saddle acceptable to the Engineer shall be secured to the CIPP in accordance with the manufacturer's recommendations.

(5) Before the service lateral pipe is connected to the saddle, the Contractor shall hand wipe a hydrogen sulfide resistant composite epoxy resin mixture inside the saddle where the saddle and CIPP surfaces meet to ensure a watertight seal.

(6) The Contractor shall connect the lateral service pipe to the saddle according to the manufacturer's recommendations and in a manner acceptable to the Engineer.

Add the following subsection:

00413.46 Manhole Restoration and Structure Connections - After the installation is complete, perform final trimming and sealing of the liner at access structures to provide watertight pipe and structure seals. Neatly and smoothly trim the finished ends of the liner to within one inch of access structure wall. Provide a smooth transition between the existing structure channel invert and the liner using cementitious or other approved material to prevent settling of sediments or debris from catching on the liner or ponding of any standing water in the access structure. Seal all holes and voids in manhole and structure walls immediately surrounding the new liner with a chemical grout, compatible with the resin mixture of the liner.

Reinstall manhole cones, slabs, grade rings, frames, covers, inverts, and reconstruct benches and channels after each pipe liner installation. Internal rehabilitation of manholes is not permitted until after the liner is installed and accepted.

Remove temporary dams after work is complete and pipe is clean and restored according to 00490.

00413.72 Material Sampling and Testing –

Add the following before the sentence that begins "Obtain restrained samples…":

For all UV-CIPP installed from the same manufacturing process (i.e., same batch of resin, felt, and manufacturing process), prepare at least two above grade restrained samples for each diameter using the same material and the curing equipment as the original installation. Immediately deliver to the City one sample. Any sample removed from the project site without

approval will be rejected. For each sample, fill out the Chain of Custody Form (provided at the end of this Specification Section) and provide to the Agency or City Project Representative along with sample.

Add the following to the end of the subsection:

Samples for each type described below should be large enough to provide the recommended specimens for testing. For flexural properties, the full wall thickness of the liner samples will be tested. Sample size is based on installed liner thickness.

Plate samples will not be allowed.

(a) Testing – Send one sample per installation to a certified AL2A laboratory for testing according to ASTM D790 and ISO 178. Submit signed, dated and timed copies of all test results to the City. Physical properties of the installed CIPP will be confirmed in accordance with ASTM F1216 and D2019 and pursuant to the following additional criteria:

(1) Thickness - Thickness will be measured according to ASTM F2019, D5813, & D3567.

Ultrasonic pulse echo, per ASTM E797, may be used as an alternate method of measuring thickness, as approved and at no additional cost to the City. If ultrasonic pulse echo is used, use a minimum of 8 evenly spaced measurements around the internal circumference of the installed CIPP within the host pipe at a distance of 12 inches to 18 inches from the end of the pipe. Record a minimum of 16 evenly spaced measurements.

If the ultrasonic method is used, use the flaw detector with A-scan display and direct thickness readout, as defined in 6.1.2 of ASTM E797. Manufacture a calibration block from the identical materials used, to calibrate sound velocity through the installed liner. Calibrate the transducer daily in accordance with the equipment manufacturer's recommendations. The average thickness should be calculated using all measured values and shall meet or exceed minimum design thickness as agreed upon between purchaser and seller.

(2) Short-Term Flexural Properties – Submit test results for flexural properties per ASTM D790.

(b) Retesting - If any test fails, collect and deliver additional samples to the City's Construction Manager for re-testing. If the second samples fail, bring the liner into compliance by methods described in 00413.73.

00413.73 Repairs – Add the following to the end of the subsection:

If an installed liner has unacceptable wrinkles, fins, discontinuities, leakage, delamination, pinholes, gouges, tears, soft spots, blisters, failed tests, or other defects, submit to the City's Construction Manager a repair plan to remedy the defect(s). The City reserves the right to require the installation of a second liner, removing and re-installing a full-thickness liner, constructing a full pipe replacement, or installing a liner repair, as approved. After remedial measures are performed to bring the liner system into compliance with conformance standards, conduct additional testing as required by the City per 00413.72.

00413.90 Payment –

Add the following pay items:

Pay Item	Unit of Measurement
(b) Service Line Reconnections - Internal	Each
(c) Service Line Reconnections - Excavation	Each

Add the following to the end of the subsection:

Spot repairs and flow diversion will be paid for according to Section 00490.

No separate or additional payment will be made for:

- Temporary manhole modifications/repairs to provide access for performing the work.
- Installation of end seal material or addressing deficient end seals
- Removal of protruding taps, tree roots, controlling leaks, and other cleaning activities during host pipe preparation process.
- Removal, repair, or replacement of liners that are determined to be noncompliant with 00413.72.
- Sampling and testing.
- Additional testing, cleaning, and video inspection required as a result of correction of unsatisfactory work.
- Internal reconnection of existing service laterals.
- Temporary manhole access ramp construction and removal.
- Intermediate pipe access and repair, backfill, and restoration.

Add the following subsection:

00413.91 Payment Deduction - Payment will be based upon the Contract Unit Price and test results acquired according to 00413.72. Should test results fail to meet the specified design parameters for thickness and initial physical properties, yet comply with Conformance Standards in 00413.73, a payment deduction will be made according to the Payment Formula below.

Payment = Length Installed x Contract Unit Price x (Actual Safety Factor/Design Safety Factor)

The Actual Safety Factor will be calculated using the governing design equations (i.e. equations yielding the greatest minimum thickness) from ASTM F1216-Appendix X1. The measured thickness, measured flexural strength, and measured initial flexural modulus will be substituted for their respective design values while the remaining design parameters specified in 00413.03 are held constant. The Design Safety Factor is specified in 00413.03.

No additional payment is made for liners exceeding required design safety factor. The UV-CIPP will be considered Defective Work if the actual safety factor is below 1.0. The City reserves the right to require removal and replacement of Defective Work, at its sole discretion.

Chain of Custody Form
CIPP Liner Test Samples

City Contract Number: Click here to enter text.

Project Name: _____

Client: _____

Sample ID: _____ (Must be a unique identification number.)

Sample Location: _____ (Manhole-to-Manhole Segment Number)

Sample Type: _____ (Restrained, flat plate)

Pipe Diameter (Inches): _____ Liner Thickness (mm): _____

Initial Cure Date and Time: Click here to enter a date. at _____ (AM/PM)

Date and Time Sample Taken: Click here to enter a date. at _____ (AM/PM)

Sample Taken by: _____ (Installer Signature)

Witnessed by: _____ (Inspector Signature)
Test results will not be accepted without inspector's signature.

Shipped By: _____ (Shipper Name) Shipment ID: _____

Testing Laboratory: _____ (Lab Name)

To be filled out by testing lab: (Or attach lab form)

Date Sample Received: Click here to enter a date.

Date Sample Tested: Click here to enter a date.

Tested By: _____ (Lab Technician Signature)

Comments: _____

Attach test results to this form and return to Owner at:

Test Results Received By: _____ (Owner Signature)

Date Results Received: Click here to enter a date.

End of Section

Section 00415 – Video Pipe Inspection

(Note: This specification is specific to Video Pipe Inspection for CIPP Lining and should only be included in the Special Provisions if CIPP Lining is being used on a project.)

Comply with Section 00415 of the Standard Specifications modified as follows:

Add the following subsection:

00415.01 Submittals – All the supplied data and information will become the property of the Owner. The following shall be submitted:

(a) Sample Submittal - An example of a typical CCTV Inspection final deliverable shall be submitted for approval by the Engineer prior to the start of work. The example deliverable shall contain the following:

(1) A sample NASSCO PACP Standard Exchange Database, version 6.0.2 or greater, in Microsoft Access file format (.mdb), as exported from the Contractor's data collection software.

(2) A proprietary database as generated by the Contractor's data collection software.

(3) Example media files, including observation photos, CCTV videos, and reports; with all files consistently utilizing the required file naming conventions and folder structures.

(4) The proposed viewing software to be used with the proprietary inspections database and related media.

(5) NASSCO PACP validation report in PDF format, demonstrating the sample is fully conforming to NASSCO PACP standards and conventions. Validation reports can be obtained by submitting a sample database to: http://www.nassco.org/training_edu/te_database_upload.aspx.

(6) Inspections database(s) shall be fully cross-referenced to the videos, images, and reports.

(7) Example reports will be presented in both hard copy and in PDF format, and all other sample data will be presented in digital format on an external hard drive.

The Engineer will review the video footage, inspection logs, and database file to determine if the quality of the video image is acceptable, if defects were properly identified and documented, and that the database is in PACP format. Samples shall be with the same camera and lighting equipment proposed for the work.

The Contractor shall be responsible for modifications to its equipment and/or inspection procedures to achieve report material of acceptable quality. No work shall commence prior to approval of the material by the Engineer. Once accepted, the report material shall serve as a standard for the remaining work.

(b) Intermediate Inspection Submittal - No later than every fourteen (14) days following the completion of a pipeline inspection, the Contractor will submit the following:

(1) Two (2) hard copies of full details report for each inspection, showing the position and full text of each defect encountered and their grades.

(2) An overall summary report detailing major defects and inspections that require attention.

(3) A list of unmapped manholes and/or pipe segments that were identified during inspections but were not shown on field maps. This list shall include the field-assigned ID and a geographic reference or description (street address, intersection, etc.).

(4) A statistical report showing lengths of sewers inspected and a breakdown of sizes and lengths inspected.

(5) At regular agreed intervals, an external hard drive will be submitted to the Engineer containing a single NASSCO PACP Standard Exchange Database (version 6.0.2 or greater) containing all inspections to date, encoded videos, observation photos, inspection reports in PDF format, and support files. The supplied data and information will become the property of the Owner.

(c) Final Inspection Submittal - At the completion of all inspection work, the Contractor will supply the following to the Engineer to be delivered within ten (10) days of the inspection:

(1) A single, consolidated NASSCO PACP Standard Exchange Database (version 6.0.2 or greater) in Microsoft Access file format (.mdb) containing all inspections.

(2) NASSCO PACP validation report for the consolidated database (See Section 3.04.B.5.).

(3) All encoded inspection videos, observation photos, and inspection reports using required file naming formats.

(4) A single, consolidated proprietary database containing all inspections for the Contract, as generated by the Contractor's data collection software.

(5) Free-issue software to be used for the viewing of the proprietary inspections

(d) Calibration Data – Submit calibration data for recording device including the date on which it was last calibrated.

Equipment

00415.20(a) Video Camera – Replace this subsection, except for the subsection number and title, with the following:

(a) Video Camera - Use a digital color video camera capable of pan-and-tilt radial viewing that pans plus or minus 275 degrees and rotates 360 degrees and a zoom ratio of at least

40:1. Lighting intensity shall be remote-controlled and shall be adjusted to minimize reflective glare, providing a clear image of the full pipe circumference and all areas of concern. Provide a camera and lighting system capable of operating in 100% humidity conditions. Camera shall include "Data-View" displaying date, pipe number, and footage reading of distance traveled.

00415.20(b) Transporter – Add the following to the end of the subsection:

The transporter shall be capable of a minimum of 900 feet of continuous inspection.

00415.20(c) Recording Device – Replace this subsection, except for the subsection number and title, with the following:

Provide a device capable of recording video with "Data-View" displaying date, pipe number, and footage reading of distance traveled along the profile in tenths of feet and indicating the camera's position from the starting point. Calibrate the meter counter to be accurate within plus or minus 2 feet in 1,000 feet and measure the distance traveled by the camera in the sewer. The device must be capable of recording a digital video with a minimum resolution of 720 x 480.

Video equipment shall include genlocking capabilities to the extent that computer-generated data (e.g., footage, date, size, address and location), as determined by the Engineer, can be overlaid onto the video, and both indicated on the television monitor and permanently recorded on the inspection videotape.

Add the following subsection:

00415.24: Digital Video Format - Digital video files (Inspection Videos) shall be captured and/or recorded in the MPEG-2 format, minimum. The minimum resolution of videos shall be 720 pixels (x) by 480 pixels (y) and an encoded frame of 29.97 frames per second. The internal video capture files shall be linked to the database file(s) (Inspection Observations). The "link" of the video capture file to the database observation file is required and each observation shall record the name of the video file and the frame number referencing the time in the video when the inspection was made. The inspection observation(s) shall link to the video record in real time.

Add the following subsection:

00415.25: Image Format Requirements

(a) The inspection image files (pictures) shall have the ability to be exported to industry standard formats, including JPEG, BMP, and TIFF, and be transferable by disk, DVD, and/or external hard drive to an external personal computer utilizing standard viewers and printers. Digital pictures must have a minimum resolution of 1024 pixels (x) by 768 pixels (y).

(b) The video image capture module shall be capable of collecting multiple color video frames of the defects found during inspection and then linked to the inspection reports. There shall not be a limitation to the number of pictures allowed per observation.

Add the following subsection:

00415.26: Software

(a) The software shall be NASSCO PACP-certified (most recent release) and conform to its pipeline assessment procedures.

(b) Software shall export to a PACP (MDB) format (most recent release).

Add the following subsection:

00415.27: Database Requirements

(a) The Contractor must use the City's GIS pipe and manhole nomenclature. Each sewer segment, which extends from node to node, not necessarily from manhole to manhole, as identified on the contract drawings, shall have a separate video file. If field conditions result in multiple videos for a single sewer segment, the videos shall be combined into a single video file for the database.

(b) Each video file shall be named with the upstream and downstream manhole IDs and "WF" or "AF" to indicate whether the video is "with flow" or "against flow". For example, 10540_to_5890_AF.mpeg identifies the video for the pipe segment with upstream node 10540 and downstream node 5890 and the video was filmed from 5890 to 10540.

(c) These videos shall be linked to a single open-architecture database file. The database file must include fields as required by PACP.

(d) All video paths in the database file shall read as follows: "\Videos".

(e) Ensure that the database field titled "Sewer_Use" is populated as: "Sanitary"

(f) All videos linked to the database shall be saved in a subfolder named "Videos" (as opposed to a separate folder for each video).

Add the following subsection:

00415.30 Qualifications – The Contractor shall be qualified or shall have a qualified independent company specializing in video inspections to inspect the sewer interior using a color television camera, documentation of the inspection on video with audio location and date information, video title information, hard-copy inspection logs, and a Pipeline Assessment Certification Program (PACP) compliant database.

Internal video inspection shall be performed by a National Association of Sanitary Sewer Service Companies (NASSCO) PACP certified operator and shall meet the coding and reporting standards and guidelines as set by PACP. All report annotations, pipe conditions, and pipe defects shall be identified properly using PACP codes as defined by PACP, and severity ratings shall be calculated according to PACP.

00415.40 Video Inspection – Replace this subsection, except for the subsection number and title, with the following:

(a) General Video Inspection – The Contractor shall be responsible for properly inspecting the pipe and providing the finished inspection video and database file. Inspection shall consist of:

(1) Pre-Construction Video Inspection of the sewer prior to CIPP installation, following cleaning, root removal, intruding tap removal, and/or grouting.

(2) Final Acceptance Video Inspection of the sewer following CIPP installation and lateral reinstatement.

(b) Notice and Access - Notify the Engineer a minimum of 48 hours before beginning cleaning or video inspection. Allow the Engineer access at all times, to observe the video monitor and all other operations.

(c) Cleaning:

(1) The term "clean" as used in this Section, shall mean removing all sand, dirt, roots, grease and all other solid or semi-solid materials from the sewer pipelines, so that a closed circuit television camera can be used in the internal pipeline inspection for the purpose of discerning structural defects, misalignment and infiltration/inflow sources.

(2) The Contractor shall certify that sufficient cleaning units can be provided, including standby units in the event of breakdown, in order to complete the work within the contract period. Further, the Contractor shall certify that standby or back-up equipment can be delivered to the site within 24 hours in the event of equipment breakdown.

(3) Prior to the commencement of work, the Contractor shall coordinate access to water with the local water utility. Water will not be furnished by the Owner.

(4) All details of the point of water connection, backflow protection, conveyance methods, draw-off rates, times and all local conditions regarding the use of water shall be approved by the Engineer and the utility providing the water prior to commencement of work. All equipment, labor, and material required for obtaining water for the work shall be provided by the Contractor. The Contractor must ensure that a 6-inch minimum air gap is maintained at the water supply point on desilting/cleaning/jetting equipment or any other receiving apparatus used to obtain water from the utility’s hydrants.

(5) Cleaning will be accomplished by utilizing a high pressure, hydraulic sewer pipeline cleaner. Pressure jetting equipment used shall be sufficient for the purposes of attaining the degree of cleanliness in sewers as specified.

(6) The cleaning unit(s) shall be capable of operating routinely, up to a minimum of 500 feet from the point of access to the sewer; minimum hose diameter shall be 1 inch.

(7) Successive passes using constantly moving pressure jetting techniques shall be applied to sewers until they are cleaned to the level specified. Nozzle hold-time (stationary time), for any particular location, shall not be more than 60 seconds in order to forestall damage to the pipe being cleaned. Ideally nozzles shall have jet

angles of between 30° to 45°. “High efficiency nozzles” (discharging “pencil jets”) with jet angles higher than this figure shall not be allowed to be stationary at any time.

(8) Cleaning shall be done immediately prior to the internal inspection to preclude the build-up of debris from infiltration/inflow sources and upstream manhole sections. Should television inspection reveal that a sewer pipeline is not clean; the cleaning operations shall be repeated until the sewer pipeline is clean. This additional cleaning shall be done at the expense of the Contractor, at no additional cost to the Owner.

(9) During preconditioning and cleaning work and all other associated Contract operations, sewer services shall be maintained at all times. This requirement may be relaxed only with the written approval of the Engineer.

(10) The manholes and sewers to be preconditioned and cleaned convey sanitary sewage or combined sewage. In many instances such sewers are subject to high flows, either continuously or in a periodically varying cycle, due to rainfall, infiltration, and/or pumping operations. The Contractor shall include in his proposal provisions for dealing with such variations, and where necessary, schedule the Work to accommodate such variation in flows.

(11) Cleaning shall include the trapping and removal of all sediments and residual wastes from successive manholes as the cleaning progresses. When hydraulic cleaning equipment is used, a suitable weir or dam shall be constructed in the downstream manhole, in such a manner, that the solids and water are trapped. Under no circumstances shall sewage or solids removed there from, be dumped onto streets, in catch basins or in storm drains. Material which could cause pipeline stoppages, accumulations of sand in wet wells, or damage to pumps, shall not be permitted to pass from manhole section to manhole section. The cost of trapping, removing, hauling and disposing of the residual wastes shall be included in the cost of cleaning. Disposal of residual wastes shall be in accordance with, and at a location approved by the Engineer and the Owner.

(12) The Contractor shall provide for the pumping down of any surcharged manhole section and provide all bypass pumping, if required, during the cleaning operation. All bypass pumping shall be approved by the Engineer.

(13) The Contractor shall submit a comprehensive equipment list to the Engineer before commencement of the Work. The complete list, which shall include all backup and standby equipment, shall be broken down into the following categories (at a minimum):

a. Safety equipment
b. Manhole preconditioning and cleaning equipment
c. Sewer preconditioning and cleaning equipment
d. Flow diversion and flow control equipment
e. Traffic control equipment
f. All other equipment necessary for the completion of the work.

(14) Blockages in the system shall be reported to the Engineer immediately.

(15) A responsible representative of the Contractor shall be present on the site of the work, or other location approved by the Engineer, to provide supervision of the work.

At all times, and especially when a change of work location is underway, the Contractor's representative shall keep the Engineer continuously aware of the location, progress, planned execution of the work, and problems encountered.

(16) Remove and dispose of all debris according to 00290.20.

(17) Precautions

a. The Contractor shall take all necessary precautions to ensure that water used does not flood property or buildings served by the sewer pipeline being cleaned.

b. No fire hydrant shall be obstructed, in case of a fire in the area served by the hydrant.

c. The Contractor shall take all necessary precautions to protect the sewer pipelines from damage that might be inflicted by improper use of cleaning equipment and shall repair, at no cost to the Owner, any damage caused by the cleaning operation.

d. The Contractor shall furnish, to the Owner, certification of the accuracy of the automatic counter before any work shall begin on this Project. If, at any time, the Engineer has reason to believe that the counter is inaccurate, the calibration of the counter will be checked before any more work progresses.

e. The Contractor shall provide, operate, maintain and subsequently remove on completion, adequate ventilation apparatus in the form of blowers and/or fans. The ventilation apparatus shall introduce a fresh air supply to support a safe environment for Work in sewers, manholes and all other confined spaces, which shall be kept free from dangerous, toxic and/or explosive gases, whether generated from sewage, soil strata or other source.

f. The Contractor shall employ the "best practicable means" to minimize and mitigate noise as well as vibration resulting from operations. Mitigation measures shall include the utilization of sound suppression devices on all equipment and machinery particularly in residential areas and in the near vicinity of hospitals and schools, especially at night.

g. The Contractor shall inform the Engineer before the commencement of any portion of the work of any significant change in the methods of noise attenuation from those previously approved.

h. All pumps, generators, combination cleaners or other noise emitting equipment shall be suitably screened to minimize nuisance and noise pollution. This requirement shall not be taken as preventing or prohibiting the execution of work necessary for the saving of life, protection of property, or safety of the personnel and/or facilities. The Contractor shall notify the Engineer of such use of plant or equipment in an emergency situation as soon as practicable.

(18) Data Collection

a. The Contractor shall complete a cleaning report for each sewer segment cleaned. A hard copy of this report shall be furnished on a weekly basis to the Engineer. The information required on the cleaning report shall be as follows:

- Location, size and condition of sewer line. Location will be indicated by road name, intersection(s) and GPS coordinates. Size will be indicated by nominal internal diameter. Condition will be indicated by narrative describing visual observation and the items below, augmented by photos where needed.
- Degree and nature of deposits prior to cleaning.
- Length of sewer cleaned.
- Estimated amount and types of debris and sediment removed. Indicate approximate location.
- Grease build-ups - Indicate approximate location.
- Structural failures - Indicate approximate location.
- Blockages - Indicate percent blockage or free area.
- Method and man hours actually expended for cleaning.

(d) Flow Control – The Contractor shall conduct inspection work to achieve a view of at least 95 percent of the pipe diameter. This may require that the Contractor provide flow control or bypassing in accordance with Section 00490.

(e) Verbal Commentary – The Contractor shall record an audio narrative of the location, upstream and downstream control points, date, and time of the inspection.

(f) Access –The Engineer shall have access to observe the monitor and all other operations at all times. The system of cabling employed to transport the camera and transmit its signal shall not obstruct the camera's view.

(g) Inspection – The Contractor shall observe the following requirements when conducting video inspections:

(1) The camera shall be pulled through the sewer in either direction, but all inspections at each location shall be in the same direction.

(2) Inspections shall be from the center of the starting manhole to the center of the ending manhole. Video inspections must begin prior to the camera head entering the pipeline. Camera counter shall start continuous recording upon entering the invert of the pipeline being inspected.

(3) Pan and tilt the entire circumference at the pipe-manhole interface, at any change in pipe material, and at other locations to ensure proper documentation of the pipeline's condition.

(4) Maximum rate of travel shall be 30 feet per minute when recording.

(5) Portions of the pipeline may be bowed or bellied and as a result the camera may encounter a submerged condition. Where the camera encounters a submerged

condition, the Contractor shall reduce the flow depth to an acceptable level using a high-velocity jet nozzle or other acceptable dewatering device.

(6) Pan and tilt the camera in the invert of each manhole to give a full visual inspection of the starting, intermediate, and ending manholes.

(7) Each pipe segment video recording must have its own electronic file.

(8) Video inspection recordings must be continuous for each pipe segment. Video recording can be paused and then restarted without generating a new file.

(h) Image Perspective – The camera image shall be down the center axis of the pipe when the camera is in motion. The Contractor is required to provide a 360-degree view of the pipe interior. Points of interest shall also be videotaped and shall include, but not be limited to, defects, debris, and sediment. If, in the opinion of the Engineer, lighting is insufficient to gather the appropriate data, auxiliary lights will be required at no additional cost to the City.

(i) Sewer Identification – All inspection documentation shall include the sewer identification (at a minimum, the upstream and downstream manhole identification names, or numbers).

(j) Quality Assurance – The Engineer will review HDDs and logs to ensure compliance with the requirements listed in this section and the Contract documents. The Engineer will review the video footage to make sure that the required information is provided and the recording is of acceptable quality. If the sewer line is determined not to be adequately cleaned, it shall be re-cleaned and video-inspected by the Contractor at no additional cost to the City. If the Engineer determines that the video footage is defective or not of adequate quality, the Contractor shall conduct video inspection again at no additional cost to the City. Line segments that are not televised continuously from structure to structure will be re-inspected at no additional cost to the City.

(k) Video Record – The Contractor shall maintain an additional copy of all inspection documentation (HDDs, databases, and logs) for the duration of the work and guarantee period.

(l) Inspection Acceptance – Acceptance of the inspections shall be based on the Engineer's verification that the quality and format of the video and database meets the requirements of the specification and the successful upload of the database file and videos into the City's software.

00415.42(a) Remote Video Inspection with Laser Profiler - Replace the paragraph that begins "Use video inspection equipment meeting…" with the following paragraph:

Use video inspection equipment meeting the requirements of 00415.22. Calibrate the laser profiler according to the manufacturer's specifications and ASTM F3080 Section 9.

00415.90 Payment – Add the following to the bulleted list where no separate or additional payment will be made for:

- Cleaning

End of Section

Section 00440 - Commercial Grade Concrete

(This Section requires SP02030 and SP02050.)

Comply with Section 00440 of the Standard Specifications modified as follows:

00440.10 Materials - Add the following to the end of the material list:

Fiber 02045

00440.11 Proportions – Add the following to the end of the bullet list:

- Fiber - ½ bag per yard for curb and flat work

00440.12 Properties of Commercial Grade Concrete –

In the bullet that begins “Entrained Air…” replace “4.0 to 7.0 percent” with “4.5 to 7.5 percent”.

In the bullet that begins “Compressive Strength…” replace “3,000 psi” with “4,000 psi”.

(Use the following subsection .40(b) when 00759 is used for Commercial Grade Concrete curbs, concrete curb ramps with curbs, islands, traffic separators, driveways, sidewalks, monolithic curb and sidewalks, miscellaneous surfaces, and stairs)

00440.40(b) Placing - Add the following bullet to the end of the bullet list:

- When haul time or placement conditions warrant exceeding the time of discharge, submit a detailed breakdown of the estimated time needed from batching to discharge of a load along with the measures that will be taken to ensure slump, temperature and uniformity will be maintained. Submit in advance to establish a new time limit at the Engineer’s discretion.

00440.40(d) Weather - Replace this subsection, except for the subsection number and title, with the following:

Do not place CGC when the air temperature is below 35 °F or above 100 °F without approval.

Protect CGC from freezing if the air temperature is expected to drop below 35 °F during the first 5 Calendar Days after placement.

All concrete placed below 35 °F shall be approved under the following prescribed cold weather concrete plan:

- Concrete may be placed when the ambient air temperature is 25° F and rising, and the projected day time temperature high will be above 35 °F for 2 days (unless otherwise approved by the City Engineer)
- Concrete shall not be poured below 25° F

- Concrete may not be poured on frozen ground
- If subgrade is frozen, all frozen material must be removed and new compacted base must be placed before concrete is poured
- Concrete subgrade must be inspected by the City prior to placing concrete
- At a minimum, when ambient air temperatures are between 30 °F and 40 °F, hot water will be used to maintain concrete temperatures not less than 55 °F at placement
- At a minimum, when ambient air temperatures are between 25 °F and 30 °F, hot water will be used to maintain concrete temperatures not less than 55°F at placement and 1% non-Chloride accelerator
- Provide batch tickets to the Inspector
- The City may require the use of a hi/low thermometer to record the temperature of the placed concrete for 7 calendar days. Concrete must be maintained at 40 °F minimum during this time
- If concrete temperature falls below 40 °F, the City may choose to have the concrete removed and replaced at the contractors/permittee expense
- Prevent concrete from freezing for 7 calendar days after concrete is placed
- At a minimum, cover all concrete at night if the 7 day forecast shows a potential for freezing. It is up to the contractor to determine the best practice for protecting the concrete.
- Alternate cold weather concrete plans may be submitted for review but approval is at the City’s discretion.

When the air temperature exceeds 90 °F, place concrete in accordance with ACI 305R-10.

End of Section

Section 00442 - Controlled Low Strength Materials

(This Section requires SP02030.)

Comply with Section 00442 of the Standard Specifications.

End of Section

Section 00445 – Sanitary, Storm, Culvert, Siphon, and Irrigation Pipe

(This Section requires SP02415.)

Comply with Section 00445 of the Standard Specifications modified as follows:

00445.11 Materials –

Delete the reference to Polyvinyl Chloride Pipe in the material table

(e) Tracer Wire - Replace this subsection, except for the subsection number and title, with the following:

a. **Tracer Wire** - Furnish Copperhead Superflex 1045G-SF tracer wire, or approved equal.

b. **Connectors** - Furnish Copperhead SnakeBite LSC1030C locking connectors for terminals and connectors, or approved equal.

c. **Terminal Access Point** - Furnish Copperhead SnakePit LD14 terminal access point, or approved equal.

Add the following to the end of the subsection:

(i) Marking Tape - Marking tape shall be non-detectible marking tape for sewer that is 2 inches wide APWA green, stretchable to a minimum of 7 times its original size. Provide marking tape with the label that matched the utility. Marking tape shall meet all requirements of the owning utility and as approved by the Engineer.

(j) Gravity Sanitary and Storm Sewer Pipe

a. Rigid PVC pipe compounds used in gravity sewer pipe shall conform to ASTM D-1784, Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (PVC) Compounds.

b. PVC pipe shall conform to ASTM D-3034 standards dimensions ratio not to exceed 35 or to ASTM F679, minimum pipe stiffness of 46 psi. Provide manufacturer's certification, including test results, for all materials supplied under this specification.

c. Where minimum cover cannot be maintained, or where directed by the Engineer, pipe shall be C-900 water pipe meeting the requirements of AWWA C-900 Specifications, Polyvinyl Chloride (PVC) Pressure Pipe

d. Polyethylene ADS N-12 Dual Wall Flexible Water Tight Pipe used in gravity storm sewer pipe shall conform to ASTM F 2648 and shall have a smooth interior and annular exterior corrugations.

e. Solid-wall HDPE used in gravity irrigation pipe shall conform to Section 02415.20.

(k) Pressure Sewer Pipe

a. Pipe shall be C900 and have a minimum DR of 18 unless specified otherwise for pressure sewer pipe 4 inches in diameter and larger. Pipes 4 inches in diameter and larger shall be gasketed and shall use mechanical joints with the exception of service tees, which shall use glued joints.

b. Pipe and fittings smaller than 4 inches in diameter shall be Schedule 40 PVC assembled using glued joints.

c. Vacuum mains shall be constructed of SDR 21 PVC.

(l) Jointing Materials – Polyvinyl Chloride Pipe

a. **Gravity Sewer Pipe** – Joints shall be rubber gasketed and watertight conforming to ASTM D3212 for gravity sewers. Gaskets shall conform to ASTM F477. Lubricant jointing shall be as approved by the pipe manufacturer.

b. **Pressure Sewer Pipe** – Joints shall be rubber gasket or solvent welded depending on pipe size. Solvent welded joints shall conform to the applicable requirements of ASTM D2466 and ASTM D2467.

c. **Gravity Storm Sewer** – Joints shall be watertight per requirements of ASTM D3212. Gaskets shall conform to ASTM F477. Gaskets to be installed by pipe manufacturer and covered with removable protective wrap. Joint lubricant as approved by manufacturer.

(m) Fittings – Polyvinyl Chloride Pipe

a. Gravity Fittings

i. PVC pipefittings shall conform to ASTM D3034, standard dimensions ratio not to exceed 35 or to ASTM F679, minimum pipe stiffness of 46 psi. Provide manufacturer's certification, including test results, for all materials supplied under this specification.

ii. All fittings shall be the same as the joints used on the sewer pipe. Caps or plugs shall be furnished with each tee outlet or stub with the same type gasket and joint as furnished with the service connection pipe specified for future service connections. The plug or cap shall be banded or otherwise secured to withstand all test pressures involved without leakage.

iii. Each tee for future service connection shall be marked with detection tape and a new 2-inch x 4-inch utility grade wooden stake painted green all around. The face of the curb shall be marked with an "S" locating the service crossing. Where no curbs are being installed, the end of service tee shall be marked with a #4 rebar set adjacent to the 2 x 4 stake and set to within 6-inch of the finished grade.

b. Pressure Sewer Fittings

i. **Plug Valves** – Type V405 Eccentric (Isolation Valves)

Plug valves shall be a non-lubricated type and rated at 175psig CWP drip-tight shutoff, with pressure from either direction, and shall have a cast iron body with flanged ends. The valve-closing member shall rotate 90° degrees to a full open or closed position with the plug rotating out of the sewage flow. The lug shall be cast iron with round or rectangular port of no less than 80 percent of the connecting pipe area. The plug shall be coated with Buna-N or Hycar elastomers with seats Type of 316 stainless steel or nickel. The valve stem bearing shall be self-lubricating stainless steel or reinforced Teflon, with the stem seal multiple V-rings (Chevron), U-cups, or O-ring of nitrile rubber, and shall include grit seals on the valve stem. Valves shall be polymer coated inside and out, and have a non-rising stem. Unless otherwise specified, plug valves shall be supplied with a 2" operating nut. In vault service boxes or above ground plug valves shall be supplied with hand wheels.

Approved manufactures:
1. Keysone; Ballcentric
2. Dezurik; Series 100
3. Victaulic; vic-Plug

ii. **Check Valves** – Check valves on pressure sewer mains shall be external lever and weight actuated, iron-body, flanged-end, resilient seat check valves equivalent to Kennedy model 106 ALS. APCO model 104P3 with backflow device may be used in lieu of the Kennedy check valve in certain applications.

iii. **Pressure Sewer MH and C.O**. – Cleanouts shall be constructed as indicated on the Standard Drawings. MH shall be a 48-inch manhole as illustrated in the Standard Drawings.

iv. **Pressure Pipe Air-release Valves** – Air-release valves shall be constructed as indicated on the Drawings, complete with 2-inch shut-off valve, 1-inch blow-off valve, and back flushing apparatus, APCO Model 400, Valmatic 302, or equal. Valve shall provide for an operating pressure range of 0-50 psi.

v. **Hot Tap Specifications** – 2-inch and 3-inch saddles shall be epoxy coated ductile iron body saddles with double stainless steel straps equivalent to type 202S as manufactured by Romac.

All taps larger than 2 inch shall be stainless steel sleeves equivalent to type SST service saddles as manufactured by Romac.

vi. **Valve Boxes** – Valve boxes subject to traffic loading shall be a two-piece grade adjustable box. The valve box shall have 7-inch I.D. with a slip top section without a dirt flange on the bottom as shown in the

Standard Drawing. Valve boxes shall be cast iron East Jordan Iron Works #363912 or equal. The bottom extension piece shall be a single piece of 6" 3034 pipe of the proper length for to allow for 6"-12" inches of overlap. The word "SEWER" or letter "S" shall be cast into the top of the lid. Valve boxes shall not be located in driveways.

vii. **Restraining Device** – Restraining devices used on pressure sewer shall be a full-circumference wedge-type device as manufactured by Romac Industries. Restraining device shall be Grip Ring™ or approved equal.

c. **Sewer Lateral fittings**

i. **Sewer Service Markers** – Service connection markers shall be new, one-piece Douglas Fir or cedar, 2x4, utility grade or better. Rebar shall be #4, Class 40 or better.

ii. **Service Saddles** – Gravity line service saddles shall be Romac "CB" type saddles or equivalent with stainless steel strap. No other type shall be permitted. Furnish Predco PE44 Exothermic Epoxy Kit, 4 oz Resin and 4 oz Hardener In on 8 oz Jar, or approved equal, for application around gasket seals.

iii. **Swing Check Valves** – Swing valves shall be APCO series 100, Legend Model T451, or equivalent U.S. Brands. The check valve shall be capable of passing a 2-inch diameter solid.

iv. **Plug Valves** – Non-lubricated 175 psig rated type CWP drip-tight shutoff with pressure from either direction cast iron body with flanged ends. The valve-closing member shall rotate 90° degrees to a full open or closed position with the plug rotating out of the sewage flow. The lug shall be cast iron with round or rectangular port of no less than 80 percent of the connecting pipe area. The plug shall be coated with Buna-N or Hycar elastomers with seats Type of 316 stainless steel or nickel. The valve stem bearing shall be self-lubricating stainless steel or reinforced Teflon, with the stem seal multiple V-rings (Chevron), U-cups, or O-ring of nitrile rubber, and shall include grit seals on the valve stem. Valves shall be polymer coated inside and out, and have a non-rising stem. Unless otherwise specified, plug valves shall be supplied with a 2" operating nut. In vault service boxes or above ground plug valves shall be supplied with hand wheels.

Approved manufactures:
1. Keysone; Ballcentric
2. Dezurik; Series 100
3. Victaulic; vic-Plug

00445.40(b) Line and Grade - Replace this subsection, except for the subsection number and title, with the following:

Centerline and grade control will be established prior to the start of construction.

Do not vary from established line and grade more than ½ inch for line and more than 1/32 inch per inch of pipe diameter. Variance shall not exceed 1 inch, subject to the following limitations:

00445.40(c) Pipe Distribution and Handling – Add the following paragraph to the end of the subsection:

Do not stage more pipe along an open trench, prior to installation, than can be installed in one work shift.

Add the following subsection:

00445.40(h) Sewer Taps – Sewer taps shall be performed only by competent personnel of companies' pre certified for sewer taps by the City of Bend. Tapping equipment shall be used only for sewer taps. A representative of the City Engineer must witness every sewer tap. Provide a minimum of 5 calendar days' notice prior to installing tap. Apply exothermic epoxy around gasket seals to adhere the gasket to the pipe.

00445.43(c) Polyvinyl Chloride Pipe – Add the following paragraphs to the end of the subsection:

For pressure sewer, wrap the pipe four (4) times per 20-foot section with detection tape to differentiate this pipe from the white or blue plastic pipe used in potable water applications.

Fittings, plugs, and caps shall be installed in pipe in the manner described within these specifications or by the approval of the City Engineer, or his/her representative. For dissimilar pipes, (e.g. AWWA C900 to ASTM D3034), a hard PVC transition type adapter coupling shall be used. Special conditions encountered for which suitable adapter couplings are not available, shall be referred to the City Engineer for consideration of an approved method. Fern-co and Calder Coupling type fitting will not be allowed.

(1) Solvent Welded Joints – After a length of Solvent Weld pipe is placed in the trench, both the spigot end and the receiving bell shall receive a thorough application of primer and glue as per the manufacturer's specifications. The pipe shall be centered, seated, and rotated at least 90°. The pipe shall be brought to correct line and grade and secured in place with approved backfill material. Pipe and fittings which do not allow a sufficient and uniform space for jointing shall be removed and replaced with pipe and fittings of proper dimensions to ensure such uniform space. Precaution shall be taken to prevent dirt from entering the joint space.

(2) Number of Pipes Laid Before Jointing – Solvent Weld and Rubber gasket joint pipe shall be connected as hereinafter specified as soon as they are placed in the trench.

(a) Pressure Sewer Thrust Blocking – Place thrust blocks at all angle points on pressure sewer. Where approved by the City Engineer, restrained joints may be used on pressure sewer lines in lieu of thrust blocks or deadmen.

00445.48 Tracer Wire - Replace this subsection, except for the subsection number and title, with the following:

(a) General – Place tracer wire directly over the pipe centerline. Make tracer wire splices using a solderless connection kit that effectively moisture-seals two or more conductors for direct burial and securely join the wires both mechanically and electrically. Insulate splices to be moisture-proof and waterproof. Splices wrapped with tape will not be accepted as waterproof. Have all splice kits approved prior to installation. Test all tracer wire with locating Equipment prior to acceptance.

(b) Storm Sewer – Install tracer wire on all storm sewer pipes that do not terminate on both end at a structure. Tracer wire is not required on storm sewer pipes between structures.

(c) Sanitary Sewer

(1) Gravity Sanitary Sewer – Install tracer wire on all gravity sanitary sewer laterals from main to clean out. Tracer wire is not required on gravity sewer main between structures.

(2) Pressure Sanitary Sewer – Install tracer wire on all pressure sanitary sewer pipes.

(d) Terminal Access Point – Where terminating tracer wire at a location that does not have a cleanout, or other surface element, terminate tracer wire in a terminal access point set to finish grade.

Add the following subsection:

00445.49 Marking Tape - Replace this subsection, except for the subsection number and title, with the following:

Install one layer of marking tape 1 foot above the pipe in all sanitary and storm sewers trench and as needed for relocated utilities or marking tape that is disturbed or damaged during construction.

00445.70(a) Storm Sewer and Culvert Installations – Add the following sentence to the end of the subsection:

Perform low-pressure air testing on storm sewer mains.

00445.70(b) Siphon, Irrigation, and Sanitary Sewer Installations – Add the following paragraph to the end of the subsection:

No sewer line will be televised until all inverts and channels in manholes are grouted and the manholes and pipes have been flushed with water.

00445.71(a) General – Add the following paragraph to the end of the subsection:

All pressure sewer and sewer force mains shall successfully pass a hydrostatic test prior to acceptance.

00445.72(a) General – Replace the sentence that begins “After completing installation…”, with the following:

After completing installation of the system, including all service connections, installation of other facilities requiring excavation through the trench backfill, backfilling and compaction, receipt and review of compaction reports, and prior to wearing surface paving, conduct a low-pressure air test or a hydrostatic test.

00445.72(c) Air Testing - Replace this subsection, except for the subsection number and title, with the following:

The pressure gauge used in air testing shall have minimum divisions of 0.1 psi and an accuracy of 0.0625 psi. All air testing shall be by the Time Pressure Drop Method. The test procedure is as follows:

(1) The Contractor may wet the lines prior to testing.

(2) Determine the average height of the groundwater over the line. The test pressures required shall be increased 0.433 psi for each foot of average water depth over the exterior crown of the pipe.

(3) Add air slowly to the section of system being tested until the internal air pressure is raised to 4 psi greater than the average back-pressure due to groundwater.

(4) After the test pressure is reached, allow at least 2 minutes for the air temperature to stabilize, adding only the amount of air required to maintain pressure.

(5) After the temperature stabilization period, disconnect the air supply.

(6) At any convenient observed pressure reading at 4.0 psig greater than the average external pressure of any groundwater above the pipe, begin timing the pressure loss. If the time shown in the table below for the designated pipe size and length elapses before the air pressure drops 0.5 psig, the section is considered to have passed the test. The test may be discontinued once the prescribed time has elapsed, even though the 0.5 psig loss has not occurred.

Pipe Dia. (in)	Min. Duration (min:sec)	Length for Min. Duration (ft)	Equation for Specific Length (sec)	Time (Minutes:Seconds)								
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	500 ft
4	1:53	597	0.19*L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427*L	2:50	2:50	2:50	2:50	2:50	2:50	2:50	3:12	3:33
8	3:47	298	0.76*L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	6:20
10	4:43	239	1.187*L	4:43	4:43	4:43	4:56	5:56	6:55	7:54	8:54	9:53
12	5:40	199	1.709*L	5:40	5:40	5:41	7:07	8:32	9:58	11:23	12:49	14:14
15	7:05	159	2.671*L	7:05	7:05	8:54	11:07	13:21	15:34	17:48	20:01	22:15
18	8:30	133	3.846*L	8:30	9:36	12:49	16:01	19:13	22:26	25:38	28:50	32:03
21	9:55	114	5.235*L	9:55	13:05	17:27	21:48	26:10	30:32	34:54	39:15	43:37
24	11:20	99	6.837*L	11:23	17:05	22:47	28:29	34:11	39:52	45:34	51:16	56:58
27	12:45	88	8.653*L	14:25	21:37	28:50	36:03	43:15	50:28	57:41	64:53	72:06
30	14:10	80	10.683*L	17:48	26:42	35:36	44:30	53:24	62:19	71:13	80:07	89:01
33	15:35	72	12.926*L	21:32	32:18	43:05	53:51	64:37	75:24	86:10	96:56	107:43
36	17:00	66	15.384*L	25:38	38:27	51:16	64:06	76:55	89:44	102:33	115:22	128:12

Technical Data:

a) Allowable Air Loss Rate (Q): The value for Q is 0.0015 cubic feet per minute per square foot of internal surface.

b) Testing Main Sewers with Services: If lateral sewers such as services are included in the test because of the difficulty in isolating such lateral sewer, their lengths may be ignored for computing test times. Ignoring the laterals results in a slightly more severe test.

c) Rounding Off Pipe Lengths: Rounding off pipe lengths shall always be to the next higher length value shown, i.e., the test time for 201 feet shall be the times shown for 250 feet. At the discretion of the Inspector, test times for a unique pipe length may be linearly interpolated from the next higher and lower times indicated.

Add the following subsection:

00445.72(e) Hydrostatic Pressure Testing of Pressure Sewer and Force Mains – Pressure sewer and force main shall be tested by hydrostatic methods. Furnish all necessary equipment and material and make all taps in the pipe as required for testing purposes. The test pressure shall be two times the calculated operating pressure, but not less than 50 psi for the low end of the pipe for a minimum duration of 2 hours. For high pressure lines, the test pressure shall not exceed the manufacturer's maximum operating pressure recommendation. Calculate allowable loss using the following:

Loss Formula - The quantity of water lost from the main must not exceed the number of gallons per hour determined by the formula:

$$L = \frac{SD(P)^{1/2}}{148{,}000}$$

L = allowable leakage in gallons per hour
S = length of pipeline tested in feet
D = nominal diameter of the pipe in inches
P = average test pressure during the leakage test in psi

Correct all visible leakage regardless of the allowable leakage specified. If the measured leakage exceeds the allowable amount specified, or if pressure cannot be maintained as specified, locate and repair the leaks and retest the pipeline until test requirements are met.

00445.74 Video Inspection of Sanitary and Storm Sewers - Replace this subsection, except for the subsection number and title, with the following:

After laying and joining sanitary and storm sewer pipe installations from 6 inches to 72 inches in diameter, including backfill and compaction of trenches, receipt and review of compaction reports, but before any finish surfacing or final paving, the Contractor shall coordinate with the City for the City to conduct a video inspection of all sanitary sewer pipes and storm sewer pipes.

Contractor shall introduce water flow of sufficient quantity at the upstream end of the pipe such that flow is observed to be exiting the downstream end of the pipe to be video inspected. Maximum allowable vertical pipe deflection shall not exceed the line and grade requirements of Section 00440.40(b) and will be determined by CCTV observation of standing water depth remaining in any section of the pipe after flow introduction.

Findings of the video inspection shall be recorded, provided to the Contractor, and the Contractor shall be required to correct all deficiencies at no expense to the City. Upon correction of deficiencies revealed by video inspection, the Contractor shall notify the City Engineer and a follow-up video inspection of the corrected areas will be done by the City. Costs for any follow-up video inspections will be borne by the Contractor.

The City will provide video inspection of all lines prior to completion of the one-year warranty and final acceptance of the work. This will be done at no cost to the Contractor.

Findings of the video inspection shall be recorded, provided to the Contractor, and the Contractor shall be required to correct all deficiencies at no expense to the City. Upon correction of deficiencies revealed by video inspection, the Contractor shall notify the City Engineer and a follow-up video inspection of the corrected areas will be done by the City. Costs for any follow-up video inspections will be borne by the Contractor.

If at any time during the one-year warranty period examination of the sewer line discloses a deficiency, that deficiency shall be corrected by the Contractor at no expense to the City.

Add the following subsection:

00445.80 Measurement – Delete the paragraph that begins “Video pipe inspection…”.

00445.80(k) Sewer Taps – The quantities for sewer taps will be measured on the unit basis.

00445.91 Payment –

Add the following Pay Items to the Pay Item list:

	Pay Item	**Unit of Measurement**
(m)	Sewer Service Pipe ____ Inch	Foot
(n)	Sewer Taps	Each

In item (m), the nominal pipe size will be inserted in the blank.

Delete the paragraph that begins “Video pipe inspection…”.

End of Section

Section 00470 - Manholes, Catch Basins, and Inlets

Comply with Section 00470 of the Standard Specifications modified as follows:

(Use the following subsection .10 when composite frames and covers will be used. Composite frames and covers are only permitted for use in non-traffic areas.)

000470.10 Materials – Add the following to the materials list:

Composite Frames and Covers……..... .....2450.31

000470.13 Inside Drop Manhole Connectors – Replace this subsection with the following:

000470.13 Inside Drop – Furnish Reliner inside drop bowl or approved equal. Size drop bowl per the manufacturer's recommendation based on the inlet pipe size. Furnish silicone to be used as a seal between the bowl and the manhole wall. Furnish stainless steel anchor bolts and anchor straps for inside drop pipe connections.

000470.14 Pipe and Fittings – Add the following to the end of the subsection:

Furnish BMP 24R oil/water separator snout, or approved equal. Anchor bolts shall be stainless steel.

(Use the following subsection .16 when corrosion resistant manholes are required.)

000470.16 Sanitary Sewer Manhole Carry-Through – Replace this subsection with the following:

000470.16 Corrosion Resistant Manholes – Furnish corrosion resistant manholes per the following:

(a) Polymer Concrete Manholes – Furnish polymer concrete manholes per Section 02451.

(b) Crystalline Waterproofing Additive – Furnish precast manholes with crystalline waterproofing additive per Section 02452.

Add the following subsection:

00470.18 Drywell

(a) Drain Rock – Furnish commercially available clean 2" – 3" crushed or river run drain rock.

(b) Drywell Liner – Furnish Seattle Textile PVC Coated Polyester Mesh (STC Item #: VM-1000-XXX-99) or approved equal.

Add the following subsection:

00470.19 Resilient Connector – Furnish flexible rubber connector conforming to the requirements of ASTM C923. Use Series 304 stainless steel pipe clamps to secure the pipe to the connector.

00470.41(c) Grates, Frames, Covers and Fittings Replace this subsection, except for the subsection number and title, with the following:

Set metal frames for manholes on full non-shrink grout beds to prevent infiltration of surface water or groundwater between the frame and the concrete of the manhole section. If concrete is to be poured around the frames, coat the portion of the frame that will contact the concrete with hot asphalt before placing the concrete. Set frames, covers and grates true to the locations and grades established. Clean bearing surfaces and provide uniform contact. The use of a bolt adjustment system for frames from the QPL is allowed. Secure all fastenings. Construct all mortared, sanitary sewer manhole necks and all riser ring joints made with non-shrink grout using an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted.

00470.42 Precast Concrete Catch Basins and Inlets - Add the following sentence to the end of this subsection:

Grade adjustments using a bolt system from the QPL is allowed.

00470.45 Steps – Delete this subsection

(The Agency does not allow steps or ladders in storm or sanitary structures)

Add the following subsection:

00470.48 Drywell Facility Construction – Install drywell structure per 00470.41. Place woven geofabric against undisturbed earth as shown in the standard drawing. Place drywell drain rock around the structure to the elevations of the concrete cap. Fold over the woven geofabric and place moisture barrier on top of the drain rock.

Pour the concrete cap directly on the moisture barrier – the concrete cap does not need to be formed. In earth or granular material, the outside two feet of the concrete cap shall be poured over undisturbed earth. In rock excavation, the cap may be poured directly to the rock wall, provided that the rock wall is stable.

The fabric liner specified for the inside of the drywell barrel shall have a smooth finish to promote cleaning by washing down. Felted materials are not acceptable. Fabric liner shall have sufficient tensile strength to be hung without undue sagging, and to resist tearing. It shall be resistant to raveling, and shall be anchored 18 inches back underneath the cone and at each dry well joint for the entire depth of the drywell.

The final elevation for each manhole shall conform exactly with the finished street. It is permissible to adjust the manhole frame to final grade after street paving provided the structure is low enough so as not to interfere with the street paving operation. Patching material shall be asphalt concrete with a maximum patch width of 6-inches.

Add the following subsection:

00470.72 Drywell Facility Testing – Prior to acceptance, all drywells shall pass a performance test under observation by a City representative. The test shall follow the following procedure:

1. Install the drywell per the approved plans, specifications, and applicable construction guidelines.

2. Inspect drywell prior to testing, making sure the drywell is clean and free of sediments.

3. Field check the accuracy of the flow meter by filling up a suitable container with known volume; for example a calibrated 55-gallon barrel.

4. Introduce clean water into the drywell and monitor using an in-line flow meter.

    a. If the drywell total inflow design volume is 10,000 gallons (1,336 CF) or less, place the design volume in the drywell within a 1 hour period and verify that the water either disappears immediately or document the standing water per the COSM Appendix 4B, Full Scale Drywell Test Method.

    b. If the drywell total inflow design volume is between 10,000-25,000 gallons (1,336-3,342 CF), place an initial 10,000 gallons (1,336 CF) into the drywell within 1 hour. If any standing water is present at the end of the 10,000-gallon test, then the City will require the full design inflow volume and/or a full-scale 2-hour drywell test per COSM Appendix 4B.

5. Infiltration Testing - Post-construction infiltration testing is required regardless of prior testing. Draw down measurements shall be performed to determine infiltration rate and recorded during the drywell testing, tested in 5-minute increments for 20 minutes (obtaining 4 recorded draw down measurements). An average infiltration will be determined from the draw down measurements and compared to the design infiltration used in the calculations.

Swale and drywell failure is determined if the facility cannot 1) contain volumes during the test, 2) if the facility is unable to infiltrate at the design infiltration rate (dictated in the construction documents or the storm water report) and 3) if the stormwater rises to the highest perforation in the drywell.

The standard testing form is provided on the next page.

UIC/Swale (Facility) Testing Report Form

Project: _____ Permit number: _____

Drywell ID: _____ Engineer of Record: _____

Date Tested: _____ Engineer Company:_____

Tester: _____ Testing Company:_____

Facility Dimensions:

Depth (*A*): _____feet Length:___ feet Width:_____feet

Testing (Based on approved plans and COSM requirements)

Required quantity:____gallons Required Testing time: ___ min

Assumed / Design Infiltration: ____ gal/min = ____ft/min

Test Time Start: _____

Depth of water at start: _____feet

Test Time End: _____

Depth of water at end: _____ feet (*B*)

Drawdown time – Infiltration Determination

Time (After test)	Depth, feet	Depth Change, feet, (*C*)	Infiltration (ft./min) I = *C* / 5
Test End	(*B*) =	0	
5 min			
10 min			
15 min			
20 min			
		Infiltration Average =	

Passed: ☐ Failed: ☐

Tester Signature: _____ EOR signature: _____

00470.90 Payment –

Add the following Pay Item to the Pay Item list:

	Pay Item	**Unit of Measurement**
(l)	Drywell Facility ____ Cubic Yard	Foot

In item (l), the drainage gallery size will be inserted in the blank.

End of Section

Section 00480 - Drainage Curbs

Comply with Section 00480 of the Standard Specifications.

End of Section

Section 00490 - Work on Existing Sewers and Structures

(This Section requires SP00470.)

Comply with Section 00490 of the Standard Specifications modified as follows:

Add the following subsection:

00490.12 Rubber Composite Grade Rings – Furnish rubber composite risers rings with a minimum tensile strength of 150 psi and a minimum density of 60 pcf.

Add the following subsection:

00490.40(a) Sanitary Sewer Bypass – Bypass sanitary sewer flows as needed to complete work shown. Bypassing system may be gravity or pumping. Submit a Bypass Plan for all anticipated sanitary sewer bypassing within 45 days of notice to proceed to the Engineer. The Plan shall include a narrative and diagram of the bypass, a detailed sequence of activities, a schedule, and a list of equipment and materials. See also requirements in Section 00150, Control of Work. The Contractor shall begin bypass facility construction only after the Plan is approved by the Engineer. Existing sanitary sewers and services must remain active at all times by either gravity flow, existing pressure system, or sewer bypass.

Provide vactor trucks, pumps, piping, sumps, electric power, and any other equipment, materials, and labor necessary to bypass flows as needed to maintain sewer service during construction. Pumping equipment, including all engines, motors, and generators, shall not exceed the City of Bend Municipal Code noise ordinance criteria of (60 dBA nighttime in residential areas as indicated in the code). Sound attenuating enclosures may be required to meet this criterion. Provide adequate capacity to handle existing flows and additional flow due to rain. Design bypass system capacity for peak flows indicated on Drawings. Do not discharge raw sewage onto private property or city streets, or into storm drain systems. The Contractor shall be responsible for any fines – local, state, or federal – resulting from a sanitary sewer spill.

If the bypass system includes pumps, provide a backup pump, generator, and vactor trucks as necessary, and a plan for switching over to the backup system in the event of power and/or equipment failure of the primary temporary pumping plan system. The backup system shall be capable of the same flow as the primary system, and the switch to the backup system shall prevent interruption of service. Switching to the redundant system shall not cause an interruption of sewer bypass or service to customers.

Place bypass piping in temporary trenches or provide ramps as necessary to provide uninterrupted access to businesses, residences, or any public access area. At locations where vehicles normally access, provide a surface suitable for all passenger cars that is smooth and has a maximum grade change that will not damage low clearance vehicles. Provide all measures necessary to protect the pipe from the heaviest expected load as approved by the Engineer. Restore the area disturbed for placement of temporary pipe to original or better condition. If the area is a paved roadway, restore the pavement to pre-construction condition. Prepare and submit temporary traffic control plans to facilitate bypass pumping.

Provide notice to all parties that may be affected by the placement of temporary piping 2 weeks in advance of any disruptions to access. Coordinate all activities with affected parties, and as approved by the Engineer.

Place bypass piping, pump stations, appurtenances, supplies, and any other items associated with temporary pumping within existing right-of-way and in areas approved by the City and the Engineer.

Restore all areas disturbed by pumping facilities or activities to the same or better than original condition, and as approved by the Engineer. All costs shall be incidental to bypass pumping.

00490.43 Abandoning Pipes in Place - Replace this subsection, except for the subsection number and title, with the following:

Abandoning pipe in place is not allowed. All abandoned utilities are required to be removed and disposed of properly, unless otherwise approved by the Engineer.

When pipe abandonment is approved, drain abandoned pipes and plug watertight. Plug abandoned pipes with gasketed mechanical plugs or grout seals, as directed. Where abandoned pipes connect to sewer manholes, install the plugs or seals from the inside of the manhole and reshape the channel to conform to the Standard Drawings.

Fill abandoned pipes greater than 12 inches diameter with sand, controlled low-strength material meeting the requirements of 00442, or other approved material.

00490.90 Payment –

Add the following Pay Item to the Pay Item list:

Pay Item	**Unit of Measurement**
(j) Sanitary Sewer Bypass Complete, ____ GPM.....	Lump Sum

In item (j) insert the maximum flow rate of the existing sewer in the blank.

End of Section

Section 00492 – Manhole Rehabilitation

Section 00492, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00492.00 Scope - This work consists of rehabilitating existing manholes using applied materials to restore or augment structural integrity, repair voids, and protect against corrosion and infiltration. Work also includes cleaning and surface preparation, removal of loose materials, stopping infiltration, manhole step removal, and manhole testing.

00492.01 Definitions - The following terms used in this Section are defined as follows:

(a) Structural Lining – A cementitious rehabilitation system that will provide a fully structural solution as well as provide some minor corrosion protection from bacteriological, chemical, gaseous (hydrogen sulfide), erosion and abrasion.

(b) Protective Coating – A coating system to provide continuous protection against corrosion from bacteriological, chemical, gaseous (hydrogen sulfide), erosion and abrasion, withstand hydrostatic pressures, and provide some structural enhancement to the existing structure.

(c) Rehabilitation System –A lining, coating, or combination of the two as called out in this Section or on the Plans. In addition, materials used to repair or prepare the existing surface is considered a part of the rehabilitation system.

(d) The terms "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.

(e) DFT – Minimum dry film thickness, without any negative tolerance.

(f) Key – Groove of certain depth and width for the purpose of mechanical locking. Approximate depth and width of a quarter (¼) inch by a quarter (¼) inch.

(g) Holiday Testing – Holiday testing is a non-destructive test method to check protective coatings for discontinuities including voids and pinholes. This testing is used to find coating film discontinuities that are not clearly visible.

00492.02 Submittals - Provide the following for review in a single package, following the requirements of subsection 00150.35 at least 30 days prior to commencing rehabilitation Work:

(a) Manhole Rehabilitation Work Plan, including:

(1) Product documentation, including:

a. Materials List: A coating materials list showing the manufacturer and the product number, keyed to the coating systems herein. The list shall be submitted prior to or at the time of submitting samples.

b. Manufacturer's Information: For each coating system to be used, the following data:

- Manufacturer's data sheet for each product proposed, including:
  - Statements on the suitability of the material for the intended use.
  - Application, substrate and air temperatures necessary for application
  - Acceptable humidity and surface temperature ranges for application
  - Cure time
- Technical and performance information that demonstrates compliance with the system performance and material requirements.
- Manufacturer's instructions and methodology for rehabilitation system installation including surface preparation, application, and finish work for manholes and connected pipes.
- Colors available for each product (where applicable).
- Compatibility of shop and field applied coatings (where applicable).
- Material Safety Data Sheet for each product proposed.
- Written certification by the manhole rehabilitation system manufacturer stating that the Supervisor and installers meet minimum experience requirements depicted in 00492.30.
- Manufacturer approval of rehabilitation system components and application equipment.

(2) Protective Coating Samples

a. Standard manufacturer colors shall be used unless otherwise stated by the Agency and only if available by the manufacturer. If custom mixed colors are indicated by the Agency and are available, the color samples shall be made using color formulations prepared to match the color samples furnished by the Engineer. The color formula shall be shown on the back of each color sample (if applicable). A step sample of the protective coating shall be provided and furnished at the Engineer’s request.

(3) Experience Requirements of the Protective Coating Field Application Contractor

a. Three references which verify that the Field Application Contractor has demonstrated successful application of the specified coating system in the past 3 years. Provide the size (area of coating), time of completion, name, the owner’s address and telephone number for each installation referenced.

b. A written statement from the Field Application Contractor or Manufacturer stating that they are qualified and experienced in the application of the specified coating/ lining systems. The letter shall state the manufacturer and model number of mixing, heating, and pumping equipment to be used to apply the specified coating systems.

c. A written statement from the Manufacturer certifying that the Field Application Contractor's onsite foreman and each applicator performing Work on the project has been trained and approved to apply the selected coating system.

d. A written warranty from the Contractor and coatings manufacturer providing protection from defects in material or workmanship. See Section 00492.75.

e. The Field Application Contractor shall provide SSPC QP 1 Certification or the manufacturer's certification of the applicator for the specified coating system.

(4) Manhole preparation plan, including:

a. Proposed methods and procedures for surface preparation, which must meet the minimum guidelines indicated in the lining manufacturer's application instructions.

b. Proposed methods for sealing leaks to allow for optimum bond strength conditions for the approved rehabilitation system.

(5) Description of rehabilitation system and equipment components, including certification that the equipment to be used for applying the products has been manufactured or approved by the manhole rehabilitation system manufacturer(s).

(5) Detailed instruction and methodology for rehabilitation system application, including how finish work for all pipe and manhole connections to rehabilitated manholes will be completed to prevent infiltration and exfiltration.

(6) Description, layout, and application sequencing plan.

(7) Wastewater Flow Control/Bypassing Plan (if required to conduct the Work).

(8) Plan for capturing extraneous debris during rehabilitation processes and debris disposal.

(9) Temporary Traffic Control Plan (if required to conduct the Work).

(b) Submit the following during construction, within 10 days of completion of tests:

(1) Pull test records that include, at a minimum: manhole identification number, test pressure, repeat test number, repairs (if any) made, and actual loading fixture (dolly) used in each test.

Materials

00492.10 Materials - Furnish materials that will meet the following requirements:

Grout 02080
Repair, Resurfacing, and Lining Materials for Manhole Rehabilitation 02221

00492.11 Protective Coatings - General

(a) Protective Coating Suitability - The Contractor shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the Site.

(b) Protective Coating Material Sources - Where manufacturers and product numbers are listed, it is to show the type and quality of coatings that are required. If a named product does not comply with VOC limits in effect at the time of Bid opening, that product will not be accepted, and the Contractor shall propose a substitution product of equal quality that does comply. Proposed substitute materials will be considered as indicated below. Coating / lining materials shall be materials that have a record of satisfactory performance in wastewater treatment facilities or manholes.

(c) Protective Coating Compatibility - In any coating / lining system, only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

(e) Containers - Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, and name of manufacturer, all of which shall be plainly legible at the time of use.

(f) Colors - For primers and other coatings which will not be visible after the finish coat is applied, standard manufacturer colors shall be selected by the Engineer unless specified by the Agency, in the case where additional colors are available by the manufacturer. Finish (or outermost) coat colors shall be standard manufacturer colors selected by the Engineer unless otherwise specified by the Agency and if available by the manufacturer.

(1) Protective coating / lining materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. When requested, the Contractor shall provide the Engineer with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements.

(2) If a proposed substitution requires changes in the Work, the Contractor shall bear such costs involved as part of the Work.

Equipment

00492.20 Equipment - Provide equipment constructed or certified by the lining manufacturer.

Labor

00492.30 Personnel:

(a) Installers shall be trained and certified by the manufacturer in handling, applying and finishing manhole rehabilitation materials.

(b) Installers shall have completed successful rehabilitation of at least 250 sanitary sewer manholes in the last 10 years using the proposed method and materials.

(c) For each material and method, work must be supervised by a foreman trained and certified by the manufacturer with a minimum of two (2) years of experience and successful completion of thirty (30) manhole rehabilitations.

(d) Protective Coatings

(1) Installers shall possess valid Oregon state license(s) required for performance of the painting and coating Work called for in this Specification.

(2) Contractor shall provide 5 references which show that the Field Application Contractor has previous successful experience with the indicated or comparable coating / lining systems. Include the name, address, and the telephone number for the owner of each installation for which the Contractor provided the protective coating.

00492.35 Protective Coating Manufacturer's Services

(a) The Field Application Contractor shall require the protective coating manufacturer to furnish a qualified technical representative to visit the Site for technical support as may be necessary to resolve field problems.

(b) For submerged and severe service coating systems, the Contractor shall require the paint manufacturer to furnish the following services:

(1) The manufacturer's representative shall provide at least 6 hours of on-Site instruction in the proper surface preparation, use, mixing, application, and curing of the coating systems.

(2) The manufacturer's representative shall observe the start of surface preparation, mixing, and application of the coating materials for each coating system.

(c) For Lining Systems, the Manufacturer shall provide a letter certifying that the application contractor has been trained in the application of the Lining System.

Construction

(Design Note: The table below is an example of what information should be included on the Plans. Modify as appropriate. For example, consider adding existing manhole diameter, material, depth. Include "Structural Lining", "Protective Coating", or "Structural Lining + Protective Coating" to the Scope column with required thicknesses. If Table 1 in section 00492.42 is used, then minimum design thickness column would not be needed on Plans.

Manhole ID	Existing Manhole Data			Rehabilitation Scope	Minimum Design Thickness (mils)
	Diameter	Material	Depth		
SS-1	48-inches	Concrete	15 ft	Structural Lining and Protective Coating for X vertical feet measured from manhole base	1000 mils
SS-2	48-inches	Concrete	10 ft	Protective Coating	150 mils

Delete this note and table from the specifications.)

00492.40 Material Handling

(a) Material Delivery - Deliver materials to the job site in original, unopened containers, each bearing the manufacturer's name, installation method, batch number, date of manufacture, storage life, and special handling directions. Remove from the site any uncured compound determined to be more than six months old. Do not use uncured product or grout if container has been open for more than 24 hours or per the manufacturer's instructions, whichever is less.

Materials may be rejected and removed from the site if they exceed the manufacturer's recommended storage life. Provide replacement materials at no additional cost. Coating materials shall be used within the manufacturer's recommended shelf life.

(b) Material Storage - Store materials in enclosed structures, protected from weather and excessive heat or cold. Store flammable materials according to state and local codes. Coating / lining materials shall be stored under the conditions recommended by the Product Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings from different manufacturers shall not be mixed together.

Store flammable materials according to state and local codes.

(c) Mixing and Thinning of Materials - Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for other procedures relative to coating shall be strictly observed.

00492.41 Manhole Preparation

(a) Diversion of Flow – When required to complete the Work, provide and maintain a flow diversion system in accordance with Section 00490. Dam, plug or divert all active flows, including leaks, to ensure all flow is maintained at an elevation lower than the manhole surfaces requiring rehabilitation during preparation, application and curing process. Put plywood mats or sheeting over the existing flow channel and bench to

prevent debris from falling into the sewer. Collect debris from manhole bench at the end of each workday.

(b) Manhole Steps - Prior to cleaning, cut off manhole steps flush with manhole wall and grind back remaining steel to ½-inch below existing concrete surface, according to 00490 and as approved.

(c) Cleaning and Surface Preparation – Prepare surface per Manufacturers' recommendations.

(1) Remove all brick, concrete or mortar that is loose, protruding, unsound or is damaged by chemical exposure, corrosion or other means of degradation, leaving a sound surface. Fill all voids, seal all leaks and exposed rebar. All surfaces shall be clean and free of laitance or loose material.

(2) Prepare areas of exposed rebar by abrasive-blasting all exposed reinforcing steel surfaces to remove all contaminants and corrosion products. Reinforcing steel, exposed by corrosion or during surface preparation operations, shall be treated with a water-based epoxy resin, anti-corrosion coating and bonding agent such as Armatec 110 EpoCem, manufactured by the Sika Corporation, or approved equal.

(3) Clean and abrade all surfaces that are to be rehabilitated in order to produce a sound surface with adequate profile and porosity, and to provide a strong bond between the rehabilitation product and the substrate. All surface preparation methods shall be performed in a manner that produces a uniform, sound, clean, neutralized surface that is not excessively damaged and is suitable for the specified rehabilitation product(s) and adhere to the manufacturer's recommendations.

(4) Seal all infiltration leaks per manufacturer's instructions. Use grout and sealing materials recommended by the manufacturer and as approved. Repair material that is not verified by the manufacturer at the time of construction will not be allowed.

(5) Surfaces to receive rehabilitation shall be prepared with a series of grooves (key ways) cut into the substrate prior to the structural liner and cut into the structural liner prior to the protective coating at a spacing and depth as per manufacturer recommendation but no less than above and below each horizontal manhole joint, above the manhole bench, and at the top of the flow channel. The grooves shall be angled into the substrate at a 60 degree angle with a width and depth no less than 1/4 inch. At no time shall the existing reinforcement be cut or damaged during installation of the key ways.

(6) Pack annular spaces between the manhole cone or chimney and the bottom of the manhole frame with approved repair material. Where incoming laterals are to be abandoned, block laterals and build surface to be flush with manhole walls with approved repair material. Use resurfacing materials to fill large voids, lost mortar in masonry structures, smooth deteriorated surfaces and rebuild severely deteriorated structures so the profile of the prepared concrete surface does not have any pits or holes exceeding ¼-inch in depth. Trowel repair material to provide a smooth surface with an average profile equivalent to coarse 60 grit sandpaper to optimally receive the rehabilitation system products.

(d) Inspect Manhole - Prior to surface restoration, inspect all surfaces receiving rehabilitation. Provide notice of any obvious defects interfering with the proper surface preparation or application of proposed products. Inspection by the Agency or Engineer is required during and after surface preparation is complete. Manhole must pass visual inspection by the Engineer prior to application of rehabilitation products/materials.

Test prepared surfaces after cleaning, but prior to application of the rehabilitation products/materials, to determine if pH, profile and moisture content of the concrete meet the manufacturer's recommendations.

00492.42 Structural Lining - Do not begin installation until the concrete substrate is properly cured according to the manufacturer's recommendations, and as approved. Use application procedures according to the lining manufacturer recommendations and specifications, including material handling, mixing, environmental controls during application, safety, and spray equipment.

Confirm that the ambient temperature and humidity, the prepared surface temperature and moisture content, and the temperature of the lining material to be applied are within the manufacturer's allowable ranges. Shield surfaces receiving linings to avoid direct sunlight exposure or other intense heat source.

Properly match pump, hoses, gun, tip, and pressures to the specific lining application used. The equipment must be properly cleaned before work starts. Test spray pattern for uniformity of distribution.

Thoroughly mix all lining materials to ensure all agglomerated particles are reduced to original size or removed prior to placement into the application equipment (i.e. the hopper). Each batch of material should be entirely discharged before recharging with fresh material. Clean mixing equipment at regular intervals to remove all adherent materials. Add water to the mix according to the manufacturer's recommendations. Re-mixing or tempering isn't permitted. Do not reuse rebound materials.

Apply lining product to all exposed concrete surfaces, including bench, pipe penetrations, interior structure walls, ceilings, and chimney. Do not apply to flow channel. Application must consistently achieve uniform compaction with low percentage of rebound and no visible sag.

Lining shall be terminated by keying into the concrete per 00492.41(c). Prior to application of lining, the saw cut shall be dried and vacuumed to remove all dust and residue. During lining application, a liberal amount of material shall be applied to the saw cut area and smoothed level.

For pipes protruding from the manhole wall, manhole lining shall overlap the pipe by 3 inches along the outside surface of the protruding pipe. For pipes terminating flush with the existing manhole wall, cut a circular groove around the existing pipe penetration and extend lining to the edge of the circumference of the pipe. Do not extend lining into the pipe.

Install lining to the thickness necessary to qualify as a monolithic (void free) liner. Finish horizontal surfaces with wood float, sponge float, broom, or brush to produce a textured surface, or as recommended by the manufacturer.

Table 1: Liner Thickness in mils based on Manhole Depth and Diameter			
	Liner Thickness (mils)		
Depth	48-inch	60-inch	72-inch
<5 feet	750	950	1100
5 feet to 10 feet	800	1000	1200
10 feet to 15 feet	1000	1250	1500
15 feet to 20 feet	1100	1375	1650
20 feet to 25 feet	1200	1500	1800
25 feet to 30 feet	1300	1625	1950

Required Thickness: As called out in Table 1 (minimum 750 mils).

Do not add hot air to the manhole to accelerate set time of the lining.

00492.43 Preparation for Protective Coating

(a) General - Surfaces to receive protective coatings shall be prepared as indicated prior to application of coatings. The Contractor shall examine surfaces to be coated and shall correct surface defects before application of any coating material. Marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any field coating application. Surfaces to be coated shall be dry and free of visible dust.

(b) Protection of Surfaces Not to be Coated - Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations. The following surfaces shall not be coated:

(1) Stainless steel

(2) Machined surfaces

(3) Grease fittings

(4) Platform gratings, stair treads, door thresholds, and other walk surfaces, unless specifically indicated to be coated.

(c) Care shall be exercised not to damage adjacent Work during blasting operations. Spraying shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair any and all damage to adjacent Work or adjoining property occurring from blasting or coating operations.

(d) Protection of Painted Surfaces - Cleaning and coating shall be coordinated so that dust and other contaminants from the preparation process will not fall on wet, newly-coated surfaces.

00492.44 Concrete Surface Preparation for Protective Coating

(a) Surface preparation shall not begin until at least 30 Days after the concrete or masonry has been placed.

(b) At the discretion of the Inspector, the Contractor shall test the surfaces for soluble salts with the use of Chlor*Test as manufactured by Chlor*Rid International or approved equivalent. Any surfaces shall be tested and shall have a maximum concentration of 5 micrograms per square centimeter (µg/cm2). A test shall be conducted for every 100 square feet (ft2) of surface area to be coated at locations determined by the Inspector.

(c) If the soluble salt test indicates chloride concentrations greater than those outlined in these Specifications, the Contractor shall use Chlor*Rid, as manufactured by Chlor*Rid International, in the water source during Water Cleaning to remove the salts from the substrate. A substrate's surface preparation will be accepted once the soluble salt concentration is below the amounts outlined in these Specifications.

(d) In accordance with ASTM D4262, test to determine the pH of the concrete surface after the surface has been thoroughly blasted and cleaned. If the pH is outside the range recommended by the coating manufacturer, then the surface must be neutralized by removing concrete until the surface pH of 7 or greater is obtained prior to any coating application. One pH test shall be performed every 200 square feet, or less, and at locations determined by the Inspector.

(e) The Contractor shall test for capillary moisture in accordance with ASTM D4263. Moisture tests shall be taken every 200 square feet or less and at locations determined by the Inspector. If capillary moisture is present, the coating manufacturer shall be consulted to determine primer requirements and special coating application criteria.

(f) Surface Voids - Bugholes, honeycomb, or other surface voids greater than 1/4 inch in depth or 1/4 inch in diameter shall be filled in with a resurfacing mortar prior to the application of any primer or finish coat.

(g) Holes or other joint defects in masonry shall be filled with mortar and repainted. All voids and cracks shall be repaired as specified. Loose or spatter mortar shall be removed by scraping and chipping. Masonry surfaces shall be cleaned with clear water by washing and scrubbing to remove foreign and deleterious substances. Muriatic acid shall not be used. After cleaning, masonry surfaces shall be sealed or filled with a sealer or block filler compatible with the specified primer.

(h) Coating Floor/Wall Joints - A 1/4-inch wide by 3/8-inch deep saw cut shall be made on the vertical and horizontal concrete surfaces around the perimeter of the floor. The saw cut shall be 2 inches from the joint on both sides. Prior to the coating application, the saw cut shall be dried and vacuumed to remove all dust and residue.

(i) All oil, grease, and form release and curing compounds shall be removed by detergent cleaning per SSPC-SP 1 before abrasive blast cleaning.

(j) New concrete, concrete block masonry surfaces and deteriorated concrete surfaces to be coated shall be abrasive blast cleaned, per SSPC-SP 13/NACE No. 6, to remove existing coatings, laitance, and deteriorated concrete, and to roughen the surface equivalent of ICRI Concrete Surface Profile (CSP) No. 4-6.

(k) Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.

00492.45 Application of Protective Coatings

(a) Cleaned surfaces and each coat shall be inspected prior to applying each succeeding coat. The Contractor shall schedule such inspection with the Engineer in advance.

(b) Coatings shall be applied in accordance with the manufacturer's instructions and recommendations and this Section, whichever has the most stringent requirements.

(c) Special attention shall be given to materials that will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

(d) Finish coats, including touch-up and damage repair coats shall be applied in a manner that will present a uniform texture and color matched appearance.

(e) Coatings shall not be applied under the following conditions:

(1) Temperatures exceeding the manufacturer's recommended maximum and minimum allowable.

(2) Concrete surfaces will be in direct sunlight during application or within 3 hours after application.

(3) Dust or smoke laden atmosphere.

(4) Damp or humid weather.

(5) Substrate or air temperature is less than 5 degrees F above the dew point.

(6) Air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dew point within 8 hours after application of coating.

(7) Wind conditions or gusts which may bring substantial dust or airborne particles towards the site during coatings application where wind abatement cannot be achieved.

(f) Dew point shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychometric tables or instruments approved prior to the project start-up.

(g) Workmanship

(1) Skilled craftsmen and experienced supervision shall be used on coating Work.

(2) Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to ensure thorough surface preparation.

(3) Lining Systems shall be applied in accordance with the Manufacturer’s instructions.

(4) Damage to other surfaces resulting from the Work shall be cleaned, repaired, and refinished to original condition.

00492.46 Curing of Coatings

(a) The Contractor shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the most stringent, prior to placing the completed coating system into service.

(b) In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.

00492.47 Manhole Steps – New manhole steps shall be installed according to Specification Section 00490. Ensure that there are no gaps exposing concrete at the wall penetration of the new steps. Do not install manhole steps in brick manholes.

00492.50 Visual Inspection - At certain hold points in the rehabilitation process, request approval to proceed with the next stage of the application process. The designated inspection hold points for each installation are:

- Completion of surface repairs, re-profiling, and preparation.
- Completion of each application of cementitious lining (if used).

Provide 24-hour notice that approval of an inspection hold point is needed. The Owner's Representative will respond to the request within 24 hours. Visual inspection includes:

- Zero groundwater infiltration.
- All pipe connections are open and clear.
- No cracks, voids, dry spots, delamination or other types of defects of the newly applied material are visible.

Finishing and Clean Up

00492.70 Cleanup - Remove surplus materials, protective coverings, accumulated rubbish, and thoroughly clean all surfaces. Repair any overspray, splashes, splatters or other rehabilitation-related damage after approval of the work. Surfaces damaged from this clean up shall also be cleaned, repaired and refinished to the original condition or as approved.

00492.71 Field Inspection and Testing

(a) General - The Contractor shall give the Engineer a minimum of 3 Days' advance notice of the start of any field surface preparation or coating application.

(b) Inspection by the Engineer, or the waiver of inspection of any particular portion of the Work, shall not relieve the Contractor of its responsibility to perform the Work in accordance with these Specifications.

(c) Scaffolding shall be erected and moved to locations where requested by the Engineer to facilitate inspection. Additional illumination shall be furnished on areas to be inspected.

(d) Inspection Devices - The Contractor shall furnish inspection devices in good working condition for the detection of holidays and measurement of dry film thicknesses of coatings. Dry-film thickness gauges shall be made available for the Engineer's use while coating is being done, until final acceptance of such coatings. The Contractor shall furnish the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the Engineer.

(e) Tests shall be conducted by a NACE certified inspector.

(f) Film Thickness Testing - Coating thicknesses shall be measured at the time of application using a wet film gauge per ASTM D4414: Standard Practice for Measurement of Wet Film Thickness. Dry film coating thickness shall be measured in accordance with ASTM D6132. Use a PosiTector 200 or equal. Repair all verification points upon acceptance of the thickness tests.

(1) For structural lining, test a minimum of four equally spaced points around the circumference of the manhole wall. Conduct tests every 10 vertical feet, starting at a point 1 foot above the manhole bench or base in the absence of a bench. For manholes less than 11 feet deep, conduct thickness tests at a point equidistant from the bench / base of the manhole and the top of the applied liner.

(g) Adhesion Testing of Structural Liner to Substrate – Conduct one test every 5 vertical feet in accordance with ASTM C109. For structural liners less than 5 feet deep, conduct adhesion tests at a point equidistant from the bottom of the structural liner and the top of the applied liner. Remove and replace areas not meeting required 150 psi at 28 days minimum adhesion requirement (or resulting in substrate failure).

(h) Adhesion Testing of Protective Coating to Substrate - Conduct one test every 5 vertical feet in accordance with ASTM 7234. For coatings less than 5 feet deep, conduct adhesion tests at a point equidistant from the bottom of the structural liner and the top of the applied liner. Remove and replace areas not meeting required 150 psi at 28 days minimum adhesion requirement (or resulting in substrate failure).

(i) Holiday Testing - If applicable for the selected coating material(s) and manhole type, the Contractor shall test for continuity per ASTM D4787 for all coated or lined surfaces that will be submerged in water or other liquids, surfaces that are enclosed in a vapor space in such structures, and surfaces coated with any of the submerged and severe service coating systems. Areas that contain discontinuities shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then be retested.

(1) Coatings with thickness exceeding 20-mils total DFT: Pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the required coating thickness.

(2) Coatings with thickness of 20-mils or less total DFT: Tinker & Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75 volts. For thicknesses between 10- and 20-mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo or equal, shall be added to the water prior to wetting the detector sponge.

(j) Surface Preparation - Confirm proper surface profile with ICRI Concrete Surface Profile Chips.

00492.75 Warranty – The Contractor unconditionally warrants to the Agency the product and installation under this Section against failure, according to this Subsection and 00170.85(b)(1).

"Unconditionally warrant" means that the warranty covers all failures, regardless of the source or cause of the failure, including, without limitation, whether the source or cause is or may be related to workmanship, inspection, or choice of materials.

The Agency inspection of any portion of the Work during the Contract and during the product installation, the Agency acceptance of the Work, corrections under the warranty, or expiration of the warranty shall not relieve the obligations under this warranty.

(a) Warranty Period - The warranty period shall extend for 10 years from the date of product installation and Agency acceptance. During the warranty period the Contractor or coatings manufacturer will repair or replace coating at no charge to the Owner.

(b) Inspection - An inspection may be conducted during the twelfth month following completion of coating Work. The Contractor and a representative of the coating manufacturer shall attend this inspection. Defective Work shall be repaired in accordance with these specifications and to the satisfaction of the Agency. The Contractor is not relieved of its responsibilities to correct defects, whether or not the inspection is conducted.

Measurement

(Design Note: Consider using a per vertical foot for measurement and payment if Contract Documents should have the flexibility to add/delete manholes that are of unusual depth (e.g., very shallow, very deep) or size (e.g., oval, etc.). If scope is clear/set, recommend bidding the work on an "EACH" basis, especially if manholes are standard depth.)

00492.80 Measurement – The quantities of manhole rehabilitation will be measured on the unit basis for each manhole rehabilitated.

Payment

00492.90 Payment – The accepted quantities of work performed under this Section will be paid for at the Contract unit price, per unit of measurement for the following items:

Pay Item	Unit of Measurement
(a) Rehabilitate Manhole	Each

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, tools, labor, and incidentals necessary to complete full structural lining and protective coating of the manholes as specified. Manhole steps will not be installed or replaced post manhole rehabilitation.

Flow diversion will be paid for according to 00490.

End of Section

Section 00495 - Trench Resurfacing

Comply with Section 00495 of the Standard Specifications modified as follows:

00495.40 General – Add the following paragraph after the paragraph that begins “The following construction…”:

Transverse trenches in the paved ROW shall be constructed so that the termination point complies with 00745.47(a) in the travel way. Transverse trenches constructed with less than 10-foot separation between cut lines shall be surface patched as one patch incorporating both trenches per COB Standard Drawing R-11. Three or more transverse trench cuts within one pavement section or block if placed from curb to center line require a full patch from curb to center line incorporating all trench cuts as one surface patch. Three or more transverse trench cuts that cross the travel way from curb to curb within a pavement section or block require a full patch from curb to curb incorporating all trench cuts as one surface patch. The surface finish of trench patches shall comply with 00745.70(b). All longitudinal trench cuts in the paved way shall comply with 00745.47(a)(2).

Add the following subsection:

00495.41 Crack Sealing – Provide crack sealing in accordance with Section 00746 at all joints where new pavement meets existing pavement.

00495.90 Payment – Add the following paragraph to the end of the subsection:

Crack sealing will be paid for according to 00746.90.

End of Section

Section 00498 – Utility Field Explorations

Section 00498, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00498.00 Scope – This work consists of exposing existing utilities as identified on the Plans. Information gathered from Utility Field Exploration regarding utility location, configuration, dimensions, and elevations shall be added to Record Drawings.

(Use the following paragraph when Special Utility Potholes are identified in the plans. Update SP00150.11 accordingly with time requirements for completion of Special Utility Potholes)

Special Utility Potholes are identified in the plans at critical locations which may require design revisions. See Section 00150.11 for Special Utility Pothole time requirements.

Construction

00498.40 Utility Field Exploration – The subsurface conditions for existing utilities including, but not limited to, water, gas, sewer, CATV, fiber optic, power, telephone, pipe fittings, steel casing pipe, valves, duct banks, and appurtenances shown on the drawings are estimates based on surface locates and survey information. In areas of new pipeline construction, verify the existing conditions where crossings, connections to, or modifications of the existing utility are shown on the drawings. Excavate at these locations to verify existing conditions and obtain information necessary to perform required pipeline construction and connections to existing utilities.

Submit a plan to the City of the anticipated exploratory activities including the proposed schedule, local traffic control plan necessary for the exploratory work, areas of excavation, proposed extent of excavation and pavement repair.

Receive approval for the plan from the City before scheduling or starting the work. Coordinate all exploratory activities with the City to allow City observation of activities if they desire.

For each exploration, submit to the Engineer all documentation including photographs and a schematic of the actual conditions, including depths, pipe size, material, locations of joints, thrust blocks, valves, fittings, and other appurtenances, and measurements between all features.

Contractor shall be responsible to locate the exact invert of each pipe or conduit shown on the plans or as identified in the field. Invert elevations and horizontal location based upon layout of the new pipe will immediately be provided to the Engineer/Owner to allow grade comparisons of the design. Contractor shall locate the utility and provide the information to the Engineer/Owner prior to construction activity coming within a minimum of 500-feet of the locate to allow field adjustment of pipe grades as necessary.

Complete field exploration activities at each location and submit documentation a minimum of 1 week prior to construction in that area. If the actual conditions require changes to the work shown on the drawings, immediately notify the Engineer.

Measurement

00498.80 Measurement – The quantities for utility field exploration shall be measured on a per each basis for all investigative efforts regardless of the type, size or location of the utility below existing ground.

Payment

00498.90 Payment – The accepted quantities for work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

(Delete the pay item(s) from the list that are not included in the Schedule of items, but do not change the alpha characters next to the pay item.)

Pay Item	Unit of Measurement
(a) Field Explorations	Lump Sum
(b) Special Utility Pothole	Each

The unit price paid for Field Explorations (Potholing) shall include all compensation for coordination activities, documentation, traffic control, excavation and replacement of materials in each utility field exploration areas, surface restoration, and associated activities not covered under other bid items.

End of Section

Section 00499 – As-Built Drawings

Section 00499, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00499.00 Scope – This work consists of providing as-built drawings showing all aspects of construction as required by Section 00150.40.

00499.15 General – Prepare and maintain as-built drawings in accordance with the procedures set forth in this section. When applicable, prepare as-built drawings in accordance with regulations as set forth by the State of Oregon Department of Environmental Quality for both wastewater and/or water systems and State of Oregon Department of Health Services. Submitted as-built drawings not meeting ODEQ and DHS regulations shall not be considered approved.

As-built drawing information required in the submittal for acceptance includes a complete set of red-lined drawings, construction contractor's field installation notes of the facilities as-constructed, and original construction field survey notes.

(a) During Construction - Maintain a working set of red-lined drawings on site and available for viewing by the Engineer upon requests.

(b) Following Construction - Submit a red-lined copy of the original Plans noting all changes made. The information furnished shall include all modifications made and shall represent the material installed and in operation. The as-built drawings shall contain the same data shown on the construction contractor's field installation notes and provide enough information for the Engineering of Record to prepare Record Drawings..

(c) Field Installation Notes – Provide field installation notes containing the horizontal and vertical location information as constructed including, but not limited to:

- Manhole and cleanout horizontal station and vertical elevations
- Valves, fire hydrants, valve boxes, PRV's and mechanical joint fittings
- Make, model and location of all thrust restraint fittings and total footage of pipe restrained
- Service connections at the mains and stationing
- Special fittings
- All encountered utilities
- Changes in pipe size, slope, or type
- Service locations at property lines swing-tied to above-ground facilities, such as fire hydrants, houses, light poles, or water valve boxes. For sanitary sewer, provide the invert elevation of the connection at the property line or easement line.
- Irrigation system

Measurement

00499.80 Measurement – No measurement of quantities will be made for Work performed under this Section.

Payment

00499.90 Payment – The accepted quantities for Work performed under this Section will be paid for at the Contract lump sum amount for the item “As-Built Drawings”.

Partial payments will be made as follows:

- When 30 percent of the Contract is complete..... 30%
- When 60 percent of the Contract is complete..... 30%
- At completion of the Contract once As-Built drawings are accepted..... 40%

Contractor must demonstrate as-built drawings are being adequately maintained to receive partial payment.

End of Section

SP00500 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00500 – BRIDGES

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00510 – Structure Excavation and Backfill

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00510 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00510 of the Standard Specifications modified as follows:

(Use the following subsection .04(a) when shoring is required.)

00510.04(a) Defined Shoring Systems - Add the following to the end of this subsection:

Construct shoring at the location(s) listed below:

(Use the following table to indicate the shoring location and the defined system(s) allowed. Include the beginning and ending stations, use either "Lt." or "Rt.", or a separate shoring alignment as required, to locate and provide minimum shoring length, and include the defined type of shoring system type(s) allowed from the list: All, 5A, 5B, 5C, 5D, 5E, 5F, 6A, 6B, 7A. Add or delete rows in the table as necessary to list additional locations and list all applicable defined shoring systems.

Example:

Beginning Station	***Ending Station***	***Shoring System Type(s) Allowed***
Station 1+55 Rt.	*Station 2+45 Rt.*	*All*
Station 4+00 Lt	*Station 4+40 Lt.*	*5A*

)

Beginning Station	**Ending Station**	**Shoring System Type(s) Allowed**
Station _____*(*Lt.*)(*Rt.*)*	Station_____ *(*Lt.*)(*Rt.*)*	

(Use the following subsection .80(b)(1) when structure excavation is paid for on the lump sum basis.)

00510.80(b)(1) Lump Sum - Add the following to the end of this subsection:

The estimated quantity of structure excavation is:

Location	Structure Excavation (Cubic Yard)

(Use the following subsections .80(d) when granular wall backfill and/or granular structure backfill will be measured and paid for on the lump sum basis.)

00510.80(d)(1) Lump Sum - Add the following to the end of this subsection::

The estimated *(*quantity*)(*quantities*)* of *(*granular wall backfill*) (*and*) (*granular structure backfill*) (*is*)(*are*)*:

(Delete headings that do not apply. Obtain quantities from the designer.)

Location	Granular Wall Backfill (Cubic Yard)	Granular Structure Backfill (Cubic Yard)

(Include the following cofferdam design checklist when required by the Bridge Designer.)

COFFERDAM DESIGN CHECKLIST

Instructions - This cofferdam design checklist was developed to facilitate the design, review, and erection of cofferdams to be used for ODOT bridge construction projects. This checklist is intended to act as a reminder to design or check for specific important aspects of this construction. It is not a substitute for plan and/or design criteria or specification requirements.

The Checklist is to be completed and signed by the cofferdam design engineer. Answer every question. Attach to the Checklist an explanation of any negative responses.

Submit the Checklist according to 00510.03.

	YES	NO	N/A
A. Contract Plans, Specifications, Permits, etc.			
1. Are the cofferdam Working Drawings prepared, stamped and signed by an engineer registered to practice in Oregon?	____	____	____
2. Have three copies (five copies if railroad approval is required) of the complete design calculations accompanied the cofferdam drawings submittal?	____	____	____
3. Are cofferdam Working Drawings in compliance with the requirements of the construction plans general notes?	____	____	____
4. Are cofferdam Working Drawings in compliance with contract plan structural details?	____	____	____
5. Are cofferdam Working Drawings in compliance with the requirements of the Oregon Standard Specifications for Construction, subsection 00150.35?	____	____	____
6. Are all existing, adjusted or new utilities in proximity with the proposed cofferdam shown on the cofferdam Working Drawings and is projection of these utilities addressed?	____	____	____
7. Are clearance requirements satisfied and shown on the cofferdam Working Drawings?	____	____	____
B. Loads			
1. Are the magnitude and location of all loads, equipment and personnel that will be supported by the cofferdam shown noted on the cofferdam Working Drawings?	____	____	____
2. Are design loads and material properties used to determine design stresses shown for each different cofferdam member shown on the cofferdam Working Drawings?	____	____	____

3. Is the assumed water elevation for seal design shown on the Working Drawings? ____ ____ ____

4. Does the cofferdam design assume water pressure acts on the full height of the cofferdam (from the vent to the bottom of the excavation?) ____ ____ ____

5. Has percolation into the excavation been addressed? ____ ____ ____

C. Allowable Stresses

1. Have the design loads used for cofferdam design of all members been noted in the design calculations? ____ ____ ____

2. Are the allowable stress and the calculated stress listed in the summary for each different cofferdam member? ____ ____ ____

D. Timber Construction

1. Are timber grades consistent with material to be delivered to the construction site, noted on the cofferdam drawings, and in accompanying calculations for all timber cofferdam material? ____ ____ ____

2. If "rough" lumber is specified for the cofferdam, are the actual lumber dimensions used in the calculations shown? ____ ____ ____

E. Steel Construction

1. Are steel structural shapes and plates identified by ASTM number on the cofferdam Working Drawings and in the calculations? ____ ____ ____

2. Have steel beams been checked for bending, shear, web crippling and buckling of the compression flange? ____ ____ ____

F. Compression Members, Bracing Members and Connections

1. Has general buckling been evaluated for all compression members? ____ ____ ____

2. Has bracing been provided at all points of assumed support for compression members? ____ ____ ____

3. Is bracing strength and stiffness sufficient for the intended purpose? ____ ____ ____

4. Has all connections been designed and detailed? ____ ____ ____

_____ _____
Designer Engineer of Record Signature Date

(Include the following shoring design checklist when required by the Bridge Designer.)

SHORING DESIGN CHECKLIST

Instructions - This shoring design checklist was developed to facilitate the design, review, and erection of shoring to be used for ODOT construction projects. This checklist is intended to act as a reminder to design or check for specific important aspects of this construction. It is not a substitute for plan and/or design criteria or specification requirements.

The Checklist is to be completed by the shoring design engineer. Answer every question. Attach to the Checklist an explanation of any negative responses.

Submit this Shoring Design Checklist for each stage and phase of the project, along with the shoring design summary, Working Drawings and calculations according to 00510.04.

		YES	NO	N/A
A.	**General**			
1.	Are the shoring Working Drawings and supporting calculations prepared, stamped, and signed by an engineer registered to practice in the state of Oregon?	____	____	____
2.	Are the temporary shoring installation plans, construction sequence, and removal plan compatible with the project construction staging/phasing?	____	____	____
B.	**Design Standards**			
1.	Does the shoring design comply with standards identified in ODOT GDM 15.3.26.3 and related sections?	____	____	____
2.	Is the design standard and edition identified in the shoring design calculations?	____	____	____
C.	**Loading**			
1.	Have the design loads, including special loading conditions (e.g. cranes, stockpiles, etc.), used for shoring design of all members been noted in the design calculations?	____	____	____
2.	Have the appropriate load and resistance factors or factors of safety on the shoring system been identified, for all applicable load combinations or load cases?	____	____	____
3.	If public traffic is near or directly above the shoring system, has a minimum traffic live load surcharge of 250 psf been applied?	____	____	____

4. Have the loads from actual construction equipment and not less than 250 psf been included in the shoring system design? ____ ____ ____

5. Have the construction loads for different stages of construction been considered and included in the calculations? ____ ____ ____

6. Have the effects of any construction activities adjacent to the shoring system on the stability/performance of the shoring system been addressed in the shoring design (e.g., excavation or soil disturbance in front of the wall or slope, excavation dewatering, vibrations and soil loosening due to soil modification/construction activities)? ____ ____ ____

7. Have earth pressure diagrams been included? ____ ____ ____

8. Does the shoring design consider the effect of water saturated soil pressure acting on the full height of the shoring? ____ ____ ____

D. Geotechnical and Structural Analysis

1. Has internal stability been evaluated? ____ ____ ____

2. Has eccentricity/overturning stability been evaluated? ____ ____ ____

3. Has sliding been evaluated? ____ ____ ____

4. Has overall/global stability been evaluated? ____ ____ ____

5. Has bearing capacity been evaluated? ____ ____ ____

6. Have displacement constraints or other performance objectives of the shoring system been identified and evaluated? ____ ____ ____

7. Has each stage of the shoring system construction been evaluated to carry traffic and construction loads and ensure internal and external stability through the construction and loading sequence? ____ ____ ____

8. Are the allowable stress and the calculated stress listed in the summary for each different shoring member? ____ ____ ____

9. Have steel beams been checked for bending, shear, web crippling and buckling of the compression flange? ____ ____ ____

10. Have connections for all phases of construction and removal been designed for all interim loading? ____ ____ ____

11. Has buckling, bracing strength, and stiffness been evaluated for all compression members? ____ ____ ____

E. Materials

1. Are all soil, rock, and other material properties used for the design of the shoring system provided and consistent with GDM and the subsurface field and lab data? ____ ____ ____
2. Are timber grades noted on shoring drawings and in accompanying calculations? ____ ____ ____
3. Are the minimum lumber dimensions shown in the calculations and noted on the Working Drawings? ____ ____ ____
4. Are steel structural shapes, bolts, connections, and plates identified by ASTM number on the shoring Working Drawings and in the calculations? ____ ____ ____

F. Shoring Working Drawings

1. Is the field verified ground topography above and below the shoring wall shown? ____ ____ ____
2. Are all existing, adjusted or new utilities, structures, and “no work zones” in proximity to the proposed shoring shown on the shoring Working Drawings and is protection of these items addressed? ____ ____ ____
3. Are horizontal and vertical clearance requirements identified and shown on the shoring Working Drawings? ____ ____ ____
4. Are plan view, elevation and cross sections drawn to scale, with dimensions defining location and size of the temporary shoring, components, and excavation limits? ____ ____ ____
5. Are the magnitude and location of all loads, equipment and personnel that will be supported by the shoring shown or noted on the shoring Working Drawings? ____ ____ ____
6. Has a dewatering plan been shown? ____ ____ ____
7. Have all connections been detailed? ____ ____ ____
8. Has bracing been detailed? ____ ____ ____

G. Testing and Monitoring

1. If a “yes” response to No. D-6, is a monitoring plan provided to verify adequate performance of the shoring system throughout the design life of the system? ____ ____ ____
2. Has a load testing program been provided for soil nails, tiebacks, or other applicable elements of the shoring system ____ ____ ____

_____ _____

Design Engineer of Record Signature Date

End of Section

Section 00530 - Steel Reinforcement for Concrete

(This Section requires SP02510 if epoxy coated reinforcement is required.)

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00530 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00530 of the Standard Specifications modified as follows:

(Use the following subsection .80(a) when reinforcement is paid for on the lump sum basis. Remove the coated reinforcement table if coated rebar is not required. Delete the "Stainless Steel" column when stainless steel reinforcement is not required. When stainless steel rebar is used, fill stainless steel grade in the blank. Add additional rows as necessary. Obtain information from the Bridge Designer.)

00530.80(a) Lump Sum - Add the following to the end of this subsection:

The estimated quantity of reinforcement is:

Structure Number	Uncoated Reinforcement Quantity (Pound)			
	Grade 60	Grade 80	Grade 100	Stainless Steel Grade ____ ____

Structure Number	Coated Reinforcement Quantity (Pound)		
	Grade 60	Grade 80	Grade 100

The weight of miscellaneous metal, based on weights listed in 00530.80(b) and Project quantities, is included in the estimated quantity of uncoated reinforcement.

End of Section

Section 00540 - Structural Concrete

(This Section requires SP02001 and SP02050.)

Comply with Section 00540 of the Standard Specifications modified as follows:

00540.41 Design of Falsework for Vertical Pressures - Replace the title of this subsection with "**Design of Falsework"**

00540.41(e) Additional Requirements at Railroad Traffic Openings - Replace the bullet that begins "Design bracing so that the bent…" with the following bullet:

- Design bracing so that the bent will resist the required horizontal load or 5000 pounds, whichever is greater.

Add the following subsection:

00540.41(f) Concrete Forms on Steel Structures - Provide sufficient temporary bracing or temporary struts and ties to minimize lateral deflection and rotation of the exterior steel girder. Calculate exterior girder rotation according to the Oregon Bridge Design Manual section 1.38.4. Limit deck deflection at the edge of deck due to girder rotation to no more than 1/4 inch.

Support compression member or bottom connection of cantilever formwork support brackets either within 6 inches maximum vertically of the bottom flange or within 6 inches maximum horizontally of a vertical web stiffener.

If partial depth cantilever formwork support brackets are permitted, submit Working Drawings showing the additional formwork struts and ties used to brace the steel girder against web distortion.

(Use the following paragraph if bolt holes are allowed in the exterior girder web to support form brackets.)

Shop drill bolt holes in the exterior girder web to support form brackets. Fill the holes with fully torqued ASTM F3125 Grade A325 or button-head twist-off bolts ASTM F1852 or F2280 bolts according to Section 02560. Place each bolt head on the exterior side of the web. No holes are to be made in the flanges.

00540.45 Construction of Forms - Add the following sentences to the end of the paragraph that begins "Permanent stay-in-place bridge":

Use removable concrete forms on all steel Structures. Do not weld any part of the form to any steel girder.

(Use the following subsection .80(a)(1) when concrete is paid for on the lump sum basis. List by bridge number then by bid item name. Add items as appropriate. Delete what does not apply. Obtain information from the Bridge Designer.)

00540.80(a)(1) Lump Sum - Add the following to the end of this subsection:

The estimated quantity of concrete is:

Bridge No. _____

Type and Class	Quantity (Cu. Yd.)
Foundation Concrete, Class _____	_____
Deck Concrete, Class _____	_____
General Structural Concrete, Class _____	_____

Bridge No. _____

Type and Class	Quantity (Cu. Yd.)
Foundation Concrete, Class _____	_____
Deck Concrete, Class _____	_____
General Structural Concrete, Class _____	_____

(Include the following falsework design checklist when required by the Bridge Designer.)

FALSEWORK DESIGN CHECKLIST

Instructions - This checklist was developed to facilitate the design, review, and erection of falsework to be used for Oregon Department of Transportation bridge construction projects. This checklist is intended to act as a reminder to design or check for specific important aspects of this construction. It is not a substitute for plan and/or design criteria or specification requirements.

The Checklist is to be completed and signed by the Falsework Design Engineer. Answer every question. Attach to the Checklist an explanation of any negative responses.

Submit the Checklist according to 00540.41(a).

	YES	NO	N/A
A. Contract Plans, Specifications, Permits, Etc.			
1. Are the falsework plans prepared, stamped and signed by an engineer registered to practice in Oregon?	____	____	____
2. Have three complete sets (five if railroad approval is required) of the design calculations been included with the falsework drawings submittal?	____	____	____
3. Are falsework plans in compliance with the requirements of the construction plans general notes?	____	____	____
4. Are falsework plans in compliance with contract plan structural details?	____	____	____
5. Are falsework plans in compliance with the requirements of the Oregon Standard Specifications for Construction, subsection 00150.35?	____	____	____
6. Are all existing, adjusted or new utilities in proximity with the proposed falsework shown on the falsework plans and is protection of these utilities addressed?	____	____	____
7. Are clearance requirements satisfied and shown on the falsework plans?	____	____	____
8. For construction in or over navigable waters have all requirements for construction of falsework that are called for in the Coast Guard Permit been incorporated in the falsework design?	____	____	____
9. Has possible damage from traffic been considered in the falsework design?	____	____	____

10. Has damage from stream drift been considered in the falsework design? ____ ____ ____

11. Is the concrete placing sequence shown and is it consistent with the contract plans? ____ ____ ____

B. Foundation Requirements

1. Are driven falsework piling provided as called for on the contract plans? ____ ____ ____

    a. Is a minimum pile tip elevation or penetration indicated on the drawings? ____ ____ ____

    b. If timber falsework piles are specified, are the recommended order lengths sufficient to virtually eliminate the possibility of pile splices? ____ ____ ____

    c. Is a detailed static pile capacity analysis included in the calculations? ____ ____ ____

    d. If lateral loads are applied to the piling by equipment, dead loads, flowing water, or drift, is a detailed lateral load analysis included in the calculations? ____ ____ ____

    e. When piling are in an active waterway, have the potential effects of scour on axial and lateral pile support been addressed in the calculations? ____ ____ ____

    f. Does the proposed falsework pile hammer meet the minimum field energy requirements as listed in 00520.20(d)(2)? ____ ____ ____

    g. Will a driving criteria graph [FHWA Gates Equation, in 00520.42(b)] plotting blow count versus stroke for an acceptable pile hammer be provided for the project inspector? ____ ____ ____

2. Is falsework supported on spread footings or mud sills? ____ ____ ____

    a. Are the spread footing elevations shown on the drawings? ____ ____ ____

    b. Has a rational method for determining the ultimate bearing capacity of the foundation materials been presented and described in the calculations? ____ ____ ____

c. Have the soil parameters used in calculating the ultimate bearing capacity been listed and confirmed by the designer? ____ ____ ____

d. Has an appropriate Factor of Safety been used for calculating the allowable bearing capacity of the foundation materials? ____ ____ ____

e. Are spread footing settlement estimates included in the calculations? ____ ____ ____

f. Have effective stresses been used in the calculations, when applicable? ____ ____ ____

g. When spread footings are founded near the top of a slope or in a slope, have the ultimate bearing capacity calculations been modified accordingly? ____ ____ ____

h. When spread footings may be subjected to flowing water, have the potential effects of scour on ultimate bearing capacity been addressed in the calculations? ____ ____ ____

C. Loads

1. Are the magnitude and location of all loads, equipment and personnel that will be supported by the falsework shown and noted on the falsework plans? ____ ____ ____

2. Has the mass of specific equipment units to be supported by the falsework been included in the calculations or on the falsework plans? ____ ____ ____

3. Is the deck finishing machine supported in a manner that will not impose load on concrete forms except deck overhang brackets? ____ ____ ____

4. Are design loads and material properties used to determine design stresses for each different falsework member shown on the falsework plans? ____ ____ ____

5. Is the worst loading and member property condition, rather than the average condition, used to obtain design loads? ____ ____ ____

6. Are deck forms for concrete box girders supported from the girder stem and not from the bottom slab? ____ ____ ____

7. Are diaphragm loads or other concentrated loads included in the analysis of supporting beams? ____ ____ ____

8. If sloping structural members exert horizontal forces on the falsework, is bracing or ties used to resist these loads? ____ ____ ____

D. Allowable Stresses

1. Has the method used for falsework design of all members except for manufactured assemblies been noted in the design calculations? ____ ____ ____

2. Are manufactured assemblies identified as to manufacturer, model, rated working capacity and ultimate capacity? ____ ____ ____

3. Is the allowable stress and the calculated stress listed in the summary for each different falsework member, except for manufactured assemblies? ____ ____ ____

E. Timber Falsework Construction

1. Are timber grades consistent with material to be delivered to the construction site, and noted on falsework drawings, and in accompanying calculations for all timber falsework material? ____ ____ ____

2. If "rough" lumber is specified for falsework by the falsework designer are the actual lumber dimensions used in calculations shown? ____ ____ ____

3. If plywood spans are governed by the strength of the plywood, are the allowable stress and the calculated stress shown on the submitted calculations? ____ ____ ____

4. If plywood spans are governed by the allowable spacing of supporting joists, are the allowable and the proposed spacing shown on the falsework plans? ____ ____ ____

5. Have timber stringers been checked for bending, shear, bearing stresses, and 1/240 of the span length deflection? ____ ____ ____

6. Are joists identified as being continuous over 3 or more spans when they are not analyzed as simple spans? ____ ____ ____

7. Have stringers and cap beams been checked for bearing stresses perpendicular to the grain as well as for bending and shear stresses? ____ ____ ____

8. Have posts been checked as columns as well as for compression parallel to the grain? ____ ____ ____

F. Steel Falsework Construction

1. Are steel structural shapes and plates identified by ASTM number on the falsework plans and in the calculations? ____ ____ ____

2. Have steel beams been checked for bending, shear, web crippling and buckling of the compression flange? ____ ____ ____

3. Has horizontal plane bracing been shown where required to limit compression flange buckling? ____ ____ ____

G. Deflections and Settlement

1. Is falsework deflection for concrete dead load shown on the plans for all falsework spans? ____ ____ ____

2. Is falsework deflection from concrete dead load limited to 1/240 of the span length for all falsework spans? ____ ____ ____

3. Do stringers supporting cast-in-place concrete compensate for estimated camber? ____ ____ ____

4. For beam spans with cantilevers, has the upward deflection of the cantilevers due to load placed on the main spans been investigated? ____ ____ ____

5. Are provisions shown for taking up falsework settlement? ____ ____ ____

H. Compression Members, Connections and Bracing

1. Has general buckling been evaluated for all compression members? ____ ____ ____

2. Has bracing been provided at all points of assumed support for compression members? ____ ____ ____

3. Was bracing in each direction considered in establishing the effective length used to check post capacity? ____ ____ ____

4. Is bracing strength and stiffness sufficient for the intended purpose? ____ ____ ____

5. If temporary bracing is required during intermediate stages of falsework erection, is it shown on the falsework plans? ____ ____ ____

6. Have all connections been designed and detailed? ____ ____ ____

7. Are web stiffeners required on steel cap beams to resist eccentric loads? ____ ____ ____

8. Are wedges required between longitudinal beams and cap beams to accommodate longitudinal slope or to reduce eccentric loading? ____ ____ ____

9. Has the width to height ratio of wedge packs been verified to fall within the limits given in the special provisions? ____ ____ ____

10. If overhang brackets are attached to unstiffened girder webs, has the need for temporary bracing to prevent longitudinal girder distortion been investigated? ____ ____ ____

11. Have beams and stringers with height/width ratios greater than 2.5:1 been checked for stability? ____ ____ ____

12. Have sloping falsework members that exert horizontal forces on the falsework been braced or tied to resist these loads? ____ ____ ____

13. If beams supporting cast-in-place concrete have cantilever spans, have the falsework plans been noted to require the main spans be loaded before loading the cantilever spans? ____ ____ ____

14. Have timber headers set on shoring towers been checked for eccentric loads, and for shear and bending stresses produced by the eccentricity? ____ ____ ____

I. Highway and Railroad Traffic Openings (For falsework over or adjacent to highway or railroad traffic openings.)

1. Do falsework plans satisfy construction clearances shown on the contract plans? ____ ____ ____

2. Are posts designed for 150% of the calculated vertical loading and increased or readjusted for loads caused by prestressing forces? ____ ____ ____

3. Are mechanical connections 2,000 pounds minimum capacity shown at the bottom of posts to footing connections? ____ ____ ____

4. Are mechanical connections 1,000 pounds minimum capacity shown at the top of the post to cap connections? ____ ____ ____

5. Are beam tie downs 500 pounds minimum capacity shown for all beams? ____ ____ ____

6, Are 5/8 inch or larger diameter bolts used at connections for timber bracing? ____ ____ ____

7. Are temporary erection and removal bracing shown? ____ ____ ____

J. Additional Requirements for Railroad Traffic Openings

1. Do falsework plans show collision posts as shown on the contract plans? ____ ____ ____

2. Do posts adjacent to the openings have a minimum section modulus of?

   a. steel - 9.5 cubic inches ____ ____ ____
   b. timber - 250 cubic inches ____ ____ ____

3. Are soffit and deck overhang forming details shown? ____ ____ ____

4. Are falsework bents within 20 feet of centerline of the track sheathed solid between 3 feet and 17 feet above top of rail with 5/8 inch thick minimum plywood and properly blocked at the edges? ____ ____ ____

5. Is bracing on the bents within 20 feet of the centerline of the track adequate to resist the required assumed horizontal load or minimum 5,000 pounds, whichever is greater? ____ ____ ____

_____ _____
Designer's Signature Date

End of Section

Section 00543 - Architectural Treatment

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00543, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00543.00 Scope - This Work consists of applying concrete surface texture, color, and anti-graffiti coating to the indicated concrete faces, as shown in the Plans.

00543.02 Required Submittals - Submit the following at least 10 Calendar Days before the preconstruction conference:

- Electronic submittal of the form liner manufacturer's pattern details;
- Electronic submittal of manufacturer's instructions for handling, cutting, assembling, and finishing form liners;
- Electronic submittal of the stain manufacturer's written application instructions;
- One color sample for each proposed stain to be used;
- A description of proposed containment methods and plan for disposal of chemical or other residues; and
- Documentation showing that the firm performing the Work of this Section has successfully completed a minimum of 5 projects involving comparable textured and colored concrete construction within the previous 5 years. Include the name, location, and approximate completion date for each previous project, and the name and phone number of an owner's representative who can attest to the success of the project.

Materials

00543.10 Form Liners - Furnish form lining Materials and patterns according to the Specifications and as approved by the Engineer.

(a) General - All form liners used for a particular pattern shall be from the same manufacturer.

00543.11 Form Liners - Furnish a high-quality form liner product that attaches easily to the forms. Form liners shall be:

- Capable of withstanding anticipated concrete pour pressures without compressing more than 1/4 inch or leaking concrete so as to cause physical or visual defects in the finished Work; and
- Removable without causing damage to the concrete surface or the substrate.

00543.12 Colored Stain - Furnish a semi-opaque, solvent-based or water-based, colored stain that penetrates the surface of the concrete. The stain shall allow moisture and vapor

transmission, and shall not alter the textured surface or its resistance to attack by moisture, alkali, acid, mildew, mold, or fungus.

Furnish concrete surface stain color that conforms to the following colors:

(In the following list, replace the color and color number if necessary. Delete all orange parentheses.)

- Brown, conforming to SAE AMS-STD-595C color #*(*31090*)*.

Furnish one of the following stains or approved equal:

(In the following list, add, delete, or replace options as necessary. Obtain the approval of Technical Resource for this Section.)

- Canyon Tone Stain, by United Coating
  8001 N Bruce Road
  Spokane, WA 99217
  Telephone: (509) 998-6270

- Chemprobe Conformal Stain, by Tnemec Corporation
  7929 Second Ave. S.
  Seattle, WA 98108
  Telephone: (206) 661-2086

- H&C Colortop Water-Based Solid Color Concrete Stain by H&C Products Group
  101 W. Prospect Avenue
  Cleveland, OH 44115
  Telephone: (800) 867-8246

Submit color chip to the Engineer for approval before ordering stain.

00543.13 Anti-Graffiti Coating – Furnish the following sacrificial graffiti control system or approved equal:

- Monochem Permashield Sacrificial Graffiti Control System by Monopole, Inc.
  4661 Alger Street
  Los Angeles, CA 90039
  Telephone: (818) 500-8585

00543.14 Form Release Agents and Patching Materials - Furnish form release agents and patching Materials that are compatible with the form liner system and stain.

00543.15 Form Ties - Furnish form ties with set break-backs at least 1 inch below the finished concrete surface (bottom of rustication groove), so designed that the device can be disengaged and removed without spalling or damaging the concrete.

00543.16 Quality Control - Provide quality control according to Section 00165.

Construction

00543.40 Pre-Production Tests:

(a) Form Liner Test Panels - Construct vertical, unreinforced test panels for each form liner type specified, to demonstrate the surface texture produced by the form liner. The minimum size for the test panel shall be 8 inches thick by 8 feet wide by 6 feet high.

The test panel shall include one vertical and one horizontal joint between adjacent sections of form liner to demonstrate that the finished pattern meets the appearance requirement of 00543.41.

Construct test panels in a location designated by the Engineer, using the same concrete class and finishing procedures as proposed for the finished Structure.

The Engineer will examine the surface of the resulting test panel. Remove and dispose of unsatisfactory test panels according to 00290.20(c) and repeat test as required. Do not proceed with the Work prior to receiving the Engineer's approval.

Retain the approved test panel to serve as the standard for accepting subsequent texturing Work.

(b) Coloring Test - Perform one or more color application tests prior to applying stain to the finished Work. Perform test(s) on cured form liner test panel(s) constructed according to 00543.40(a), or other area(s) where directed. If results do not meet Specifications, repeat the test on new test panel(s) until the Engineer approves the results.

The approved test area will serve as the standard for accepting subsequent stain application, and may be incorporated into the finished work if approved.

00543.41 Form Liner Installation - Ensure that form liners are clean and free of concrete build-up, blemishes, tears, or other damage prior to each use.

Attach liner to forms following manufacturer's recommendations. Butt adjoining liners with less than 1/4-inch seams. Fill open cracks prior to placing concrete. Assemble and join form liner panels so that the finished pattern has a continuous appearance, and is not interrupted by visible vertical or horizontal joints between panels.

Coordinate form tie locations with the form liner pattern. Locate form tie holes in the high point of the rustication groove between stone patterns.

00543.42 Coloring - After the textured concrete has cured as recommended by the stain manufacturer, but not less than 28 Days after concrete placement unless approved by the Engineer, stain the textured surfaces where shown, following the manufacturer's instructions.

Ensure the concrete surface is free of all laitance, dirt, dust, grease, efflorescence, curing agents, form release agents, paint, or other foreign material before applying stain.

Sand blasting or other methods that reduce the approved surface texture will not be allowed for cleaning concrete surfaces. If using pressure washing, manage wash water according to Section 00290.

The stained surface shall be free of blemishes, discoloration, surface voids, and conspicuous form marks.

Measurement

00543.80 Measurement - The quantities of Architectural Treatment will be measured on the area basis and will be the area of treatment on the indicated concrete faces, including faces of approved test panels incorporated into the main concrete surface.

No measurement of quantities will be made for test panels, including architectural treatment of test panels not included in the main concrete surface.

Payment

00543.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Architectural Treatment	Square Yard
(b) Test Panels	Lump Sum

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for:

- furnishing and placing formliners
- release agents
- patch mix
- finishing
- caulking compounds
- concrete surface colorant
- concrete sealers
- anti-graffiti coating

End of Section

Section 00545 - Reinforced Concrete Bridge End Panels

(This Section requires SP02001.)

Comply with Section 00545 of the Standard Specifications modified as follows:

Add the following subsection:

00545.01 Terminology - For the purposes of this Section, the terms “end panel” and “end panels” shall respectively refer to and shall be read to mean “approach slab” and “approach slabs”.

End of Section

Section 00550 - Precast Prestressed Concrete Members

(This Section requires SP00530, SP02001, and SP02560. This Section required SP02510 if epoxy coated reinforcement if required.)

Comply with Section 00550 of the Standard Specifications modified as follows:

00550.80 Measurement - Add the following paragraph to the end of this subsection:

Stirrup extension reinforcement will be measured according to 00530.80. Estimated quantities of reinforcement for the lump sum method will be listed in 00530.80(a).

00550.90 Payment - Add the following paragraph to the end of this subsection:

Stirrup extension reinforcement, as shown, will be paid for according to 00530.90.

End of Section

Section 00582 - Bridge Bearings

Comply with Section 00582 of the Standard Specifications.

End of Section

Section 00585 - Expansion Joints

(This Section requires SP02530.)

Comply with Section 00585 of the Standard Specifications modified as follows:

00585.01 Definitions -

Replace the sentence that begins "**Asphaltic Plug Joint Seal -** A sealed joint composed of Aggregate**.**…" with the following sentence:

Asphaltic Plug Joint Seal - A closed joint composed of Aggregate and flexible binder material placed over a steel bridging plate.

Replace the sentence that begins "**Closed Joint** - A sealed or filled joint designed…" with the following sentence:

Closed Joint - A sealed joint designed to prevent water and debris from passing through the joint.

Add the following definition:

Control Joint - A joint created by sawing a groove in a surface to create a weakened vertical plane and filled with a poured material.

Replace the sentence that begins "**Filled Joint** - A joint using a preformed …" with the following sentence:

Filled Joint - A joint using a preformed joint filler placed prior to concrete pour.

Delete the definition for **Sealed Joint**

Replace the sentence that begins "**Strip Seal** - A sealed joint with an extruded**.**…" with the following sentence:

Strip Seal - A closed joint with an extruded elastomeric seal retained by edgebeams that are anchored to the structural elements.

Add the following subsection:

00585.02 Submittals:

(a) Materials - At least 21 Calendar Days before starting Work, submit QPL listed products to the Engineer for approval.

(b) Personnel Qualifications - At the pre-construction conference, submit joint installer personnel certifications(s) from the manufacturer affirming that the installers have been trained in application methods of materials and health and safety to install Closed Joints as detailed.

(c) Working Drawings - At least 21 Calendar Days before starting Work, submit unstamped Working Drawings from the manufacturer for each Closed Joint according to 00150.35. Include the following:

- Plan, elevation and section of the joint system with dimensions and tolerances.
- Complete details of all joint materials with all ASTM, AASHTO or other material designations.
- Method of installation including sequence and installation details at traffic barriers, roadway surfaces, curbs and sidewalks.
- Joint details to include the following:
  - Prevent the entrance of water and debris into the joint.
  - Accommodate the required structure movements shown.

00585.11 Approval of Materials - Delete this subsection.

00585.12 Concrete for Blockout Opening - Replace the sentence that begins “Fill blockout openings with the …” with the following sentence:

Fill blockout openings with the same class and type of concrete used in the deck, unless otherwise shown.

00585.30 Closed Joint Installers - Replace this subsection with the following subsection:

00585.30 Joint Installers - Provide trained personnel to install the Closed Joints.

00585.31 Sealed Joint Manufacturer's Representative - Replace this subsection with the following subsection:

00585.31 Expansion Joint Seal Manufacturer's Representative - Provide a manufacturer's representative on-site during the installation of expansion joint device. Discuss with the representative regarding the Work to be done, the methods of installation, installation procedures, and the required Equipment to assure correct installation of expansion joints

00585.42(a) Submittals - Replace this subsection with the following subsection:

00585.42(a) Notification - Notify the Engineer in writing at least 7 Calendar Days before installing the Closed Joint. Include the Contract number, bridge number, joint seal material, product name, and the approximate date of installation.

00585.42(c) Joint Preparation - Replace the sentence that begins “Prepare the joint surfaces as directed…” with the following sentence:

Prepare the joint surfaces as shown or directed in this Section and according to the joint material manufacturer's recommendations.

00585.42(d) Weather Conditions at Time of Installation - Replace this subsection, except for the subsection number and title, with the following:

Install joint seals when the weather conditions are suitable for joint installation according to the manufacturer's recommendations.

00585.42(e) Leakage Check - Replace this subsection, except for the subsection number and title, with the following:

After joint installation is complete, check joints for leakage by flooding the joint with water. Maintain ponding of water in the roadway shoulders or 3 feet from the gutter line, whichever is greater, for 2 hours. Use an unnozzled water hose delivering one gallon of water per minute to the inside face of railing. Verify no leaking of joints. If leakage is observed, repair the joints using a method recommended by the manufacturer and approved by the Engineer prior to starting Work at no additional cost to the Agency. Perform additional leakage check at no additional cost to the Agency. Additional leakage checks have the same requirements.

Add the following subsection:

00585.50 Control Joint - Construct Control Joints as shown. If details of the control joint are not shown, sawcut the surface 1 1/2 inches deep and 1/2 inch wide and fill it with hot applied joint sealant.

00585.80 Measurement - Add the following to the end of the subsection:

The estimated quantities of joints are:

(List all applicable joint types, e.g. expansion joints, control joints, or hot applied joint sealant, as the pay item name. Obtain information from the Bridge Designer.)

Structure	Joint Type	Quantity (Foot)
Bridge No. _____		
Bridge No. _____		

00585.90 Payment - Add the following to the pay item list:

(Add the following pay item to the pay item list when a control joint is specified and not paid with paving Work.)

(g) Control Joint ..... Lump Sum

(Add the following pay item to the pay item list when removing and replacing hot applied joint sealant in an existing joint are specified and not paid with paving Work.)

(h) Hot Applied Joint Sealant..... Lump Sum

Replace the bullet that begins “preformed expansion joint filler…” with the following bullet:

- preformed joint filler, hot applied joint sealant, or sawcutting to construct Filled Joint

Replace the bullet that begins “providing the manufacturer's…” with the following bullet:

- providing the expansion joint seal manufacturer's representative

Add the following to the end of this subsection:

When the Contract Schedule of Items does not indicate payment for control joints performed under this Section, no separate or additional payment will be made for the control joint. Payment will be included in payment made for the appropriate items under which the control joint is required.

End of Section

Section 00587 - Bridge Rails

(This Section requires SP02001.)

Comply with Section 00587 of the Standard Specifications modified as follows:

00587.80 Measurement - Add the following to the end of this subsection:

The estimated quantity of bridge rail is:

(List rail type as the pay item name. Obtain information from the Bridge Designer.)

Structure	Rail Type	Quantity (Foot)
Bridge No. _____		
Bridge No. _____		

End of Section

Section 00589 - Utility Attachments on Structures

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00589, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00589.00 Scope - This Work consists of providing for attachment or installation of utilities on new and existing Structures as shown or as directed.

(Use the following two paragraphs when structures have been designated "Special Structures" by Bridge Engineering Section. List the designated Special Structures by bridge number.)

The following Structures are designated "Special Structures":

- Bridge No. _____
- Bridge No. _____

Utility attachments to Special Structures shall not alter the appearance of the Structure. Make attachments only inside the girder line, as close as possible to the soffit, or as required to make the installation as inconspicuous as practicable.

Materials

00589.10 General - Furnish utility attachment systems using Materials from the QPL and meeting the following requirements:

Structural Steel	02530
Forgings, Shafting, Castings, and Nonferrous Materials	02540
Fasteners	02560
Reflective Sheeting	02910.20(a)
Resin Bonded Anchor System	00535.10

Furnish brackets constructed of hot-dip galvanized structural steel.

Construction

00589.40 General - Provide sufficient space around utilities for maintenance activities.

Avoid drilling through reinforcing steel. If reinforcing steel is hit, move the anchor location and patch the hole with an approved patching material from the QPL.

Attach conduits or brackets to concrete Structures galvanized concrete inserts, unless otherwise shown or approved.

00589.41 Natural Gas Lines - Conform to the portions of CFR 49 Part 192 that are applicable to the Work. Provide isolation valves 200 feet from each end of the Bridge as shown.

(Include the following subsection .42 when a casing is requested by the Utility Coordinator. Delete the item from the subsection that does not apply, but do not change the alpha characters next to the title. Fill in the blank with the appropriate information.)

00589.42 Casing –

(a) Natural Gas Casing - Install steel pipe casing for natural gas lines below bridge deck as shown. Natural gas line will be installed within casing by others.

(b) Communication Casing - Install (insert the type of casing as discussed with the Utility Owner) casings for communications lines below bridge deck as shown. Communication lines will be installed within casings by others.

(Include the following Subsection .43 when a waterline will be attached to a bridge)

00589.43 Water Line Attachment - Install ductile iron pipe and fittings with restrained joints according to 01140.00 through 01140.52 below the bridge deck as shown and specified.

00589.48 Labeling - Clearly label all piping or conduit systems according to the following APWA color code:

Table 00589-1

Material	Marker Background Color
Electrical Power Lines, Cables, Conduits, Lighting Cables	Red
Gas, Oil, Steam, Petroleum, Gaseous Materials	Yellow
Communications, Alarm, Signal Lines, Cables, or Conduits	Orange
Potable Water	Blue
Reclaimed Water, Irrigation, Slurry Lines	Purple
Sewers, and Drain Lines	Green

Generate purple by placing purple transparent film over white reflective sheeting. The purple tint of the transparent film shall match Federal Standard Color 595B No. 37100.

Minimum length of label shall be as shown in Table 00589-2.

Table 00589-2

Pipe O.D. Min.	Pipe O.D. Max.	Length of Label	Width of Label

3/4"	1 1/4"	8"	3/4"
1 1/2"	2"	8"	1"
2 1/2"	6"	12"	2"
8"	10"	12"	2"
10"	—	12"	2"

Place labels on each pipe or conduit, on each side of every bent, and at each entrance to a box girder.

Where piping is above or below normal line of sight, place pipe labels so that label may be seen from normal eye height.

Measurement

00589.80 Measurement - No measurement of quantities will be made for Work performed under this Section.

Payment

00589.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract lump sum amount for the item "Utility Attachment on Structures".

The type of utility attachment on structures will be inserted in the blank.

Payment will payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

End of Section

Section 00593 - Powder Coating Metal Structures

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00593 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00593 of the Standard Specifications modified as follows:

(Use the following subsection .10(b) to list topcoat colors that aren't identified in the Standard Specifications. Fill in the blanks as instructed and obtain information from the Designer. Copy and repeat the paragraph as needed. For color number, only use numbers 14159 to 28915 from the SAE AMS-STD-595 color index.

For metal handrail and pedestrian, the standard color to be used is SAE AMS-STD-595 color #20140.

Example:

For the combination rail on Bridge No. 12345A, provide a topcoat color of High Gloss Black that conforms to SAE AMS-STD-595 color # 17038.)

00593.10(b) Color - Add the following to the end of this subsection:

For __*(Structure number or item description)*__, provide a topcoat color of __*(Color Name)*__ that matches SAE AMS-STD-595 color # __*(Color Number)*__.

End of Section

Section 00595 - Reinforced Concrete Box Culverts

(This Section requires SP02001. This Section requires SP00591 when spray waterproofing membrane is required.)

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00595 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00595 of the Standard Specifications modified as follows:

(Include the following bullet if welding is to be performed. Select the appropriate 00560.26(a) for bridge size culverts or 00560.26(b) for non-bridge culverts. Check with the designer.)

00595.44 Precast Installation – Add the following to the end of this subsection:

- Perform structural steel welding according to *(*00560.26(a) or 00560.26(b)*)*.

(Use the following .80 for estimated quantities for wing walls and aprons.)

00595.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of reinforcement and concrete for wing walls and aprons are:

(Fill in the appropriate amount of wing wall and apron reinforcement and concrete. Obtain information from the Bridge Designer.)

	Reinforcement (Pound)	**Concrete (Cubic Yard)**
Wing Walls	.....	.....
Aprons	.....	.....

End of Section

Section 00596A - Mechanically Stabilized Earth Retaining Walls

(This Section requires SP02001 and SP02690.)

Comply with Section 00596A of the Standard Specifications modified as follows:

(Use the following subsection .01 and bullets when the contractor will be required to select a permanent proprietary MSE wall system. For "Bridge" retaining walls and "Highway" retaining walls, fill in the blank with the structure number. If the retaining wall does not have a structure number, delete the phrase ", structure no. ____ ,".)

00596A.01 Proprietary MSE Walls - Add the following to the end of this subsection:

Select one of the following preapproved proprietary MSE retaining wall systems for the wall, structure no. ____, as shown:

(Fill in the blanks with the proprietary retaining wall system name (including the "™" symbol), company name and telephone number from the ODOT Geotechnical Design Manual, appendix 15-D.)

- ARES® MSE Retaining Wall System, provided by Tensar®, telephone: (360) 779-5555.
- LANDMARK® MSE Retaining Wall System, provided by Anchor® Wall Systems, telephone: (949 363-6663.
- Reinforced Earth® MSE Retaining Wall System, provided by The Reinforced Earth® Company, telephone: (303) 790-1481.

(Use the following subsection .04(b) to list proprietary wall geotechnical and seismic design parameters. Obtain information from the designer. Delete what does not apply. Delete the language in orange parentheses that does not apply and delete all orange parentheses. Copy and paste the structure number, station limits, and associated bullets for each separate retaining wall.)

00596A.04(b) Design Calculations - Add the following to the end of this subsection:

The following retaining wall design parameters have been established for this Project:

Structure No. _____ : Sta. _____ to Sta. _____ *(*Lt.*)(*Rt.*)*

- Foundation soil unit density _____ lbs./cu. ft.
- Foundation soil angle of internal friction _____ degrees
- Foundation soil nominal (unfactored)
- bearing resistance _____ lbs./sq. ft.
- Retained soil unit density _____ lbs./cu. ft.
- Retained soil angle of internal friction _____ degrees
- Reinforced soil unit density _____ lbs./cu. ft.

- Reinforced soil angle of internal friction _____ degrees
- Peak ground acceleration coefficient (*PGA*) _____
- Short period spectral acceleration coefficient (S_S). _____
- Long period spectral acceleration coefficient (S_1) _____
- Site class _____
- Peak seismic ground acceleration coefficient
- modified by zero period site factor (A_s) _____
- Horizontal seismic acceleration coefficient (k_h) _____

(Use the following bullet and sub-bullet when the Mononabe-Okabe method is <u>not</u> required. Repeat as necessary for variations in wall height and backslope along the wall.).

- Between Station _____ and Station _____ *(*Lt.*)(*Rt.*)*:
  - Total (static plus seismic) external seismic thrust (P_{AE}) ..... _____ lbs./ft.

(Use the following bullet and sub-bullets to specify minimum length of soil reinforcement. Repeat as necessary for variations in wall height, backslope, bearing resistance and other parameters which can change along the wall.)

- Between Station _____ and Station _____ *(*Lt.*)(*Rt.*)*:
  - Minimum length of soil reinforcement for overall stability _____ft.
  - Minimum length of soil reinforcement for external stability _____ft.

00596A.11(c) Modular Block Core and Drainage Backfill - Replace this subsection, except for the subsection number and title, with the following:

Furnish 3/4" - No. 4 PCC Aggregate Material meeting the requirements of 02690.20(a) through (e).

(Use the following subsection .12(e)(1) when precast concrete panel facing is required. Use one of the following options as instructed below. Delete the option that does not apply.)

00596A.12(e)(1) Portland Cement Concrete - Add the following paragraph to the end of this subsection:

[Option 1 - Use the following paragraph when an ARES™ wall system is <u>not</u> specified.]

Furnish Class 4000 structural concrete meeting the requirements of Section 02001.

[Option 2 - Use the following paragraph when an ARES™ wall system is specified.]

For ARES™ retaining wall systems, furnish Class 4500 structural concrete meeting the requirements of Section 02001, except the maximum water-cementitious material ratio shall not exceed 0.44. For all other retaining wall systems use Class 4000 structural concrete meeting the requirements of Section 02001.

00596A.15 Elastomeric Bearing Pads for Precast Concrete Facing Panels - Replace this subsection, except for the subsection number and title, with the following:

In horizontal and diagonal joints between precast concrete panels, furnish the grade, size, number and type of bearing pads shown in the stamped Working Drawings and design calculations prepared by the manufacturer. Determine the stiffness, size, and number of bearing pads so that the final joint opening is 3/4 inch ± 1/8 inch or as shown.

(Use the following subsection .16 when KeySystem I™, LANDMARK™, or MESA™ wall systems are specified in 00596A.01.)

00596A.16 Concrete Modular Block Facing Connection Devices - Add the following to the end of this subsection:

(Use the following paragraph and table when the LANDMARK™ wall system is specified.)

For LANDMARK™ wall systems, furnish lock bars that are made of a rigid, polyvinyl chloride polymer conforming to the following requirements:

Property	Limits	Specification
Specific Gravity	1.4 (min.)	ASTM D792
Tensile Strength (at yield)	2,700 psi (min.)	ASTM D638

(NOTES to Specification Writer:

(1) The bid item quantity for MSE retaining walls is "Lump Sum," and includes all labor, materials, and inclusive items necessary to complete the work. Items such as excavation, shoring, reinforced backfill, and standard copings are considered inclusive items to the wall pay item, but items such as sidewalk copings, traffic barrier, moment slabs, guardrail and fencing are considered appurtenances along with the following items and should be included as separate bid items:

Items associated with referenced standard drawings and details such as architectural treatments, geomembrane barriers, drainage pipes and geocomposite drainage panels.
Items associated with incidental work, such as scour protection, dewatering, or foundation improvement.
Larger structures such as culverts.
Items that cost more than 5 percent of the lump sum cost.

(2) For proprietary retaining wall systems, where details of wall construction are generally not known until after the construction contract is awarded, do not include estimated quantities for inclusive items.)

00596A.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of retaining walls are:

(Provide wall area below. The wall area is bounded by the beginning and end of the wall, top of the wall (excluding wall coping), and top of the footing or leveling pad. If no footing or leveling pad exists, the bottom of the wall is used. Copy and paste more lines, as necessary, to list estimated areas for each retaining wall.)

Structure Number _____ :

Station Limits	**Area**
Sta. _____ to Sta. _____ *(*Lt.*)(*Rt.*)*	___(Wall area here)___ sq. ft.

(Use the following paragraph to list estimated quantities for nonproprietary retaining wall systems only. Ensure that the Wall (Bridge) Designer provides estimated quantities for all-inclusive items such as excavation, shoring, reinforced backfill, leveling pads, wall drainage backfill/geotextile, and standard coping. Copy and paste more lines, as needed, to list estimated quantities for each nonproprietary retaining wall.)

The estimated quantities of listed Materials are:

Structure No. _____: Sta. _____ to Sta. _____ *(*Lt.*)(*Rt.*)*

Material	**Estimated Quantities**
_____	____ cu. yd.
_____	____ foot
_____	____ lb.

End of Section

Section 00596B - Prefabricated Modular Retaining Walls

(This Section requires SP02690.)

Comply with Section 00596B of the Standard Specifications modified as follows:

(Use the following subsection .01 and bullets when the contractor will be required to select a permanent proprietary Prefabricated Modular wall system. For "Bridge" retaining walls and "Highway" retaining walls, fill in the blank with the structure number. If the retaining wall does not have a structure number, delete the phrase ", structure no. ____ ,".)

00596B.01 Proprietary Prefabricated Modular Walls - Add the following paragraph and bullet list to the end of this subsection:

Select one of the following preapproved Prefabricated Modular proprietary retaining wall systems for the wall, structure no. ____ , as shown:

(Fill in the blanks with the proprietary retaining wall system name (including the "™" symbol), company name and telephone number from the ODOT Geotechnical Design Manual, appendix 15-D.)

- Allan Block AB Classic Retaining Wall System, provided by Allan Block Corporation, telephone: (952) 835-5309.
- Ultrablock™ Retaining Wall System, provided by Ultrablock, Inc., telephone: (800) 377-3877.

(Use the following subsection .04(b) to list proprietary wall design parameters. Obtain information from the designer. Delete what does not apply. Copy and paste the structure number and bullets for each separate retaining wall.)

00596B.04(b) Design Calculations - Add the following to the end of this subsection:

The following retaining wall design parameters have been established for this Project:

Structure Number _____

- Foundation soil unit density..... _____ kips/cu. ft.
- Foundation soil angle of internal friction..... _____ degrees
- Foundation soil nominal (unfactored)
- bearing resistance ..... _____ kips/sq. ft.
- Retained soil unit density ..... _____ kips/cu. ft.
- Retained soil angle of internal friction ..... _____ degrees
- Peak ground acceleration coefficient (*PGA*)..... _____
- Long period spectral acceleration coefficient (S_1)..... _____
- Site class ..... _____

(Use the following two bullets when the Mononabe-Okabe method is required.)

- Peak seismic ground acceleration coefficient modified by short period site factor (A_s)..... _____
- Horizontal seismic acceleration coefficient (K_h)..... _____

Use the following bullet and sub-bullet when the Mononabe-Okabe method is <u>not</u> required. Repeat as necessary for variations in wall height and backslope along the wall.)

- Between Station _____ and Station _____ *(*Lt.*)(*Rt.*)*:
  - Total (static plus seismic) external seismic thrust (P_{AE}) ..... _____ kip/ft.

(Use the following bullet and sub-bullets to specify minimum base width for external and overall stability. Repeat as necessary for variations in wall height and backslope along the wall.)

- Between Station _____ and Station _____ *(*Lt.*)(*Rt.*)*:
  - Minimum base width for overall stability ..... _____ ft.
  - Minimum base width for external stability ..... _____ ft.

00596B.11(b) Modular Block Core and Drainage Backfill - Replace this subsection, except for the subsection number and title, with the following:

Furnish 3/4" - No. 4 PCC Aggregate Material meeting the requirements of 02690.20(a) through (e).

00596B.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of retaining walls are:

(Provide wall area below. Copy as necessary.)

Station Limits	**Area**
Sta. _____ to Sta. _____ *(*Lt.*)(*Rt.*)*	___ <u>(Wall area here)</u> ___ sq. ft.

(Use the following paragraph to list estimated quantities for <u>nonproprietary retaining wall systems only</u>. Ensure that the Wall (Bridge) Designer addresses quantities for excavation, shoring (if needed), and leveling pad concrete and rebar, and backfill. Copy and paste more lines to address the estimated quantities for nonproprietary retaining wall systems.)

The estimated quantities, for estimating purposes only, of excavation, shoring, leveling pads, and specified backfill for nonproprietary retaining wall systems are:

Structure Number	**Material**	**Estimated Quantities**
_#_	_____	____ cu. yd.
_#_	_____	____ foot

_#_ _____ ____ lb.

End of Section

Section 00596C - Cast-In-Place Concrete Retaining Walls

Comply with Section 00596C of the Standard Specifications modified as follows:

00596C.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of retaining walls are:

(Provide wall area below. Copy as necessary.)

Station Limits	Area
Sta. _____ to Sta. _____ ***(***Lt.***)(***Rt.***)***	___ (Wall area here) ___ sq. ft.

(Use the following paragraph to list estimated quantities. Ensure that the Wall (Bridge) Designer addresses quantities for concrete, reinforcement, excavation, shoring (if needed), and backfill. Copy and paste more lines to address the estimated quantities for retaining wall systems.)

The estimated quantities, for estimating purposes only, of concrete, steel reinforcement, excavation, shoring, and specified backfill for retaining wall systems are:

Structure Number	Material	Estimated Quantities
_#_	_____	____ cu. yd.
_#_	_____	____ foot
_#_	_____	____ lb.

End of Section

SP00600 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00600 – BASES

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00620 - Cold Plane Pavement Removal

(This Section requires SP00744 or SP00745 when traffic is not allowed on the cold planed surface.)

Comply with Section 00620 of the Standard Specifications modified as follows:

00620.40(e) Warning Signs - Replace this subsection, except for the subsection number and title, with the following:

Provide warning signs as required where abrupt or sloped drop-offs occur at the edge of the existing or new surface according to Sections 00221 and 00222.

(Use the following subsection .43 when traffic restrictions are required on cold planed areas. Delete what does not apply.)

00620.43 Maintenance Under Traffic - Replace this subsection, except for the subsection number and title, with the following:

(Use these three paragraphs when traffic is allowed on cold planed areas for a limited duration. Obtain time limit from the pavement designer. Time limit should not exceed 7 Calendar Days. Verify time limit aligns with sequencing requirements in Section 00150.11. Designer to consider traffic control and drainage impacts with allowing traffic on a cold planed surface.)

Traffic will be allowed on the cold planed surface up to ___ Calendar Days after removing the existing surface. Sweep and clean the cold planed surface before opening to traffic.

Submit a plan describing how drainage will be maintained while traffic is on the cold planed surface at least 7 Calendar Days prior to cold planing.

Before beginning paving operations, make repairs to the existing cold planed surface as directed. Payment for the repairs will be made according to 00195.20.

(Use this paragraph when cold planed areas are required to be paved before opening to traffic. Delete subsection number in parentheses that does not apply. Delete all orange parentheses. Be sure to include 00744.51 or 00745.51 in the special provisions, as appropriate.)

Traffic is not allowed on the cold planed surface. Before opening the area to traffic, pave the surface according to *(*00744.51*)(*00745.51*)*.

End of Section

Section 00640 - Aggregate Base and Shoulders

(Use Section 00640 when the project does not meet the minimum criteria to use Section 00641)

Comply with Section 00640 of the Standard Specifications modified as follows:

00640.41 Hauling and Placing - Add the following paragraph to the end of this subsection:

Prior to the placement of base rock, completely install, grout, seat, backfill, set to finish grade, and compact test around all structures (e.g. manholes, utilities, catch basins).

00640.80 Measurement - Replace this subsection, except for the subsection number and title, with the following:

The quantities of Aggregates will be measured on the weight basis or on the area basis according to the following:

(a) Weight Basis – When measurement is by weight, quantities will be measured in the hauling vehicle.

(b) Area Basis – When measurement is by area, the quantity will be the number of square yards of Aggregate Base constructed to the full thickness. The surface area will be limited to the neat lines shown in the plans or as directed in the field. Each area constructed with varying thicknesses, as directed or shown, will be adjusted by converting it to an equivalent area at the Pay Item thickness on a proportionate volume basis.

00640.90 Payment – Replace this subsection, except for the subsection number and title, with the following:

The accepted quantities of Aggregates will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Aggregate Base	Ton
(b) Aggregate Shoulders	Ton
(c) Aggregate Base, ____ Inches Thick	Square Yard

In item (c), the depth of Aggregate Base will be inserted in the blank.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for water used to obtain proper compaction and in the care of the Work.

When the Contract Schedule of Items does not indicate payment for Work performed under this Section, no separate or additional payment will be made. Payment will be included in payment made for the appropriate items under which this Work is required.

End of Section

Section 00641 - Aggregate Subbase, Base, and Shoulders

(Use Section 00641 when any of the following apply, otherwise, use Section 00640:

- ***Project includes any quantity aggregate base on collector or arterial roads***
- ***Project includes more than 3,500 tons of aggregate base)***

Comply with Section 00641 of the Standard Specifications modified as follows:

00641.10(a) Base and Shoulder Aggregate - In the paragraph that begins "Aggregate for bases…", add the following sentence after the first sentence:

Base aggregate shall be either 1” - 0 or ¾” - 0 size.

00641.41 Mixing, Hauling, and Placing - In the paragraph that begins "Add water to the Aggregate …", add the following sentence after the first sentence:

Prior to the placement of base rock, completely install, grout, seat, backfill, set to finish grade, and compact test around all structures (e.g. manholes, utilities, catch basins).

00641.80(c) Area Basis - Replace the sentence that begins “The surface area will be…” with the following:

The surface area will be limited to the neat lines shown in the plans or as directed in the field.

End of Section

Section 00645 - Recycled Asphalt Products in Base

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00645, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00645.00 Scope - This Work consists of hauling recycled asphalt products from Agency provided stockpiles specified in Section 00160 and placing one or more layers of recycled asphalt products, mixed with water, on a prepared surface to the lines, grades, thicknesses, and Cross Sections shown or established.

Materials

00645.10 Materials - Furnish recycled asphalt products of the designated sizes from the stockpiles except discard hardened lumps exceeding 2 inches on any measured face at the stockpile site in a separate new stockpile or reprocess to achieve the desired maximum size limit.

Acceptance of the recycled asphalt products will be by visual inspection.

00645.12 Limits of Mixture - Provide a mixture of recycled asphalt products and water having a uniform moisture content sufficient to obtain the required compaction. Water may be introduced in a mixing plant, or on the grade.

00645.15 Quality Control - Provide quality control according to Section 00165.

Equipment

00645.21 Hauling Equipment - Provide recycled asphalt products hauling vehicles capable of hauling and depositing the recycled asphalt products material with a minimum of material segregation.

00645.22 Watering and Spreading Equipment - Provide Equipment to add water to the recycled asphalt products and spread to the lines and grades shown or directed.

00645.23 Compacting Equipment - Provide self-propelled rollers and compactors capable of reversing without backlash and meeting the following requirements:

- A gross static weight of at least 10 Tons.
- Adequate to compact to specified density while the recycled asphalt products is still moist.

Labor

00645.30 Quality Control Personnel - Provide a technician having a CDT technical certification.

Construction

00645.40 Preparation of Foundation - Provide a firm surface or material on which recycled asphalt products is to be placed, according to Sections 00330 or 00610 as applicable.

00645.41 Mixing, Hauling, and Placing - Load the recycled asphalt products into the hauling vehicle without compacting material remaining in the stockpile.

Add water to recycled asphalt products while mixing to provide moisture content according to 00645.12.

Thoroughly mix the combined recycled asphalt products and water for as long as necessary to produce a homogeneous mixture. Mix, haul, and place the material by one of the following methods:

(a) Stationary Mixing Plant - Combine materials in a pug mill or rotary mixer.

Deliver and deposit the mixture without delay. Deliver the mixture to the spreading Equipment by direct deposit into its receiving device, or by placing in uniform windrows in front of the Equipment.

(b) Road Mix - Place materials for each layer, add water, and mix with a motor grader until a homogeneous mixture is achieve.

00645.43 Thickness and Number of Layers - If the required compacted depth of the Course exceeds 6 inches, construct it in two or more layers of nearly equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches unless approved by the Engineer.

Place each layer in spreads as wide as practical and to the full width of the Course before a succeeding layer is placed.

00645.44 Shaping and Compacting - Begin compaction of each layer immediately after the material is spread. Determine optimum roller pattern according to ODOT TM 306 C *Control Strip Method of Compaction*. Maintain optimum roller pattern throughout.

Shape and maintain the surface of each layer, during the compaction operations, to produce a uniform texture, and to meet the requirements of 00645.45.

Apply additional water over the materials for proper compaction.

00645.45 Surface Tolerance - The finished surface of the recycled asphalt products and the surface of each underlying layer shall parallel the established grade and Cross Section for the finished surface within 5/8 inch.

The finished surface of the compacted recycled asphalt products, when tested with a 12 foot straightedge, shall not vary from the testing edge by more than 5/8 inch at any point. Furnish and operate the straightedge as directed.

Maintenance

00645.60 Care of the Work - After construction of each layer and completion of recycled asphalt products Course, maintain the layer to specified conditions, and prevent or repair segregation, raveling, or rutting until it is covered with a following layer or until all work is completed.

Measurement

00645.80 Measurement - The quantities of recycled asphalt products will be measured on the area basis, of recycled asphalt products constructed to the full nominal thickness. In areas and where the thickness is other than the full nominal thickness, the areas will be adjusted by converting it to an equivalent number of square yards at the full nominal thickness on a proportionate volume basis.

Payment

00645.90 Payment - The accepted quantities of recycled asphalt products will be paid for at the Contract unit price, per square yard, for the item "Recycled Asphalt Products in Base, _____ Inches Thick".

The thickness of the recycled asphalt products will be inserted in the blank.

Payment will be payment in full for hauling and placing the Agency provided Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for water used to obtain compaction or in care of the work.

End of Section

SP00700 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00700 – WEARING SURFACES

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00705 - Emulsified Asphalt Prime Coat and Emulsified Asphalt Fog Coat

Comply with Section 00705 of the Standard Specifications modified as follows:

00705.11(a) General - In the paragraph that begins "Obtain samples of Emulsified Asphalt according to AASHTO T 40…" replace the words "AASHTO T 40" with the words "AASHTO R 66".

00705.11(c) Fog Coat - Replace the paragraph that begins "Provide CSS-1…" with the following paragraph:

Provide CRS-2P or HFRS-P1 Emulsified Asphalt for the fog coat.

End of Section

Section 00706 - Emulsified Asphalt Slurry Seal Surfacing

Comply with Section 00706 of the Standard Specifications modified as follows:

00706.23 Rollers – Delete this subsection

00706.48 Rolling – Delete this subsection

End of Section

Section 00715 - Multiple Application Emulsified Asphalt Surface Treatment

Comply with to Section 00715 of the Standard Specifications modified as follows:

(Use the following subsection .00 when surface treatment is NOT designated on the plans. Delete those that do not apply. Remove "(s)" or parentheses as appropriate.)

00715.00 Scope - Add the following to the end of this subsection:

Provide the following surface treatment(s) on this Project:

Fine Double Chip Seal
Medium Double Chip Seal
Type E-9 Oil Mat
Type E-11 Oil Mat

00715.11 Emulsified Asphalt - Add the following paragraph to this subsection:

(Choose the correct Polymer-Modified or Non-Polymer-Modified emulsified asphalt. It will be specified in the pavement design report. Delete the one that does not apply. Remove the parentheses.)

Provide *(*Polymer-Modified*)(*Non-Polymer-Modified*)* Emulsified Asphalt for this Project.

00715.11(c) Acceptance of Emulsified Asphalt - In the paragraph that begins "Obtain Emulsified Asphalt samples according to AASHTO T 40…" replace the words “AASHTO T 40” with the words “AASHTO R 66”.

(Use the following subsection .40 to change hours. Check with the Project Manager for the number of hours that emulsified asphalt and aggregate can be placed before sunset. It may range from 2 - 4 hours, depending on elevation, work in shaded areas, and other conditions.)

00715.40 Season and Weather Limitations - In the sentence that begins "Complete the application of…", replace the words "3 hours" with the words "_____ hours".

In the sentence that begins "The placing of multiple…", replace "July 1" with "June 1".

(Use the following subsections .42(a) and .43 to change hours. Check with the Project Manager for the number of hours that courses can be squared up before sunset. It may range from 2 - 4 hours, depending on elevation, work in shaded areas, and other conditions.)

00715.42(a) Type E-9 and E-11 Oil Mats - Throughout this subsection, replace the words "3 hours" with the words " _____ hours".

00715.43 Applying Emulsified Asphalt - In the third bullet, replace the words "3 hours" with the words " _____ hours".

End of Section

Section 00730 - Emulsified Asphalt Tack Coat

Comply with Section 00730 of the Standard Specifications modified as follows:

00730.11 Emulsified Asphalt - In the paragraph that begins "Obtain samples according to AASHTO T 40…" replace the words “AASHTO T 40” with the words “AASHTO R 66”.

(Use the following subsection .90 on projects that have less than 10 tons of tack coat. Obtain quantity from the Designer.)

00730.90 Payment - Replace this subsection, except for the subsection number and title, with the following:

No separate or additional payment will be made for Emulsified Asphalt tack coat. Approximately _____ Tons of Emulsified Asphalt in tack coat will be required on this Project.

End of Section

Section 00740 - Commercial Asphalt Concrete Pavement (CACP)

(Use Section 00740 when the project requires minor asphalt in areas outside of the typical vehicular travel path such as patching around curb ramps and asphalt paths. Do not include this section when Section 00744 or 00745 are included in the project.)

(This Section requires SP00730.)

Comply with Section 00740 of the Standard Specifications.

End of Section

Section 00744 - Asphalt Concrete Pavement

(Use Section 00744 when the project does not meet the minimum criteria to use Section 00745. This Section requires SP00730.)

Comply with Section 00744 of the Standard Specifications modified as follows:

(Fill in the blank with the required grade of asphalt used on the project.)

00744.11(a) Asphalt Cement - Add the following to the end of this subsection:

Provide PG 64-28 or PG 70-28 grade asphalt cement for this Project.

(Use the following subsection .42 when tack coat is not required between lifts placed during the same shift.)

00744.42 Tack Coat - Add the following sentence after the sentence that begins "Construct a tack coat…":

A tack coat is not required between lifts placed during the same shift provided the bottom lift is kept clean and free of dirt or debris.

00744.44(b) Drop-Offs - Replace the bullet that begins "Provide warning signs and markings…" with the following bullet:

- Provide warning signs and markings according to Sections 00221, 00222, 00224 and 00225 where abrupt or sloped edge drop-offs greater than 1 inch in height occur.

Add the following subsection:

00744.46 Crack Sealing – Provide crack sealing in accordance with Section 00746 at all joints where new pavement meets existing pavement.

(Use the following lead-in paragraph and one of the following two options when traffic restrictions are required. Obtain information from the pavement designer. Delete the option that does not apply.)

Add the following subsection:

[Option 1 - Use this .51 when paving through the top base course is required.]

00744.51 Opening Sections to Traffic - Schedule work so that, during the same shift, the surfaces being paved are paved full width and length through the top Base Course before opening to traffic. Traffic will be allowed on the top Base Course up to ____ Calendar Days.

Before beginning wearing Course paving operations, make repairs to the existing surface as directed. Payment for the repairs will be made according to 00195.20.

[Option 2 - Use this .51 when paving through the wearing course is required.]

00744.51 Opening Sections to Traffic - Schedule work so that, during the same shift, the surfaces being paved are paved full width and length through the wearing Course before opening to traffic.

00744.90 Payment – Add the following paragraph to the end of the subsection:

Crack sealing will be paid for according to 00746.90.

End of Section

Section 00745 - Asphalt Concrete Pavement - Statistical Acceptance

(Use Section 00745 when any of the following apply, otherwise, use Section 00744:

- ***Project includes any quantity of Level 4 paving***
- ***Project includes more than 2,500 tons of Level 2 or Level 3 paving***

This Section requires SP00730.)

Comply with Section 00745 of the Standard Specifications modified as follows:

(Use the following subsection .42 when tack coat is not required between lifts placed during the same shift.)

00745.42 Preparation of Underlying Surfaces - Add the following sentence to the end of the paragraph that begins “Treat all paved surfaces…”:

A tack coat is not required between lifts placed during the same shift provided the bottom lift is kept clean and free of dirt or debris.

00745.46(c) Placing –

In the paragraph that begins "When Leveling irregular surfaces…", replace the words "4 inches" with the words "3 inches".

In the paragraph that begins "Place the mixture in…", replace the words "4 inches" with the words "3 inches".

00745.47(b) Drop-Offs - Replace the bullet that begins “Provide warning signs and markings…” with the following bullet:

- Provide warning signs and markings according to Sections 00221, 00222, 00224 and 00225 where abrupt or sloped edge drop-offs greater than 1 inch in height occur.

Add the following subsection:

00745.47(d) Crack Sealing – Provide crack sealing in accordance with Section 00746 at all joints where new pavement meets existing pavement.

Add the following subsection:

00745.48(d) Crack Sealing – Provide crack sealing in accordance with Section 00746 at all joints where new pavement meets existing pavement.

(Use the following lead-in paragraph and one of the following two options when traffic restrictions are required. Obtain information from the pavement designer. Delete the option that does not apply.)

Add the following subsection:

[Option 1 - Use this .51 when paving through the top base course is required.]

00745.51 Opening Sections to Traffic - Schedule work so that, during the same shift, the surfaces being paved are paved full width and length through the top Base Course before opening to traffic. Traffic will be allowed on the top Base Course up to ____ Calendar Days.

Before beginning wearing Course paving operations, make repairs to the existing surface as directed. Payment for the repairs will be made according to 00195.20.

[Option 2 Use this .51 when paving through the wearing course is required.]

00745.51 Opening Sections to Traffic - Schedule work so that, during the same shift, the surfaces being paved are paved full width and length through the wearing Course before opening to traffic.

(Obtain the specific gravity for the project from the Designer and fill in the blank.)

00745.80 Measurement - Add the following paragraph to the beginning of this subsection:

The quantities of ACP shown in the Contract Schedule of Items were computed on the basis of Aggregates having a specific gravity of _____.

(Use the following two paragraphs when no separate measurement will be made for the liquid asphalt. Do NOT use on projects that have more than 100 tons of liquid asphalt. When used, be sure to also include the boilerplate language under subsection .90.)

Replace the paragraph that begins "The quantities of ACP..." with the following paragraph:

The quantities of ACP will be measured on the weight basis. No separate measurement will be made for asphalt cement used in the mixture. No deduction will be made for lime or any other additive used in the mixture.

(Use the following subsection .90 when no separate payment will be made for the liquid asphalt. Do NOT use on projects that have more than 100 tons of liquid asphalt. When used, be sure to also include the boilerplate language under subsection .80.)

00745.90 Payment - Add the following paragraphs to the end of this subsection:

No separate or additional payment will be made for asphalt cement used in the mixture.

Crack sealing will be paid for according to 00746.90.

End of Section

Section 00746 - Crack Sealing Flexible Pavements

Comply with Section 00746 of the Standard Specifications modified as follows:

00746.42 Installation Procedure - Add the following paragraphs to the end of this subsection:

Place crack sealing consistently along the length of the joint at a width of 4 to 6 inches.

End of Section

Section 00749 - Miscellaneous Asphalt Concrete Structures

(This Section requires SP00730.)

Comply with Section 00749 of the Standard Specifications.

End of Section

Section 00754 - Plain Concrete Pavement Repair

(This Section requires SP02001 and SP02050. This Section requires SP02510 if epoxy coated reinforcement is required.)

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00754, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00754.00 Scope - This Work consists of saw cutting and removing existing concrete pavement and constructing new plain portland concrete pavement repairs as shown and specified.

00754.01 Abbreviations:

SSD - Saturated Surface-Dry
SSFC - Stationary Side Form Construction

00754.02 Areas of Work - Locations of the areas for repair are as shown. Additional areas of repair may be required as determined by the Engineer.

00754.04 Prepaving Conference - Supervisory personnel of the Contractor and any Subcontractors who are to be involved in the concrete paving work shall meet with the Engineer, at a mutually agreed time, to discuss methods of accomplishing all phases of the paving work.

Materials

00754.10 Materials - Furnish Materials meeting the following requirements:

Resin Bonded Anchors	00535
Bar Reinforcement	02510
Concrete Materials	02001
Curing Materials	02050
Epoxy and Nonepoxy Bonding Agents	02070
Epoxy and Nonepoxy Grouts	02080
Galvanizing	02530.70
Portland Cement Concrete Repair Materials	02015
Poured Joint Fillers	02440.30
Preformed Expansion Joint Filler	02440.10

00754.11 Classes of Concrete - If the time frame designated for opening traffic is less than 72 hours after concrete placement, provide Class HES4000 - 1 1/2 concrete designed to attain a minimum average compressive strength of 3,000 psi prior to allowing traffic on the concrete. Otherwise furnish Class 4000 - 1 1/2 paving concrete.

00754.13 Concrete Mix Designs - Prepare and submit either new mix designs or current mix designs for each class of concrete required according to Section 02001.

00754.15 Quality Control - Provide quality control according to Section 00165, Section 02001, and the following:

(a) Concrete Mixture - If the results of any test are outside of the specification limits, stop the placement of the load. Correct the load or reject it and do not incorporate it into the work. Test subsequent loads before any further concrete placement. Correct the subsequent loads if any of the tests are still outside the specification limits. If the load cannot be corrected, reject it and do not incorporate it into the work. Testing of subsequent loads may return to the specified frequency when the test results from two consecutive loads are shown to meet the specification limits.

(b) Records - Deliver all batch tickets, water-cement ration calculations, and all other records required to the Engineer upon availability but no later than the morning of the next Day.

00754.16 Acceptance of Concrete:

(a) General - Acceptance of concrete will be based on the results of the Contractor's quality control testing according to Section 00165 and the MFTP.

(b) Aggregate - Acceptance will be based on the Contractor's quality control testing, if verified by the Agency according to Section 00165 and the MFTP.

(1) Aggregate Gradation - A stockpile contains Specification aggregate gradation when the quality level for each sieve size calculated according to 00165.40 is equal to or greater than the quality level in Table 00165-2 for a PF of 1.00. Each required sample represents a sublot. When the quality level in Table 00165 2 yields a PF of less than 1.00 for any constituent, the material is non specification.

(2) Non-specification Aggregate Gradation - Stockpiled aggregates that contain non-specification aggregate gradation will be rejected by the Engineer unless non-specification material is removed from the stockpile. Do not add additional material to the stockpile until enough non-specification material is removed so that the quality level for each constituent is equal to or greater than the quality level in Table 00165 2 for a 1.00 PF.

(c) Plastic Concrete - Acceptance of the plastic concrete will be based on the tests performed by the Contractor's QCT, according to the tolerances and limits of Section 02001.

(d) Hardened Concrete - Cast and cure the test cylinders according to AASHTO T 23 in single use plastic molds and test at 28 Days according to AASHTO T 22.

(1) General - For all classes of concrete, acceptance of hardened concrete will be based on an analysis of compressive strength tests of cylinders cast by the QCT. Test cylinders at an ODOT certified laboratory.

(2) Actual Strength Test Value - The ASTV at 28 Days is the average compressive strength of the three cylinders tested.

(3) Sampling and Testing - Sample and test according to Section 00165 and the MFTP.

(4) Acceptance - The ASTV shall exceed the f'c (specified strength) for the mix design. If a set of cylinders has an ASTV less than f'c, the Engineer will review the results to determine if the concrete represented by the cylinders shall be removed. In any case, concrete that has an ASTV of less than 85 percent of the specified strength shall be removed unless otherwise authorized, in writing, by the Engineer. The cost of removal, replacement, and all related work shall be the Contractor's responsibility, subject, if the concrete is allowed to remain in place, to a price adjustment according to 00150.25.

If an ASTV falls below the f'c, the Contractor may submit a written plan within 3 Days of the test for review by the Engineer. The plan shall outline a proposed alternate method of evaluating compressive strength. The plan shall provide evidence that a reasonable f'cr (over design) was maintained and that there is credible evidence (besides low strength) which warrants consideration of this option. If the Engineer determines that the compressive strength test results are suspect from definable external factors, the Engineer may allow an alternate method of acceptance.

00754.17 Spall Repair Material - For spall repair, furnish a PCC repair material meeting the requirements of Section 02015 except do not use products that contain magnesium phosphate. Use either "Rapid Setting" or "Very Rapid Setting" material.

00754.18 Bond Breaker - Bond breaker must be one of the following:

- Non-woven geotextile meeting the property requirements listed in Table 02320-4.
- Liquid curing compound evenly applied as a bond breaker in two applications, at a rate of 1 gallon per 130 to 165 square feet for each application, over the entire surface area.

Equipment

00754.20 Batch Plant - Provide batch plants according to 02001.40.

00754.21 Mixers - Provide mixers according to 02001.40.

For Projects requiring Class HES concrete, mobile mixers may be used if the mixers conform to the following:

- The mixer is self-propelled and carries sufficient unmixed dry bulk cement, sand, coarse aggregate, admixtures, and water to produce a minimum of 6 cubic yards of concrete on site.
- The mixer provides positive measurement of cement being introduced into the mix by meter or counter.
- The mixer provides positive control of the flow of water into the mixing chamber. Water flow is readily adjustable to provide for minor variations in aggregate moisture.

- Each mixer is calibrated to automatically proportion and blend all components according to the mix design on a continuous or intermittent basis as required by the placing operation.

Perform a calibration and yield test on each mixer prior to the first placement to accurately proportion the specified mix. Use a written calibration procedure from the mixer manufacturer, a procedure provided by the agency or other written procedure acceptable to the agency. The calibration process may be witnessed by the Engineer. Provide the Engineer with information about the scheduled date, time and place for the calibration. Perform a new calibration when the source of materials changes, when the mixer undergoes a major repair, or when requested by the Engineer.

00754.22 Hauling Equipment - Use truck mixers to transport concrete. Provide hauling Equipment conforming to AASHTO M 157.12 or AASHTO M 157.11.6.

00754.23 Paving Equipment - Provide paving Equipment conforming to the following:

- Able to vibrate, consolidate, and finish the slab to proper grade and Cross Section for the full width and depth of the concrete being placed.
- Capable of meeting the smoothness requirements.
- Approved by the Engineer.

00754.24 Concrete Saws - Provide power driven concrete saws for sawing joints, adequate in number of units and power to complete the sawing at the required rate. Also provide a standby saw on the Project Site.

00754.25 Smoothness Testing Equipment - Provide one 12-foot straightedge.

00754.26 Concrete Drills - Provide a drilling system consisting of drilling Equipment and drilling supports that:

- Is capable of drilling holes of the required diameter and depth.
- Can produce holes parallel to the pavement surface and parallel to each other within a tolerance of ± 1/8 inch.
- Can provide hole alignments at mid-depth of PCC pavement.

Labor

00754.30 Quality Control Personnel - In addition to the certified technicians required in 02001.50 provide and designate an individual to be present at the placement site at all times during concrete placements and who is authorized and responsible for acceptance and rejection of materials.

Construction

00754.40 Weather Limitations - Coordinate all operations involved in repairing the pavement so the Work will result in a finished pavement conforming to the Specifications regardless of the daily or seasonal variations in weather, temperature and humidity under which the work is permitted to proceed.

Do not place PCC during periods of rain. Do not place PCC on frozen bases. Stop placement when descending air temperature falls below 35 °F. Do not begin placement until the air temperature is 35 °F in the shade and rising and is forecast to remain above 35 °F.

Protect the pavement from weather damage. Protect unhardened PCC from precipitation with protective material. When PCC is placed during cold weather and the air temperature is forecast to drop below 33 °F, prevent the concrete from freezing for a minimum of 7 Days after placement.

Remove and replace weather-damaged pavement at no additional cost to the Agency.

00754.41 Preparation:

(a) Removal of Existing Pavement - Remove full panels of existing concrete pavement full depth as shown or directed. A vertical full depth saw cut is required along all longitudinal joints and at transverse locations. Cut concrete through tie bars and dowels. Remove concrete pavement with Equipment approved by the Engineer in a manner that does not damage remaining pavement or connections and allows for specified connections. Repair damage to the existing pavement due to the Contractor's operations, at no additional cost to the Agency, by extending the full depth repair to the satisfaction of the Engineer.

(b) Concrete Pavement Base Repair - Use material similar to existing base material or use commercial concrete. If concrete is used, place a bond breaker between the new concrete Base and the new concrete pavement. If the repair is a nominal 2 inches deep or less, the repair may be accomplished by pouring the patch monolithically with the new concrete pavement, without a bond breaker. PCC repair material may be substituted for Commercial Grade Concrete.

Compact unbound granular materials used in the Base repair as directed. Allow concrete or substitutes to cure sufficiently to support necessary construction activities without yielding prior to continuing those activities. No further testing of pavement Base material is required.

(c) Spall Repair Area - Saw cut the existing concrete pavement to a nominal depth of 2 inches. Remove existing concrete within the perimeter of the saw cut to a depth of 2.0 inches, or to sound concrete as determined by the Engineer. If jack hammers are used for removing pavement, they shall not weigh more than 30 pounds, and chipping hammers shall not weigh more than 15 pounds. Do not operate hammers at an angle greater than 45 degrees measured from the surface of the pavement. Any existing pavement that is to remain that has been damaged shall be repaired at no additional cost to the Agency.

(d) Preparation of Existing Concrete - Before placement of concrete, blow clean the existing concrete surfaces within the pour area with compressed air and dampen the area to be paved with a light application of water. If the area becomes dry before new concrete is placed, blow clean and dampen the area again.

00754.43 Placing Dowel Bars and Tie Bars:

(a) Dowel Bars - Provide smooth, round, epoxy coated dowel bars. Coat with plastic, heavy oil, or other approved material that will neither bond with nor be harmful to the PCC. Use a framework to place dowels that is continuous across the entire lane width, holds the dowels parallel with each other, holds the dowels parallel with the surface of the pavement, and holds the dowels parallel to the roadway centerline. For dowels placed across an expansion joint, use a dowel bar basket or other system of support that leaves no permanent incompressible members in place within the joint. Maximum alignment tolerance shall be 5 degrees or 3/16 inch in the length of the dowel. Place dowels within 3/8 inch of the center of the slab vertically.

Place dowel bars for joint contact at existing concrete pavement surfaces by drilling the existing concrete section and then inserting the dowel bars and grouting them in place. Drill the holes large and deep enough to insert the dowel bars with adequate epoxy or nonepoxy grout. Adjust hole locations to avoid damaging any existing reinforcement when drilling the holes. Blow the dowel bar holes clean with compressed air before grouting. Center the bar in the hole for the full length of embedment before grouting. Pump the grout into the hole around the bar so the back of the hole will be filled first. Do not allow blocking or shimming to impede the flow of the grout into the hole. If dams are needed, place them at the front of the holes to confine the grout. Place the dams to permit the escape of air without leaking grout. Do not remove dams until grout has cured in the hole.

(b) Tie Bars - Provide epoxy coated tie bars and place them for contact-type longitudinal joints by one of the following methods:

- By drilling the hardened concrete section and then inserting the tie bars as resin-bonded anchors in accordance with construction and testing procedures in Section 00535.
- By inserting the tie bars into the plastic slipformed concrete before vibrating and finishing the concrete. The tie bars may be bent before insertion. Replace any loose tie bars by drilling and grouting, as described above, at no additional cost to the Agency.
- By using threaded mechanical splice couplers from the QPL. Submit splices for approval before using. Rebar splices shall be:
- Accompanied by manufacturer's quality compliance certificate according to 00165.35.
- Installed according to manufacturer's recommendations.

00754.44 Handling, Measuring, and Batching Materials - The plant site, layout, Equipment and provisions for transporting material shall be adequate to assure a continuous supply of Material to the Project Site.

(a) Aggregates - Stockpile and remove the aggregate from stockpiles in a manner that holds segregation to a minimum.

Do not use aggregates that become segregated, mixed with earth or foreign material, or contain lumps of hardened material. Thaw frozen aggregates or aggregates containing frozen lumps before use.

(b) Batching - Separately weigh into the hoppers the fine aggregate, each separated size of coarse aggregate, cement and fly ash in the respective proportions set by the mix design. Provide a device to indicate positively that the full amount of cement and fly ash was discharged into the batch box or container. Measure water and admixtures either by volume or by weight.

Conduct batching so that the individual weights of each Material required are within the following tolerances:

Aggregates	± 2%
Cement	- 1% to + 4%
Fly Ash	- 1% to + 4%

00754.45 Mixing Concrete:

(a) General - Mix the concrete in a batch plant mixer, truck mixer, or mobile mixer and the following:

- Charge the batch into the receiving drum so some water enters before the solids and continues to flow uniformly for a portion of the mixing time.
- Keep the skip and the throats of drums free of accumulations.
- Mix the concrete only in the quantity required for immediate use.
- Do not intermix batches.
- Do not retemper concrete by adding water or by other means.

(b) Batch Plant Mixers - The mixing time for batch plant mixers shall be at least 60 seconds unless the Contractor's CCT documents meeting "Concrete Uniformity", according to AASHTO M 157, Annex A1 for concrete produced at the batch plant mixer set up for this Project, to the satisfaction of the Engineer. The mixing time may then be reduced to the extent the test permits but not less than 45 seconds.

(c) Truck Mixers - The mixing time for truck mixers shall be 70 to 100 revolutions at a mixing speed recommended by the manufacturer of the truck mixer.

00754.46 Placing Concrete:

(a) General - Perform the strike-off, consolidation, final floating and surface finishing according to the following:

- Vibrate throughout the concrete until it is uniformly consolidated. Do not segregate.
- Strike off the concrete with templates or screeds designed and manipulated to shape the concrete to the specified Cross Section between the forms, carrying a slight excess of concrete in front of the leading edge of templates or screeds at all times.
- Following the vibrating and strike-off operations, float the concrete. Include transverse floating or other smoothing and finishing actions as necessary. Check and correct the surface according to 00754.49. Keep the surface free from laitance, soupy mortar, marks or irregularities.
- Finish the surface according to 00754.49.

Correct all damage to the Subgrade or Base due to the Contractor's operations, at no additional cost to the Agency, to the satisfaction of the Engineer.

(b) One Lift - Place the concrete in final position in one Lift so a minimum of finishing will be necessary to provide a dense, homogenous pavement conforming to true grades and Cross Sections.

(c) Provision for Joints and Other Devices - While placing concrete, make provision for constructing joints, placing dowels, tie bars, and other devices, as shown and directed, and as provided in 00754.43 and 00754.48.

(d) Reject Concrete Material - Reject concrete if it:

- Is not in place within 90 minutes after being mixed.
- Has begun to take an initial set before placement.

(e) Hand Operated Equipment - Use shovels to hand spread and distribute the concrete. Do not use rakes. Do not foul the concrete with foreign matter, or disturb joint devices during such operations. Furnish hand operated mechanical vibrators satisfactory to the Engineer. Use the vibrators to consolidate the concrete pavement at least 6 feet each side of construction and expansion joints and all other areas as directed.

(f) Illumination - During hours of darkness, adequately illuminate work areas at no additional cost to the Agency.

00754.48 Joints:

(a) General - Construct joints of the kinds shown and where shown or directed. Joint types in the concrete pavement will be contraction, construction or expansion. They shall be transverse or longitudinal, as shown or directed. Extend all joints and joint filler to pavement edges or to each other.

Joints shall not vary from specified or indicated line by more than 1/4 inch. The tops of joint filler, when required, shall be slightly, but not more than 1/8 inch, below and paralleling finished pavement grade and Cross Section. Protect top edges of filler from damage by paving operations.

Construct all joints which contain preformed filler before the final floating and surface finishing of the concrete, unless otherwise directed.

(b) Longitudinal Joints - If the Contractor elects to pour the entire width of pavement at one time, construct the longitudinal joint as shown. Longitudinal joints shall be the contact type or weakened plane type as shown:

(1) Longitudinal Contact Joints - Construct longitudinal contact joints when concrete is placed against hardened concrete regardless of age, between strips of pavement or between a strip of pavement and a concrete gutter.

(2) Longitudinal Weakened Plane Joints - Construct weakened plane joints by sawing to the depths and maximum width shown. Saw longitudinal weakened plane

joints at the earliest possible time following placement of the concrete to prevent uncontrolled cracking without damaging the pavement or joint. Saws may be single or tandem, as the Contractor elects, and be controlled by guides to true line. Restore curing agents broken or damaged by the sawing operations.

(c) Construction Joints - Construct construction joints when there is an interruption of 30 minutes in the concrete placing operations.

The new concrete placed against the joint shall conform closely to the proportions and consistency of the previously placed concrete except vibrate and consolidate it to a greater degree and with more care than normal. Unless otherwise shown, do not construct construction joints within 10 feet of a transverse expansion or contraction joint. If sufficient concrete has not been mixed at the time of interruption to form a slab at least 10 feet long, remove the concrete back to the last joint and dispose of as directed.

(d) Transverse Contraction Joints - Form transverse contraction joints by sawing to the required dimensions shown on the Plans. Saw transverse contraction joints at the earliest possible time following placement of the concrete to prevent uncontrolled cracking without damaging the pavement or joint. Repair any damage to the curing material during the sawing operations immediately after the sawing is completed.

(e) Sealing Sawed Joints - Fill sawed longitudinal weakened plane joints and transverse contraction joints with poured joint filler. Thoroughly clean joints at the time of sealing. Ensure the curing period for joints is complete before allowing construction Equipment and vehicles on the pavement.

00754.49 Surface Finishing - After the concrete has been given a preliminary finish, check the surface of the fresh concrete in the longitudinal and transverse direction with a 12-foot straightedge. Correct surface deviations more than allowed by 00754.56(a). Lap each successive check with the previous check path by at least half the length of the straightedge.

(a) Textured Finish - Upon completion of the machine floating, straightedge testing, edge tooling and, if necessary, hand floating, and before initial set of the surface concrete, give the surface of the concrete a textured finish.

Accomplish the textured finish with a steel-tine tool with 1/8 inch tines that will mark the finished concrete to a depth of 1/8 inch to 3/16 inch. Randomly space the markings from 1/2 inch to 1 1/4 inches as approved. Avoid overlaps of the texturing. Construct markings either perpendicular or parallel to the roadway centerline to match the adjacent concrete pavement textured finish.

With approval of the Engineer, an astroturf or broom finish may be used in place of tining on roads to receive an overlay.

(b) Transverse Profile - Match the surface of the fresh concrete in the transverse direction to the surface of the existing concrete at the ends of the patch. Taper into existing pavement ruts in the first and last 10 to 20 feet to provide a transverse surface finish for the remainder of the patch meeting the requirements of this section.

00754.52 Edge Tooling and Filling - Tool edges at longitudinal joints and construction joints of new pavement and clean joints of previously placed concrete to remove laitance and

mortar resulting from finishing operations, and to provide clean rounded edges without ridges on the surface. Perform tooling of edges at construction joints so that no more than a 1/8 inch radius is produced.

Fill all areas of minor honeycomb or other minor defect in composition of the concrete along the exposed sides of concrete with a stiff mortar of cement and fine aggregate, and apply to the moistened concrete to the satisfaction of the Engineer. Remove and replace areas showing serious defects in composition of the concrete with specified quality concrete for full panel width between longitudinal joints or edges, and for a length not less than a full panel length. Low spots exceeding 1/4 inch in depth, if in hardened concrete, may be filled with an epoxy grout, provided the filling is neat and blends inconspicuously with adjoining concrete. Prepare the area according to the grout manufacturer's recommendations.

00754.53 Curing Concrete - Immediately after the final floating, surface finishing and edging have been completed, and while the concrete surface is still moist, cover and cure the entire exposed surface of the newly placed concrete for at least 72 hours. If the Specifications require opening the lanes to traffic in less than 72 hours, remove curing covers just prior to opening to traffic. Use one of the following provisions:

(a) Liquid Membrane-Forming Compounds - Apply liquid membrane-forming compound uniformly to the concrete by pressure-spray methods at a rate of at least 1 gallon per 150 square feet. Mix the liquid membrane-forming compound thoroughly before and during use. Liquid membrane-forming compounds are not allowed when an asphalt concrete layer will be placed on the new concrete.

(b) Other Coverings - Apply clear or white polyethylene film or insulated curing blankets as a waterproof and moisture-proof covering. Place the film or blankets beyond the edge of the repaired areas and weight to hold in position. Do not mar the concrete with the covering.

00754.54 Longitudinal Pavement Cracks - Remove and replace all patches that show longitudinal cracking or do not bond at no additional cost to the Agency.

00754.55 Spall Repair - In spalled areas, remove the existing pavement according to 00754.41(c). The repair limits shall extend beyond the spalled area a minimum of 3.0 inches. Use only rectangular or square repair shapes. Prepare the repair area according to 00754.41(d) and the PCC repair material manufacturer's recommendations, then apply a coat of epoxy grout or bonding agent to all vertical surfaces and place PCC repair material before grout dries. When a spall repair is placed directly against an adjacent longitudinal joint, place a bond breaker between the existing concrete and the area to be patched. Mix and place PCC repair material according to the manufacturer's recommendation. Use shovels to hand spread and distribute the concrete. Do not use rakes. Do not contaminate the concrete with foreign matter. Cure PCC repair material according to the manufacturer's recommendation.

00754.56 Surface Tolerance, Testing, and Correction - The surface of finished pavement shall not deviate from longitudinal and transverse smoothness more than the limits identified below. Perform straightedge testing under the supervision of the Engineer as soon as the hardness of the concrete permits.

(a) Straightedge Testing and Tolerance - Test pavement surface longitudinal and transverse smoothness with a 12-foot straightedge. The extent of the testing will be determined by the Engineer. The pavement surface shall not deviate from the straightedge at any point by more than 1/8 inch, except the transverse surface at the patch ends may vary as required in 00754.49(b).

(b) Correcting Deficiencies - Correct all segments that exceed the requirements of 00754.56(a) by one of the following methods:

(1) Remove the non-specification concrete pavement as determined by the Engineer and replace with Specification concrete pavement.

(2) Profile with an abrasive grinder equipped with a cutting head comprised of multiple diamond blades.

Retest according to 00754.56(a). Perform all corrective Work at no additional cost to the Agency, including traffic control.

Maintenance

00754.60 Protection of Concrete - Repair or replace any part of the pavement damaged by traffic or damaged from any other causes before its official acceptance, according to 00170.80. Do not operate construction Equipment or allow Public Traffic on newly placed concrete until all of the following requirements are met:

(a) The Contractor complies with 00150.60.

(b) The concrete attains a compressive strength of at least 3,000 psi as determined by testing at least two cylinders cured according to AASHTO T 23 (field cure) and tested according to AASHTO T 22.

(c) Approval is given by the Engineer before opening to traffic.

(d) The surface of the concrete is protected from scarring or abrasion and kept free of stones, loose mortar and other matter apt to be deleterious to the concrete in the paths of Equipment.

00754.61 Protection of Shoulders - A portion of the shoulder adjacent to the proposed patch, may be removed as necessary to ensure proper forming at the edge or the patch. Prior to opening to traffic, the disturbed shoulder area shall be replaced with material types and thickness similar to the existing shoulder, compacted, and restored to the existing line and grade. Include all cost of the shoulder replacement in the price bid for Concrete Pavement Repair.

Measurement

00754.80 Measurement - The quantities of Work performed under this Section will be measured according to the following:

(a) Concrete Pavement Repair - Concrete pavement repair will be measured on the area basis and will be determined by measuring the width and length of each separately

constructed Panel of pavement. The width is the measured edge-to-edge width on the surface of the pavement, perpendicular to centerline. The length is the measurement from end to end of pavement along the center line of the roadway, including the length of the bar lap splices.

The measurement of extra thickness of pavement, as shown or as ordered, will be determined by conversion on a proportionate volume basis to an equivalent number of square yards of specified thickness pavement.

(b) Spall Repair - Spall repair will be measured on the area basis and will be determined by measuring the width and length of each separate repair. The width is the measured edge-to-edge width on the surface of the pavement. The length is the measurement from end-to-end of pavement along the center line of the roadway.

The measurement of extra thickness beyond the depth shown in the Plans or as ordered by the Engineer, will be determined by conversion on a proportionate volume basis to an equivalent number of square yards of the specified thickness.

(c) Concrete Pavement Base Repair - Concrete pavement base repair will be measured on the area basis and will be determined by measuring the width and length of each separate repair. The width is the measured edge-to-edge width on the surface of the pavement, perpendicular to centerline. The length is the measurement from end-to-end of the repair along the center line of the roadway.

Payment

00754.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Plain Concrete Pavement Repair	Square Yard
(b) Concrete Pavement Spall Repair	Square Yard
(c) Concrete Pavement Base Repair	Square Yard

Item (a) includes saw cutting, removing concrete pavement, preparing the Base, and preparing the cut edges. Item (a) also includes Base repair, Leveling, or backfilling, up to 2 inches deep.

Item (b) includes sawing and removing concrete.

Item (c) includes Base repair, Leveling, and related backfilling of Subbases or Subgrade greater than 2 inches.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

End of Section

Section 00756 - Plain Concrete Pavement

(This Section requires SP02001 and SP02050. This Section requires SP02510 if epoxy coated reinforcement is required.)

Comply with Section 00756 of the Standard Specifications modified as follows:

00756.15(a) Concrete Mixture - Replace this subsection, except for the subsection number and title, with the following:

- Sample and test according to the MFTP.
- For all plain concrete pavement, provide personnel according to 00756.30 to sample and test the mix for temperature, air content, slump, water-cementitious ratio, density and yield, from the first load of each placement, whenever there is a visible change in the slump of the concrete, and when a set of cylinders is obtained.
- If the results of any test are outside of the Specification limits, stop the placement of the load. Correct the load or reject it and do not incorporate it into the Work. Test subsequent loads before any further concrete placement. Correct the subsequent loads if any of the tests are still outside the Specification limits. If the load cannot be corrected, reject it and do not incorporate it into the Work. Testing of subsequent loads may return to the specified frequency when the test results from two consecutive loads are shown to meet the Specification limits.

00756.95(a) General - Replace the bullet that begins “The average of the IRI for both…” with the following bullet:

- The IRI in each wheel path is 65.0 inches per mile or less.

End of Section

Section 00759 - Miscellaneous Portland Cement Concrete Structures

(This Section requires SP02001. This Section requires SP02510 if epoxy coated reinforcement is required.)

Comply with Section 00759 of the Standard Specifications modified as follows:

00759.03 Required Submittals – Replace this subsection with the following:

00759.03 Corrective Action Plan - Unless otherwise approved, notify the Engineer before performing corrective action. Include TPAR necessary to complete corrective action work.

At least 7 Calendar Days before concrete structures work is scheduled to begin, submit a corrective action plan. The corrective action plan shall address procedures to correct deficient structures through minor corrective action or replacement according to 00759.55(a), and include:

- List of minor corrective actions that will be used to correct deficiencies, according to 00759.50 and 00759.55.
- Procedures for performing corrective action.
- Proposed concrete grinding equipment and method of grinding.
- Proposed concrete repair material used for resurfacing ground concrete surfaces according to Section 02015.
- Construction activities, equipment and staging necessary to complete corrective action work.

The Engineer will review the corrective action plan(s) and provide a response to the Contractor within 5 Days after receiving the plan. Do not begin concrete structure work until the corrective action plan is approved by the Engineer.

Add the following subsection:

00759.13 High Strength Concrete – Furnish Class 5000 mix meeting the requirements of Section 02001 with fiber mesh meeting the requirements of Section 02045.

00756.22 Smart Level - Replace this subsection, except for the subsection number and title, with the following:

Furnish a 48-inch electronic smart level to measure grades and slopes. Calibrate smart level at the time of inspection.

Add the following subsection:

00759.23 Concrete Resurfacing Equipment - Furnish power-operated scarifying Equipment capable of uniformly removing and preparing the existing surface to depths required. For concrete grinding operations, furnish 12 segment grinders, fine-toothed scarifying Equipment, or other approved grinding Equipment.

00759.50 (a) General – Add the following paragraphs to the end of the subsection:

Construct ADA curb ramps, sidewalks, and other pedestrian facilities meeting the requirements of PROWAG. Verify compliance using smart levels meeting Section 00759.22.

Submit a corrective action plan for each non-compliant Structure after receiving notice of non-compliance from the Engineer. Perform correction of defects according to 00759.55.

00759.50 (b) Curbs, Islands, and Stairs – Add the following to the end of the subsection:

Stamp all sanitary sewer, storm sewer, and water locations centered on the curb exposure with the appropriate brand: “S” for sanitary sewer, “SW” for storm sewer, and “W” for water. Brand shall be a minimum of 4 inches in height and ¼ inch in depth.

00759.50(c) Driveways, Walks, and Surfacings - Replace this subsection, except for the subsection number and title, with the following:

Prevent segregation of the concrete during placement. Strike-off the concrete to the grade shown, and float the surface smooth. After the water sheen disappears, edge the joints and remove edging tool marks prior to final finishing. Lightly cross-broom the surface to a uniform texture. Do not trowel joints or edges after brooming surface.

00759.50(d) Curb Ramps - Replace this subsection, except for the subsection number and title, with the following:

Prevent segregation of the concrete during placement. Strike-off the concrete to the grade shown and float the surface smooth. After the water sheen disappears, edge the joints and remove edging tool marks prior to final finishing. Lightly cross-broom the surface to a uniform texture. Do not trowel joints or edges after brooming surface.

Add the following subsection:

00759.50 (f) Truncated Domes – Furnish truncated dome panels in standard sizes supplied by the manufacturer. Where cutting panels is necessary to provide custom sizes, follow manufacturer’s recommendations and use the following procedures:

- Do not install panels smaller than 2-feet by 2-feet. Provide standard panel sizes and plan cuts to minimize panel waste.
- Cut tiles to custom sizes using a continuous rim diamond blade in a circular saw or mini-grinder. Use a straightedge when cutting straight lines.
- When placing cut panels, butt clean uncut edges against each other. Orient cut edges to the outsides of the ramp.
- Furnish and place anchors for cut panels according to the manufacturer’s recommendations.

Leave factory installed protective cover on truncated domes during entire installation process to prevent concrete from splashing onto the finished surface of the tile.

While concrete is workable, use steel edging trowel with a minimum of 1/8" radius to edge the finished concrete around the panel. Use a steel trowel to finish the concrete around the perimeter of the truncated dome so it is flush with field level of the tile.

Immediately after concrete has cured, remove protective plastic wrap from the truncated dome by cutting the plastic wrap with a sharp knife held tight to the concrete/tile interface. If concrete bled under the plastic, use a soft brass wire brush to clean the residue without damage to the tile surface.
Add the following subsection:

00759.55 Correction of Deficient Structures - Unless otherwise approved, notify the Engineer before performing corrective action. Correct deficiencies at no additional cost to the Agency. Perform corrective actions as directed, according to the approved corrective action plan, and according to the following:

(a) Minor Corrective Action - Submit Equipment and procedure for minor corrective action to the Engineer for approval. Minor corrective action can be performed to correct a deficiency up to 1 square foot per panel. Limit minor corrective action to one area per panel. Perform minor corrective action according to the following:

(1) Concrete Grinding - Grinding to correct high area deficiencies is limited to 3/16 inch in driveway aprons, curb ramps, or refuge and up to 1 inch in other locations. Use equipment meeting the requirements of 00759.23. Resurface all ground concrete surfaces according to 00759.55(a)(2).

(2) Concrete Resurfacing - Resurfacing to correct low area deficiencies is limited to 3/16 inch depth. Existing concrete is to be at least 7 Days old prior to resurfacing. Resurface repair areas according to the following:

a. **Keyway** - Sawcut a keyway at the boundaries of repair areas that are not already defined by panel control joints. Sawcut is to be 1/8 inch wide by 1/4 inch deep. Bevel inside edge of keyway at a 45 degree angle.

b. **Surface Preparation** - Prepare limits of repair area by grinding using equipment from 00759.23. After grinding, sandblast the surface of the repair area. Clean the surface using a low pressure washer, less than 5,000 psi.

c. **Presoak** - Presoak the repair area for a minimum of 30 minutes to saturated surface dry. Prior to resurfacing, ensure there is no ponding water on the surface.

d. **Resurface** - Provide concrete resurfacer from the QPL according to 02015.60; refer to QPL remarks to select an appropriate material based on allowable installation depths. Furnish resurfacer in a color that closely matches the color of surrounding concrete surfaces. Mask boundaries of the repair area. Use hand tools to work resurfacer into keyways and match existing grade at boundaries. Apply a light broom-finish to achieve non-slip surface.

e. **Curing and Return to Traffic** - Wet cure for a minimum of 1 hour or per the manufacturer's recommendation, whichever is more restrictive. Follow manufacturer's recommendation for return to traffic time.

(3) Concrete Crack Repair - This section allows for repairs to minor concrete cracking typical during the curing process, not as a result of defective concrete. Repair cracks in concrete according to the following requirements:

a. **Up to 1/8" Wide** – If more than two cracks less than 1/8" wide occur within a sidewalk or driveway panel, remove and replace the panel. For all other cracks less than 1/8" wide, no corrective action is required.

b. **1/8" to 5/16" Wide** - If more than one crack, 1/8" to 5/16" wide, occurs within a sidewalk or driveway panel, remove and replace the panel. All other cracks, 1/8" to 5/16" wide, may be repaired or replaced. Submit a corrective action plan per 00759.03 to the Engineer for approval prior to beginning work.

c. **Greater than 5/16" Wide** - Remove and replace affected area of concrete.

(4) ACP Grinding - Taper grind to match existing pavement with a minimum grinding width of 1 foot for each 1/4 inch of ACP removed.

(b) Acceptance of Structures - Once the corrective work or replacement has been completed, acceptance will be based on the Engineer's inspection and approval of the Structure.

00759.90 Payment –

Add the following pay item to the end of the list:

Pay Item	Unit of Measurement
(o) Concrete Walks with Sawcut Joint	Square Foot

Replace the paragraph that begins " Item (k) includes the additional Work required …" with the following paragraph:

Item (k) includes the additional Work required to construct a curb ramp or replace an existing curb ramp. Payment for the area of the curb ramp will be made under the concrete walks Pay item.

Add the following paragraph to the end of the subsection:

Replace the paragraph that begins "No separate or additional payment will be…" with the following paragraph and bullet list:

No separate or additional payment will be made for:

- preplacement conference
- concrete form verification
- any necessary repair or removal and replacement of concrete structures
- providing supervisory personnel who have an active ODOT ADA Certification for Contractors to directly supervise the curb ramp Work

- developing corrective action plans

End of Section

Section 00760 - Unit Pavers

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00760, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00760.00 Scope - This Work consists of furnishing and installing masonry unit pavers at locations shown or directed.

Materials

00760.10 Unit Paving Material - Furnish pavers and related material meeting the following requirements:

- **Paving Unit Type** - Uni-décor or approved equal
- **Unit Color** - Red, black, or red-black. Provide sample color for approval
- **Unit Size** - 80mm in streets, driveways, and roadways or 60mm in pedestrian areas
- **Unit Strength** - 8,000 psi with a maximum of 5 percent absorption (ASTM C 936)
- **Joint Sand** - Fine PCC aggregate conforming to 02690.30(g)
- **Leveling Bed** - Fine PCC aggregate conforming to 02690.30(g)
- **Aggregate Base** - 6” thick, 3/4" – 0
- **Weed Control** - Pre-emergent herbicide conforming to 01040.21

Submit proposed equivalent products to the Engineer for consideration. See 00120.16 and 00180.31.

00760.11 Salvaged Materials – Pavers salvaged as part of removal work on the Project may be reused in new construction if Engineer determines materials conform requirements of 00760.10. Salvaged materials must be structurally sound, whole, and free from cracks and chips.

Construction

00760.40 General - Install pavers according to the manufacturer's instructions.

00760.41 Aggregate Base - Place and compact aggregate to 95 percent density.

00760.42 Sand Base - Place a minimum depth 1 inch leveling bed. Screed to grade and saturate with water to ensure a firm and smooth grade.

00760.43 Weed Control - Apply granular pre-emergent herbicide over the prepared leveling bed according to the manufacturer's instructions.

00760.44 Unit Pavers - Lay out rows so they are straight and parallel to the surrounding lines. Where new or reinstalled pavers butt up against existing pavers, install whole pavers only. Do not cut pavers to fit where pavers butt up against existing pavers. Make all cuts where pavers butt up against curbs, curb ramps, sidewalks, tree wells, or other similar fixed objects. Cut pavers with masonry saw.

00760.45 Joint Sand and Compaction - After placing pavers, sweep joint sand into the joints. Use a vibrating mechanical tamper to compact.

00760.46 Surface Tolerance - Do not deviate the longitudinal and transverse surface grades by more than 1/4 inch in 12 feet. In pedestrian areas, install pavers to slopes and grades meeting PROWAG requirements.

00760.47 Clean Up - Remove excess sand and broken paving material from the site when complete.

Measurement

00760.80 Measurement - The quantities of unit pavers will be measured on the area basis.

Payment

00760.90 Payment - The accepted quantities of unit pavers will be paid for at the Contract unit price, per square foot for the item "Unit Pavers".

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for Base preparation.

End of Section

SP00800 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00800 – PERMANENT TRAFFIC SAFETY AND GUIDANCE DEVICES

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00810 - Metal Guardrail

(This Section requires SP00594 when weatherized guardrail and painting of transitions and terminals are required.)

[NOTE: Except for extra length guardrail posts, do not separately pay for new guardrail posts under this Section. New posts are included in the appropriate guardrail pay item. Replacing existing guardrail posts is covered in Section 00812.]

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 00810 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 00810 of the Standard Specifications modified as follows:

(Use the following subsection .00 when there is no earthwork on the project and grading at guardrail terminals are required to be constructed.)

00810.00 Scope - Add the following paragraph to the end of this subsection:

This Work includes constructing grading at guardrail terminals at locations shown.

(Use the following subsection .10 when weatherized guardrail is required or when only recycled plastic guardrail blocks will be allowed. Delete "(**s**)" or parentheses as applicable.)

00810.10 Materials - Add the following paragraph*(*s*)* to the end of this subsection:

(Use the following paragraph when weatherized guardrail is required.)

Furnish "weatherized" Class IV metal rail meeting the requirements of AASHTO M 180.

(Use the following paragraph when only recycled plastic guardrail blocks may be used.)

Furnish recycled plastic guardrail blocks. Wood guardrail blocks are not allowed.

(Use the following subsection .11 when weatherized guardrail is required.)

00810.11 Posts - Replace this subsection with the following subsection:

00810.11 Wood Posts - Furnish wood guardrail posts meeting the requirements of 00810.10.

(Use the following subsection .13 when guardrail anchors are required.)

00810.13 Guardrail Anchors - Replace this subsection, except for the subsection number and title, with the following:

Furnish steel guardrail anchors according to Section 02820.

(Use the following lead-in paragraph and subsection .16 when there is no earthwork on the project and grading at guardrail terminals are required to be constructed.)

Add the following subsection:

00810.16 Grading at Guardrail Terminals Materials:

(a) Embankment - Furnish embankment materials meeting the applicable parts of Section 00330.

(b) Aggregate - Furnish either 1" - 0 or 3/4" - 0 size crushed aggregate that is clean, hard, durable, and reasonably well-graded from the maximum size to dust.

(c) Asphalt Concrete Mixture - Furnish asphalt concrete mixture meeting the requirements of 00744.10 through 00744.14.

Acceptance of grading at guardrail terminals materials will be visual by the Engineer.

(Use the following lead-in paragraph and subsection .17 when weatherized guardrail and painting of guardrail transitions and terminals are required. Include 00594.10 and 00594.90(a) in SP00594.)

Add the following subsection:

00810.17 Painted Guardrail - Paint all galvanized metal guardrail transition and guardrail terminal materials according to Section 00594.

(Use the following subsection .41 when there is any possibility that hand dug guardrail posts are required. Obtain information from the Utility Coordinator or the Designer. If in doubt add this language and a quantity of 4 in the schedule of items.)

00810.41 Excavation and Backfill - Add the following paragraph to the end of this subsection:

Hand dig guardrail post holes or use other non-invasive methods when posts are located within 24 inches surrounding the outside dimension of all sides of underground utilities as shown or directed.

(Use the following lead-in paragraph and subsection .44 when grading at guardrail terminals are required and there is no earthwork on the project.)

Add the following subsection:

00810.44 Grading at Guardrail Terminals:

(a) Earthwork - Perform earthwork according to the applicable parts of Section 00330.

(b) Aggregate - Place aggregate in two or more layers of nearly equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches. Compact each layer of material by rollers conforming in general to 00641.24.

Shape and maintain the surface of each layer during the compaction operation to produce a uniform texture and firmly keyed aggregates.

Continue the compactive effort until there is no reaction or yielding observed under the compactor.

(c) Asphalt Concrete Mixture - Place asphalt concrete mixture according to 00744.40 through 00744.49.

(Use the following subsection .80 when grading at guardrail terminals are required and there is no earthwork on the project.)

00810.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of Materials for all the grading at guardrail terminals are:

(Provide estimated quantities. Delete what does not apply.)

Material	**Amount**
Embankment	___ cu. yd.
Excavation	___ cu. yd.
Aggregate Base	___ cu. yd.
Asphalt Concrete Mixture	___ ton

(Use the following subsection .90 when any of the following apply:

- ***Grading at guardrail terminals are required and there is no earthwork on the project.***
- ***Weatherized guardrail and painting of guardrail transitions and terminals are required.)***

00810.90 Payment -

(Use the following paragraph and pay item when grading at guardrail terminals are required and there is no earthwork on the project.)

Add the following Pay Item to the Pay Item list:

Pay Item	Unit of Measurement
(m) Construct Grading at Guardrail Terminals	Each

(Use the following two paragraphs when grading at guardrail terminals are required and there is no earthwork on the project.)

Add the following paragraph after the paragraph that begins "In Item (l), the type…":

Item (m) includes excavation and embankment work, aggregate, and asphalt concrete mix.

(Use the following two paragraphs when weatherized guardrail and painting of guardrail transitions and terminals are required.)

Add the following paragraph to the end of this subsection:

No separate or additional payment will be made for painting galvanized metal guardrail material.

End of Section

Section 00812 - Adjusting and Repairing Guardrail

Comply with Section 00812 of the Standard Specifications.

End of Section

Section 00815 - Bollards

Comply with Section 00815 of the Standard Specifications.

End of Section

Section 00820 - Concrete Barrier

(This Section requires SP02001.)

Comply with Section 00820 of the Standard Specifications.

End of Section

Section 00830 - Impact Attenuators

Comply with Section 00830 of the Standard Specifications.

End of Section

Section 00840 - Delineators and Milepost Marker Posts

Comply with Section 00840 of the Standard Specifications.

End of Section

Section 00850 - Common Provisions for Pavement Markings

(When this Section is used on a project and when it has a completion date of September 15 or later, contact the Scheduler to determine if a separate completion date for striping is required. If a separate completion date is required, include an interim completion date in 00180.50(h).)

Comply with Section 00850 of the Standard Specifications modified as follows:

00850.10 Materials – Delete the bullet that begins "Methyl Methacrylate"

(Use the following lead-in paragraph and subsection .12 when continental crosswalks will be installed on concrete pavement.)

Add the following subsection:

00850.12 Black Background Paint – Furnish black background paint meeting the following requirements:

Property	Black	Test
Pigment – Percent by weight, minimum	62.0	ASTM D 3723
Total Solids – Percent by weight, minimum	77.0	ASTM D 1644
Nonvolatile vehicle – Percent by weight vehicle, minimum*	43.0	ASTM D 3723 ASTM D 1644
Viscosity, KU @ 77 degrees F	80 – 95	ASTM D 562
Density, lb/gal, minimum	14.0	ASTM D 1475
Volatile Organic Content (VOC) – g/L, maximum	100	ASTM D 3960

(Use the following subsection .30 only with approval from the Engineer and when the project meets ALL of the following requirements:

- ***Only surface applied markings (no groove installed markings or tape), AND***
- ***Less than 2000' of 4" longitudinal markings, AND***
- ***Fewer than 7 legends, AND***
- ***Less than 400 square feet of bars.)***

00850.30 Manufacturer's Representative - Replace this subsection, except for the subsection number and title, with the following:

For Sections referencing 00850.30, the services of a manufacturer's representative are not required. Place pavement markings only when the pavement is ready for the pavement marking material according to the manufacturer's installation instructions.

End of Section

Section 00855 - Pavement Markers

Comply with Section 00855 of the Standard Specifications.

End of Section

Section 00856 - Surface Mounted Tubular Markers

Comply with Section 00856 of the Standard Specifications.

End of Section

Section 00860 - Longitudinal Pavement Markings - Paint

Comply with Section 00860 of the Standard Specifications.

End of Section

Section 00865 - Longitudinal Pavement Markings - Durable

(This Section requires SP00850.)

Comply with Section 0865 of the Standard Specifications.

End of Section

Section 00867 - Transverse Pavement Markings - Legends and Bars

(This Section requires SP00850.)

Comply with Section 00867 of the Standard Specifications modified as follows.

00867.45 Installation – Delete the bullet that begins “Type D: Methyl Methacrylate…”

(Use the following subsection .90 when any of the following apply:

- ***Item (q) is included in the bid schedule.***
- ***Continental crosswalks will be installed on concrete pavement.)***

00867.90 Payment –

(Use the following two paragraphs when the bid schedule contains item (q). Fill in the blank with a description of the pay item and all included details. Obtain information from the Traffic Designer and refer to the payment paragraphs in the standard for examples.)

Add the following paragraph after the paragraph that begins "Item (p) includes one…":

Item (q) includes _*(Description of pay item and included details)*_.

(Add the following pay item and paragraph when continental crosswalks will be installed on concrete pavement.))

Replace Pay Item (r) with the following Pay Item:

(r) Pavement Bar, Type____, ____ ____ ……...Square Foot

Add the following after the paragraph that begins “In item (q)…”:

In item (r), the type of pavement marking Material will be inserted in the first blank, the word “Surface” or “Grooved” will be inserted in the second blank, and the words “with Black Outline” will be inserted in the third blank when applicable.

End of Section

Section 00868 - Colored Lane Markings

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

(This Section requires SP00850.)

Section 00868, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00868.00 Scope - In addition to the requirements of Section 00850, install colored lane markings according to the following Specifications.

Labor

00868.30 Manufacturer's Representative - Provide a manufacturer's representative according to 00850.30.

00868.31 Manufacturer-Certified Installers - Provide certified installers according to 00850.31.

Construction

00868.45 Installation - Place markings only when the manufacturer's representative determines that the pavement is ready for the pavement marking material.

Apply the material to the pavement according to the manufacturer's installation instructions to the full width shown in the Plans. Joints will be allowed with no overlap or gap allowed at the joint.

Do not install reflective elements.

Install the pavement marking material surface according to the manufacturer's installation instructions to achieve a uniform initial skid resistance greater than or equal to 50 British Pendulum Number (BPN) when tested according to ASTM E303.

Apply one or more of the following marking material types:

- **Preformed, Fused Thermoplastic Film High Skid** - Install preformed, fused thermoplastic film high skid that has factory installed crushed glass or Aggregate on the surface.

- **Methyl Methacrylate** - Apply methyl methacrylate to the pavement to the full width shown in a single application. Colored lane markings shall be 90 mils to 120 mils in thickness, exclusive of projecting surface-applied friction elements, with a continuous and uniform cross-sectional configuration.

00868.75 Manufacturer's Warranty - Furnish a manufacturer warranty that unconditionally warrants to the Agency the product(s) and installation under this Section against failure, according to this subsection and 00170.85(c)(1). Use Agency-supplied warranty forms, available from the Engineer.

"Unconditionally warrant" means that the warranty covers all failures, regardless of the source or cause of the failure, including, without limitation, whether the source or cause is or may be related to workmanship, inspection, or choice of materials.

The Agency inspection of any portion of the Work during the Contract and during the product installation, the Agency acceptance of the Work, corrections under the warranty, or expiration of the warranty shall not relieve the obligations under this warranty.

(a) Warranty Period - The warranty period shall be for 18 months.

(b) Failure - For purposes of this warranty, failure is defined as one or more of the following:

- **Insufficient Color Stability:** Green markings fail to meet the requirements of the Federal Highway Administration Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14) tested according to ASTM D6628.

- **Loss of Adhesion** - Markings show 5 percent or greater loss of marking material due to non-adhesion.

- **Skid Resistance** - Markings fail to maintain an average skid resistance greater than or equal to 50 British Pendulum Number (BPN) when tested in an equal number of test locations in both wheel path and non-wheel path locations according to ASTM E303.

(c) Remedy - Upon notification by the Engineer of a failure, provide the following remedy at no additional cost to the Agency:

- Repair or replace, at the discretion of the Engineer, all failed pavement markings within 6 months of the Agency's request to do so. Failed pavement markings require repair or replacement of the entire legend or bar, not just the area showing wear.
- Use materials and procedures meeting the Specifications.
- Match repairs to adjoining Work.
- Coordinate timing of repair Work with the Engineer.

(d) Agency's Right to Make Repairs - If, in the opinion of the Engineer, a failure causes or may cause a hazard, the failure may be temporarily corrected by Agency or other forces at no additional cost to the Agency. Replace temporary repairs with permanent repairs at no additional cost to the Agency and according to the Specifications and within the time specified in 00868.75(c).

Measurement

00868.80 Measurement - The quantities of colored lane markings will be measured on the area basis.

Payment

00868.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

(Delete Pay Item(s) from the list that are not included in the Schedule of Items, but do not change the alpha characters next to the pay items.)

Pay Item	Unit of Measurement
(a) Green Bicycle Lane, Preformed Thermoplastic Film	Square Foot
(b) Green Bicycle Lane, Methyl Methacrylate	Square Foot

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

Payment for Work under this Section will be limited to 75 percent of the amount due until the Agency has received the signed warranty.

End of Section

Section 00870 - Curb Painting

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00870, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00870.00 Scope - This work consists of furnishing, preparing and installing paint materials to concrete curbs.

Materials

00870.10 Materials - Furnish high performance latex, designed for streets and parking lots, meeting the requirements of federal specification TT-P-01952E Type II. Colors must meet Traffic Standards for the Traffic Yellow and OSHA Safety Red.

Equipment

00870.20 Equipment - Submit brushes and airless sprayers to the Engineer for approval prior to use.

Construction

00870.40 Installation – Apply paint materials according to the following:

- Thoroughly clean curb surface before applying any paint coat. Remove rust, dirt, oil, grease, and other foreign substances.
- Sweep and dust all surfaces to remove all loose particles and dust immediately before painting.
- Paint only in dry weather or under cover.
- Ensure surface is free from moisture or frost when paint is applied. Do not allow painted surfaces to become wet by condensation or otherwise be subjected to freezing temperatures until the paint has reached a hard set.
- Do not begin painting if the temperature of the surrounding air is less than 5 °F above the dew point.
- Clean and apply fresh paint to any paint injuriously affected by cold, rain, moisture, or condensation.
- Thoroughly stir all paint to agitate and emulsify the contents. Maintain stirring and a uniform consistency of paint until applied. Do not thin or modify the paint.
- Applied paint either wholly by brush or, if approved by the Engineer, in part by brush and in part by approved airless spray in such a way as to secure an even paint film uniform in thickness, tint and consistency over the entire surface, free from pin holes or excessive brush marks.

- Paint the face and top of curb. Do not paint any gutter pans.
- Apply two separate applications of paint. Retrace the second application directly over the first application.
- Allow paint to thoroughly dry between application of the two separate coats.
- Prevent paint dripping, spattering or spraying of finished surfaces. Cover adjacent surfaces as needed. Clean or remove imperfections and overspray before the paint has dried.
- The Contractor shall be fully responsible for any damage to property of any kind which may result from the operations incidental to the application of any paint.

Measurement

00870.80 Measurement - The quantities of curb painting will be measured on the length basis, to the nearest foot. Measurement will be along the face of curb. No adjustment will be made for different curb height exposures or widths. Measurement along the length of curb will only be made once, regardless of multiple applications of paint on the same surface.

Payment

00870.90 Payment - The accepted quantities of curb painting will be paid for at the Contract unit price, per foot, for the item "Curb Painting".

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and Incidentals necessary to complete the work as specified.

End of Section

SP00900 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 00900 – PERMANENT TRAFFIC CONTROL AND ILLUMINATION SYSTEMS

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 00902 - Crosswalk Closure Supports

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00902, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00902.00 Scope - This Work consists of constructing crosswalk closure supports and associated signs as shown.

Materials

00902.10 Materials - Furnish Materials meeting the following requirements:

Commercial Grade Concrete 00440
Steel ..... 01070.10 and 01070.12
Signs..... 00940

Construction

00902.40 General - Install crosswalk closure supports and associated signs as shown or directed.

Measurement

00902.80 Measurement - The quantities of crosswalk closure supports will be measured on the unit basis. No separate measurement will be made for signs attached to crosswalk closure supports.

Payment

00902.90 Payment - The accepted quantities of Work done under this Section will be paid for at the Contract unit price, per each, for the item "Crosswalk Closure Supports".

Payment will be payment in full for furnishing and placing all Materials, including signs, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

End of Section

Section 00905 - Removal and Reinstallation of Existing Signs

Comply with Section 00905 of the Standard Specifications modified as follows:

00905.40 General - Add the following paragraph to the end of this subsection:

Protect and return existing signs and posts meeting current standards and in good condition designated for “removal only” to the City of Bend Publics Works at 575 NE 15th Street, Bend, Oregon. Contact the Streets Division Supervisor at (541) 317-3000 at least one business day prior to delivery. Deliver signs within 14 Calendar Days or removal.

End of Section

Section 00910 - Wood Sign Posts

Comply with Section 00910 of the Standard Specifications.

End of Section

Section 00920 - Sign Support Footings

(This Section requires SP02560. This Section requires SP02510 if epoxy coated reinforcement is required.)

Comply with Section 00920 of the Standard Specifications modified as follows:

00920.80 Measurement – Delete the paragraph that begins “Estimated quantities of concrete…”

End of Section

Section 00930 - Metal Sign Supports

(This Section requires SP02560.)

Comply with Section 00930 of the Standard Specifications.

End of Section

Section 00937 – Preparing and Coating Metal Sign Structures

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 00937, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00937.00 Scope – This work consists of preparing and coating metallic sign supports, including single post, multi-post, triangular base, and exit number supports, sign backs, and illumination poles and arms as shown or as directed and according to Section 00594.

Materials

00937.10 Materials – Furnish materials meeting the requirements of Section 00594 and the following:

(a) Manufacturing – Coat galvanized and aluminum surfaces with products from the same manufacturer, which are compatible with one another.

For galvanized and aluminum surface coating products, furnish one of the following or approved equal:

- Xymax by Rodda Paint
  12000 SW Garden Place
  Portland, OR 97219
  Telephone: 503-521-4300

- Wasser Advance Coatings Technology
  4118 B Place NW Suite B
  Auburn, WA 98001
  Telephone: 253-850-2967

(b) Coating – The coating for all surfaces to be painted shall consist of one single-component, moisture-cured aliphatic polyurethane.

For galvanized surfaces, provide coatings conforming to the following minimum requirements:

Topcoat - Matte Finish:

Generic type:	Micaceous iron oxide-filled, single-component, moistur aliphatic polyurethane
Vehicle type:	Moisture-cured aliphatic polyurethane
Volume of solids	50% minimum
VOC content:	2.8 lb/gal maximum
Finish:	Matte

Pigment:	Minimum of 3.0 lb/gal of micaceous iron oxide
Color:	As specified

Topcoat - Semi-Gloss Finish:

Generic type:	Single-component, moisture-cured, aliphatic polyurethane
Vehicle type:	Moisture-cured aliphatic polyurethane
Volume of solids:	60% minimum
VOC content:	2.8 lb/gal maximum
Finish:	Semi-Gloss
Color:	As specified

Construction

00937.40 General – Prepare metal sign supports and apply coatings according to Section 00594 and the following:

(a) New Galvanized Surfaces – Before coating, clean new galvanized surfaces with solvent (SSPC-SP1) followed by either a light brush blast (SSPC-SP7), surface etching with a 7% - 10% hydrochloric acid solution, or a vinyl wash material (designed to prepare galvanized surfaces for coating application) to produce a slightly abraded or etched appearance. Ensure that the surface is free of all debris or material resulting from the surface preparation procedures before painting. Take care that all oil, grease or similar contaminants are removed by the initial solvent cleaning before acid etching. If using abrasive blasting, do not destroy the integrity of the galvanized surface. If using vinyl wash, use material compatible with the applied coating.

(b) Weathered Galvanized Surfaces – Lightly brush-blast (SSPC-SP7) existing weathered galvanized surfaces with a light abrasive to remove loose delaminating surface contaminants, corrosion, and other deleterious material. Perform the abrasive blasting in a manner that will properly clean the surface but not destroy the integrity of the galvanizing. Provide an adequate surface to which the coating system can adhere.

(c) All Surfaces – Remove tears, slivers, and other surface defects, sharp edges, and edges hardened or damaged by flame cutting, shearing, or similar operations. Grind all welds smooth.
Clean all surfaces of material detrimental to the application of the coating system as follows:

(1) Cleaning Methods – Use one or any combination of these cleaning methods:

- high-pressure abrasive blasting
- surface etching with a 7% - 10% hydrochloric acid solution
- vinyl wash compatible with coating
- other means approved by the Engineer

Use methods specified in SSPC-SP1 "Solvent Cleaning", SSPC-SP2 "Hand Tool Cleaning", or SSPC-SP3 "Power Tool Cleaning", as necessary to augment primary cleaning procedures.

(2) Abrasives – Perform blast cleaning using an abrasive of a size which does not destroy the integrity of the galvanized surface, but provides an adequate profile for proper adhesion. Remove all materials detrimental to adhesion of the coating system not removed by solvent cleaning.

Use abrasives having no corrosion products, water, oil, or any other material detrimental to the application and adherence of the coatings. Abrasive cleanliness will be tested using ODOT TM 616. Wet abrasives are allowed if wet abrasive blasting methods are used.

(3) Air – For abrasive blasting or blowing down, use high-pressure air that is free of water, oil, or any other material detrimental to the subsequent application of the coating system. Provide adequate separators and traps. The cleanliness of the air will be tested using ODOT TM 618.

(4) Cleaning Procedures – Perform abrasive blasting operations without damaging partially or entirely completed portions of the work. Do not use blast cleaning adjacent to areas being coated.
Examine the prepared surfaces for corrosion, water, oil, grease, or any other material deposited during cleaning operations. Remove any detrimental material by solvent cleaning and reblast or re-etch if necessary.

(5) Final Preparation – Immediately before coating, ensure that the prepared surface is:
Blown down with high-pressure air supplemented by brushing if necessary
Free of all residue
Acceptable to the Engineer

Measurement

00937.80 Measurement – No measurement of quantities will be made for work done under this Section.

Payment

00937.90 Payment – No separate or additional payment will be made for work done under this Section. Payment will be included in payment made for the appropriate sign support items.

End of Section

Section 00940 - Signs

Comply with Section 00940 of the Standard Specifications modified as follows:

00940.03 Drawings - Replace this subsection, except for the subsection number and title, with the following:

Within 30 calendar days after executing of the Contract, submit electronic working drawings for each non-standard sign on the project. Obtain Agency approval prior to fabrication.

00940.46 Inspection – Delete the sentence that begins “The Contractor’s expense…”

00940.80 Measurement –

Add the following paragraph to the end of this subsection:

Double-sided signs will be measured on both faces of the sign.

(Use the following subsection .80 when agency-furnished signs are required.)

Agency-furnished signs will be measured on the unit basis.

(Use the following subsection .90 when agency-furnished signs are required.)

00940.90 Payment - Add the following Pay Item to the Pay Item list:

(g) Signs, Agency Furnished.....Each

Item (g) includes installation of signs furnished by the agency.

End of Section

Section 00950 - Removal of Electrical Systems

Comply with Section 00950 of the Standard Specifications modified as follows:

00950.02 Definitions - Delete this subsection.

(Use the following subsection .41 when removal work is not shown on the contract plan sheets.)

00950.41 Removal and Abandonment - Add the following to the end of this subsection:

[Option 1 - Use the following when NOT all removal Work is shown on contract plan sheets. Only list Work not shown]

This Work consists of removing existing electrical system*(*s*)* as shown. This Work also consists of removing the following existing electrical system*(*s*)*:

Equipment Description	Location

[Option 2 - Use the following when NO removal Work is shown on contract plan sheets.]

This Work consists of removing the following existing electrical system*(*s*)*:

Equipment Description	Location

(Use the following subsection .42 when salvaging and stockpiling removed materials. List materials and stockpile locations.)

00950.42 Salvaging and Stockpiling Materials - Add the following to the end of this subsection:

The following materials will remain the property of the Agency. Salvage the materials and stockpile them at the locations indicated. Contact Engineer to confirm delivery 48 hours prior to delivery.

Materials	Stockpile Locations

End of Section

Section 00960 - Common Provisions for Electrical Systems

(This Section requires SP02560. This Section requires SP02510 if epoxy coated reinforcement is required.)

Comply with Section 00960 of the Standard Specifications modified as follows:

00960.30 Licensed Electricians - Replace the paragraph that begins "According to the Oregon Administrative Rule …" with the following paragraph:

According to the Oregon Administrative Rule 918-282-0120(1), no person or entity shall allow any individual to perform electrical work for which the individual is not properly registered or licensed. Every person who installs electrical systems on the Project shall submit a copy of their electrical license or apprentice registration to the Engineer prior to performing any Work. They must be licensed as an S or a J under Oregon Administrative Rule 918-282.

The conduit system (conduits, junction boxes, and poles bases) for illumination systems is not required to be installed by a licensed electrician.

(Use the following subsection .42(c) when rigid metallic conduit is required.)

Add the following subsection:

00960.42(c) Metallic Conduit – Paint the following with rust-preventative coating:

- Threads on all metal conduit.
- Areas where the coating has been damaged so underlying metal is exposed.
- Exposed, ungalvanized threads resulting from field cuts.

If corrosive Soil conditions exist, coat metallic conduit with a nonmetallic coating or wrap with corrosion protection tape at least 10 mils thick.

(Use the following subsection .42(d) when connecting new conduit to existing conduit is required.)

Add the following subsection:

00960.42(d) Connecting Non-Metallic Conduit to Metallic Conduit - Use a nonmetallic female threaded connector to connect nonmetallic conduit to metallic conduit.

(Use the following subsection .42(e) when installing conduit under railroad tracks is required.)

Add the following subsection:

00960.42(e) Conduit under Railroad Tracks – Install conduit inside a galvanized, rigid metal conduit at the depth required by the governing Railroad company. Construct so that conduit ends are at least 30 feet beyond the centerline of every track or other distance as required by the Railroad.

(Use the following subsection .42(f) when installing conduit on or in a structure is required.)

Add the following subsection:

00960.42(f) Conduit on Structures - Install conduit according to 00583.40.

(Use the following subsection .42(g) when permanent wood poles are required.)

Add the following subsection:

00960.42(g) Conduit on Wood Poles - Mount conduit on wood poles with two-hole, galvanized, steel conduit straps spaced no more than 3 feet apart. Mount conduit on Utility-owned wood poles according to local Utility regulations. Use stand-off brackets if required.

(Use the following subsection .44 when permanent wood poles are required.)

Add the following subsection:

00960.44 Wood Poles - Submit stamped Working Drawings, details, and calculations for the wood pole designs to the Engineer for review according to 00150.35. Satisfy the requirements of 02120.10 and include designs for the wood poles, guy anchors, guy wires, span wires, pole setting depths, and pole bearing.

(Use the following subsection .45(f) when poles or cabinets are mounted to a structure.)

Add the following subsection:

00960.45(f) Structure Mounted Poles and Cabinets – Bond all poles and cabinets mounted on Structures or walls to a common ground rod at the end of the Structure. Ground the system at the first convenient acceptable location off the Structure.

(Use the following subsection .45(g) when permanent wood poles are required.)

Add the following subsection:

00960.45(g) Wood Poles - Bond all metallic conduit, messenger cable, terminal cabinet, and other metallic parts within 10 feet of the ground line.

(Use the following subsection .45(h) when metallic junction boxes and lids are required.)

Add the following subsection:

00960.45(h) Metallic Junction Boxes and Lids - Bond metal junction boxes and lids to form a continuous effectively grounded and bonded system with metallic conduit, grounding wire, metal standards and controller cabinets. Leave enough slack in the bond wire connected to the lid to allow complete removal of the lid. Junction boxes only containing circuits that operate at less than 25 V do not need to be bonded.

00960.46 Service Cabinet and Electrical Energy - Replace this subsection, except for the subsection number and title, with the following:

Install service cabinet and associated equipment, then arrange for the Utility providing power to have the service cabinet inspected and make the electrical hook-up prior to field testing. Field test according to 00990.70(g) for traffic signals, or according to 00970.70 for illumination.

(Fill in the table and add or delete rows as necessary. Obtain information from the Signal or Illumination designer. Delete language in orange parentheses that does not apply and delete all orange parentheses.)

Table 00960-1 contains Utility contact information to arrange for *(*the Utility*) (*Utilities*)* to make electrical hookups:

Table 00960-1

Location	Utility	Utility Contact Person's Name, Email and Phone Number	Utility Job Number

(Use the following paragraph when the electrical power is metered, Standard Practice.)

Furnish and install a meter base approved by the serving Utility (with cover by the Utility), where shown.

(Use the following paragraph when the electrical power is billed using a flat rate with no meter. Verify with the Utility provider, IGA, and Engineer.)

Electrical energy is flat-rated. Meter base is not required.

Electrical energy costs will be billed to the Agency for permanent installations.

End of Section

Section 00962 - Metal Illumination and Traffic Signal Supports

(This Section requires SP02560.)

Comply with Section 00962 of the Standard Specifications modified as follows:

(Use the following subsection .05(a) when standard signal mast arm supports are required.)

00962.05(a) Traffic Signal Mast Arm Supports - Add the following to the end of this subsection:

The following standard signal mast arm pole drawings are prequalified for use on the Project:

Valmont Industries Inc.	Drg. DB00719 page 1, Rev. P, 6/8/18 Drg. DB00719 page 2, Rev. P, 6/8/18 Drg. DB00719 page 3, Rev. P, 6/8/18 Drg. DB00719 page 4, Rev. P, 6/8/18 Drg. DB00719 page 5, Rev. P, 6/8/18 Drg. DB01290 page 1, Rev. D, 9/22/20 Drg. DB01290 page 2, Rev. D, 9/22/20 Drg. DB01290 page 3, Rev. D, 9/22/20 Drg. DB01290 page 4, Rev. D, 9/22/20
Ameron Pole Products Division	Drg. OR13TR10, Rev. E, 8/27/18 Drg. OR13TR11, Rev. F, 8/27/18 Drg. OR13TR12, Rev. G, 8/27/18 Drg. OR13TR13, Rev. C, 8/27/18

(Use the following subsection .05(c) when standard illumination supports are required.)

00962.05(c) Illumination Supports - Replace this subsection, except for the subsection number and title, with the following:

Design non-standard luminaire slip base, fixed base, and high mast poles and foundations according to the *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (2015)*. Design factors include:

Design Wind Velocity.....145 mph
Design Service Wind Velocity.....91 mph

(Use the following subsection .10 to list topcoat colors. Fill in the blanks as instructed and obtain information from the Designer. Copy and repeat the paragraph as needed. Use only basic color names and numbers from the SAE AMS-STD-595 color index.

Example:

For Luminaire Poles 1, 2, 3, 4, 5, provide a topcoat color of Black that matches to SAE AMS-STD-595 color # 17038.)

00962.10 Materials - Add the following to the end of this subsection:

For __*(Structure number or item description)*__, provide a topcoat color of __*(Color Name)*__ that matches SAE AMS-STD-595 color # __*(Color Number)*__.

00962.46(j)(2)(a) Anchor Rods for Signal Supports and Fixed Base Luminaire Supports - Replace the paragraph that begins “Mark the position of each turned element…” with the following paragraph:

Mark position of each anchor rod and an outside ridge of each first nut above the base plate with a felt tip pen or similar marker to verify subsequent nut rotation. Rotate all first nuts above the base plate past snug tight an additional amount shown in 00962.46(j)(2)(d) in two passes. "Cheater" bars or slugging wrenches are allowed if required for large diameter anchor rods. After final tightening of the first nut above the base plate, tighten the second nut to a snug tight condition for assemblies with two nuts above the base plate.

(Use the following subsection .48 to specify coating steel signal and luminaire supports.)

00962.48 Coating - Replace this subsection, except for the subsection number and title, with the following:

Prepare and powder coat supports according to the applicable portions of Section 00593 or prepare and coat supports according to the applicable portions of Section 00594. Provide coating materials for field application, repairing damaged coatings, and coating hardware after installation, according to Section 00593 or 00594. Do not coat:

- Slip plate or arm connection surfaces.
- Slip base bolting hardware.
- Anchor rods, anchor rod washers, and anchor rod nuts.

End of Section

Section 00963 - Signal Support Drilled Shafts

(This Section requires SP02510 if epoxy coated reinforcement is required.)

Comply with Section 00963 of the Standard Specifications modified as follows:

00963.10 Materials - Replace the paragraph that begins "Furnish Commercial Grade Concrete…" with the following paragraph:

Furnish Commercial Grade Concrete meeting the requirements of Section 00440 except provide the mixture with a slump of 8 1/2 inches ± 1 1/2 inches.

End of Section

Section 00970 – Highway Illumination - Replace this section with the following:

Section 00970 - Illumination

(This Section requires SP00960 and SP02926. This Section requires SP00962 when illumination supports are required.)

Description

00970.00 Scope – In addition to requirements of Section 00960, Section 00962, and Section 02926, install illumination according to the following Specifications and the requirements of the ***(***Pacific Power***) or (***Central Electric Cooperative, Inc.***)***.

(Use the following paragraph when Pacific Power is the electrical service provider.)

Pacific Power electrical service requirements can be found at the following link: https://www.pacificpower.net/working-with-us/builders-contractors/electric-service-requirements.html

(Use the following subsection .10 when junction boxes will be provided by the power company. Insert contact information.)

Materials

00970.10 Junction Boxes – Junction boxes will be provided by ***(***Pacific Power***) or (***Central Electric Cooperative, Inc.***)***. Coordinate pickup of junction boxes with ***(insert name and phone number)*** at ***(insert pickup location)*** for ***(insert WO#)*** a minimum of one week prior to installation.

Construction

00970.40 Conduit System – In addition to the requirements of 00960, follow the construction requires of ***(***Pacific Power***) or (***Central Electric Cooperative, Inc.***)***.

00970.42 Grounding and Bonding - In addition to the requirements of 00960.45 and 00962.50, ground and bond metal illumination poles according to the following:

Install 1-inch nonmetallic conduit from the pole base to the concrete and polymer concrete junction box at each pole. Install a ground rod in each junction box and install No. 6 AWG copper ground wire from the ground stud in the pole base to the ground rod in the junction box. The ground rod may be installed in the same junction box that provides illumination circuitry to the pole, if a separate and independent conduit is installed for the ground wire. Bond all metal conduit and metal junction box covers, if used, together to the ground rod.

Maintenance

00970.60 Maintaining Existing and Temporary Illumination Systems - Protect existing illumination systems and approved temporary replacements. Shutdown of a system may be allowed for alterations or final removal, as approved. Lighting system shutdowns shall not interfere with the regular lighting schedule. Notify the Engineer before performing any Work on existing systems.

Determine the exact location of existing conduit runs and pull boxes before using Equipment that may damage such facilities or interfere with any system.

Where Roadways are to remain open to traffic and existing lighting systems are to be modified, keep the existing systems in operation until the final connection to the modified circuit is made. The modified circuit is to be complete and operating by nightfall of the same Day the existing system is disconnected.

Measurement

00970.80 Measurement - The quantities of light pole foundations and trenching and conduit constructed under this Section will be measured according to the following:

- **Each Basis** – Measurement will be by actual count.
- **Length Basis** – Measurement will be along the center of trench. The length of conduit will not be measured.

Payment

00970.90 Payment – The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Pole Foundations	Each
(b) Trenching and Conduit	Foot

Item (a) includes all necessary excavation and/or auguring to installed, cast-in-place or pre-cast pole foundations, or street light sleeves as required by the power company and as shown in the project plans.

Item (b) includes all trenching, installation of conduit, junction boxes, and pull rope required to construct the lighting system as specified.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

00970.91 Electrical Energy Costs - All electrical energy costs for the lighting systems or subsystems will be paid for by the Agency.

End of Section

Section 00990 - Traffic Signals

(This Section requires SP00960 and SP00962. This Section requires SP00902 when crosswalk closure supports are required.)

Comply with Section 00990 of the Standard Specifications modified as follows:

(Use the following lead-in paragraph and subsection .10 only when the "Crosswalk Closure Support" reference in SP00902 has been included or inductive loops are used. Delete material items that do not apply.)

Add the following subsection:

00990.10 Materials - Furnish Materials meeting the following requirements:

Crosswalk Closure Support..... 00902.10
Backer Rod 02440.14

Furnish the following Materials from the QPL:

- Hot-Melt Loop Sealant

Add the following subsection:

00990.13 Solar Powered Flashing Beacon System - Furnish a flashing beacon system with a timer switch and cellular modem powered by a minimum 50W solar panel with battery backup capable of connecting to the City's Glance Management software. Furnish a solar powered flashing beacon systems from one of the following suppliers, or approved equal:

- Carmanah Technologies Corp.
  Telephone: 1-844-412-8395

- JSF Technologies, Inc.
  Telephone: 1-800-990-2454

(Use the following lead-in paragraph and subsection .40 when there is work at an existing controller cabinet.)

Add the following subsection:

00990.40 Work in Existing Controller Cabinets - Install new field wiring as shown into the existing controller cabinet without terminating.

New control equipment installed as shown in an existing controller cabinet will be tested prior to installation according to 00990.70.

At existing controller cabinets, including existing temporary controller cabinets already in service, the Agency will be responsible for:

- Storage, delivery, installation, and activation of new control equipment

- Any required modifications to existing control equipment or existing field wiring terminations
- Terminating new field wiring

Prior to the anticipated installation of new control equipment, modification of existing control equipment, or modification of existing field wiring terminations, schedule field testing according to 00990.70(g). Field testing and activation of the new control equipment or modifications will occur within the same work shift. Be present at the Project Site during field testing.

(Use the following lead-in paragraph and subsection .41 when inductive loops are used.)

Add the following subsection:

00990.41 Inductive Loop Detectors:

(a) General - Do not begin saw cutting until the loop layout has been inspected by the Engineer.

Do not place wire in saw cuts until the cuts have been inspected by the Engineer.

(b) Saw Cut and Wire Installation - Saw cut in a manner that is the most practicable, direct line between loops and junction boxes.

Immediately after saw cutting and before the cuttings dry, thoroughly flush each cut with a high-pressure water stream. Before the cuts dry, blow cuts free of water, debris, rock, and grit with compressed air. Slots may also be cleaned by means of a high-pressure water injection/vacuum extraction system. Remove rocks or other material that may be wedged in the cut. Remove and dispose of all cuttings according to 00290.20.

Dry cuts before placing wire.

After the saw cut is cleaned of debris, place the loop wire by pushing it into the slot with a blunt nonmetallic object. Use care to avoid damaging the insulation.

(c) Sealant - Install the sealant in slots according to the manufacturer's instructions. Furnish a copy of the manufacturer's specifications including application procedures. The Engineer may order a test run of any application method or material before filling saw cuts.

In order to prevent heat damage to the insulation, do not allow the temperature of the sealant to exceed 410 °F during application. Install hot-melt sealants in layers to prevent damage to wire insulation. Allow each layer to cool before the next layer is installed. Do not use water to accelerate cooling.

Sealants that crack or pull away from the saw cuts after curing will be rejected.

(d) Resistance and Continuity Testing - The resistance to ground of the loop and loop feeder combinations, shall be 500 MΩ or greater when checked at the following conditions:

- Before splicing and sealing - continuity test
- Before splicing after sealing - resistance test
- After splicing and sealing - resistance test

Furnish a report of the resistance and continuity results for each loop at each testing condition.

(Use the following lead-in paragraph and subsection .42(b) when inductive loops are used.)

Add the following subsection:

00990.42(b) Loop Feeder Cables – When terminating loop feeder cable inside the controller cabinet, do not remove the outside jacket and shield more than 6 inches from the end of the cable. Crimp lugs used for loop wire field terminals may be insulated or non-insulated. Terminate loop feeder shield drain wire to the cabinet input panel grounding bus nearest the feeder wire termination point.

00990.90 Payment - Delete Pay Item (c) from the pay item list.

Delete the paragraph that begins “Item (c) includes furnishing and installing…”

Replace the paragraph that begins “In Items (a), (b), (c), (d), (f) …” with the following paragraph:

In Items (a), (b), (d), (f) and (g), the intersection location will be inserted in the blank.

Replace the paragraph that begins “Item (b) includes furnishing and replacing…” with the following paragraph:

Item (b) includes furnishing and replacing or installing items for an existing traffic signal installation and the detection system.

Replace the paragraph that begins "Mast arm pole and strain pole foundations …" with the following paragraph:

Drilled shaft foundations for traffic signal 15 foot through 55 foot mast arm supports will be paid for according to 00963.90. Drilled shaft foundations for traffic signal 60 foot through 75 foot mast arm supports will be paid for according to 00921.90.

(Use the following paragraph and bullet when installing conduit on or in a structure)

In the paragraph that begins “No separate or additional payment will be…”, add the following bullet to the bullet list:

- Conduit installed according to 00960.42(f)

(Use the following paragraph when crosswalk closure supports are required.)

Crosswalk closure supports will be paid for according to 00902.90.

End of Section

SP01000 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 01000 – RIGHT OF WAY DEVELOPMENT AND CONTROL

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 01012 - Stormwater Control, Water Quality Biofiltration Swale

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

(This Section requires SP00842 and SP01030.)

Section 01012, which is not a Standard Specification, is included for this Project by Special Provision.

Description

01012.00 Scope - This Work consists of furnishing and installing a water quality biofiltration swale as shown.

Materials

(Delete material items that do not apply and include other materials as necessary.)

01012.10 Materials - Furnish Material meeting the following requirements:

Check Dam, Type 2 ..... 00280.15(a)
Concrete 00440
Drainage Geotextile, Type 1..... 02320
Facility Field Markers 00842.10
Drain Rock ..... 00470.18(a)
Manholes, Catch Basins, and Inlets 00470.11
Slope and Channel Liner Matting ..... 00280.14(e)
Riprap 00390.11
Riprap Geotextile, Type 1 02320
Storm Sewer Pipe 00445.11
Subsurface Drain Pipe 00430.10

01012.11 Amended Topsoil - Furnish amended topsoil in accordance with Section 01040.14(d).

01012.12 Pea Gravel - Furnish pea gravel meeting the following gradation requirements:

Sieve Size	Percent Passing (by Weight)

½”	100
3/8”	85-100
No. 4	10-30
No 8	0-10
No. 16	0-5

Construction

01012.40 General - Construct water quality biofiltration swale facility as shown. Perform excavation, fine grading, and placement work only when the facility area is dry and only from the top of the swale area. Do not stockpile excavated material in the facility area. Scarify the subsoil area a minimum 12 inches deep. Place the amended topsoil in maximum 12-inch Lifts. Compact each Lift with a water filled landscape roller.

Maintenance

01012.70 Cleaning - If a stormwater control facility is used for erosion and sediment control, remove all accumulated sediment and debris before completing the facility.

01012.71 Removal - Remove temporary erosion and sediment control features according to 00280.70 only after water quality vegetation has met the establishment requirements of 01030.60.

01012.71 Infiltration Testing – Test the infiltration rate of the water quality swale following excavation but prior to installation of materials shown in City of Bend standard drawing STRM-2. Provide infiltration rate to Engineering within 24-hours of the test. Perform infiltration testing per the following:

(a) Water Testing Volume – Swales and ponds are to be flood tested with the 6-month storm design volume, loaded within 1 hour and fully infiltrated in 24 hours (below visible surface). The swale is required to take the entire volume within the 1 hour period without overflowing.

(b) Infiltration Rates – Infiltration shall be permitted to offset storage design but limited to the lower limit of the published rate of the National Resource Conservation Services (NRCS) soil surveys, unless supported with location specific field testing to use up to, but not exceeding the upper limit.

(c) Infiltration Surface – Includes the floor area or horizontal infiltration area.

(d) Alternate Test – If the initial test fails, or there is concern the swale will not infiltrate in the required 24 hours, the facility may be initially designed or enlarged to contain the volume of two consecutive 50-year storms in a two-hour period (double design). 24-hour drainage compliance will be waived if the facility contains the double design volume without overflowing. If infiltration is included in determination of the design volume, recalculation is required for storage volume based on the measured infiltration rate to ensure the double volume is provided.

Measurement

01012.80 Measurement - No measurement of quantities will be made for Work performed under this Section. The estimated quantities of Materials are:

(Identify swales by the Water Quality Swale (WSQ) number. List each WQS separately. Obtain the WQS #, the items, and the quantities from the Designer. Fill in all the required blanks. Delete items that do not apply. Copy and paste for multiple facilities. Include excavation quantity only when the swale excavation is not part of the Roadway typical section.)

Water Quality Swale __(WQS)__ Quantities:

Item	Quantity
Excavation	____ Cu. Yd.
Drainage Geotextile, Type 1	____ Sq. Yd.
Riprap Geotextile, Type 1	____ Sq. Yd.
Loose Riprap, Class ____	____ Cu. Yd.
Drain Rock	____ Cu. Yd.
Amended Topsoil	____ Cu. Yd.
Ditch Inlet, Type D	____ Each
Concrete Storm Sewer Manhole (Flow Splitter)	____ Each
____ Inch Storm Sewer Pipe	____ Foot
____ Inch Subsurface Drain Pipe	____ Foot
Plastic Board Flow Spreader	____ Foot
Matting, Type ___	___ Sq. Yd.
Check Dam, Type 2	____ Each
Concrete Basin Flow Spreader	____ Each
Rock Basin Flow Spreader with Stone Embankment	____ Cu. Yd.
Rock Basin Flow Spreader with Riprap	____ Cu. Yd.
Porous Pavers	____ Sq. Ft.

Payment

01012.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract lump sum amount for the item "Water Quality Swale, _____".

The drainage facility identification number will be inserted in the blank.

(Use the following paragraph when the swale excavation is included in the Roadway excavation quantity.)

Excavation will be paid according to 00330.90.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

End of Section

Section 01030 - Seeding

(This Section requires SP01040 when soil testing or planting area preparation is required.)

Comply with Section 01030 of the Standard Specifications modified as follows:

01030.13(a) Label - Add the following to the end of this subsection:

Provide alternate labeling for native plant seeds as follows:

Provide the following seed mix formulas:

- **_____ Seeding:**

Botanical Name (Common Name)	**PLS + (% Purity x % Germination) = Amount (lb/acre)**	**(minimum)**	**(minimum)**	**(lb/acre)**
_____ (_____)	_____	_____	_____	_____
_____ (_____)	_____	_____	_____	_____
_____ (_____)	_____	_____	_____	_____
_____ (_____)	_____	_____	_____	_____
_____ (_____)	_____	_____	_____	_____

* Oregon Certified Seed

01030.13(f) Types of Seed Mixes - Add the following to the end of this subsection:

Provide the following seed mixes, or approved equal:

A. Grass seed mixture for areas “Disturbed by Construction”:

Species	Common Name	Percent by Seed Count
Festuca ovina	Creeping Red Fescue	30%
Pesudoregneria spicata	Blue Bunch Wheatgrass	25%
Festuca idahoensis	Idaho Fescue	15%
Achnatherum hymenoides	Indian Ricegrass	10%
Poa secunda ssp. Canbyi	Canby, OR Sandburg Bluegrass	10%
Elymus elymoides	Bottlebrush Squirreltail	5%
Linum lewisii	Blue Flax	5%

Application rate: 4 lbs. /1,000 square feet or approved equal.

* Oregon Certified Seed

B. Seed Mix for Water Quality Swales:

Species	Common Name	Percent by Seed Count
Hordeum brachyantherum	Meadow Barley	25%
Danthonia callifornica	California Oatgrass	15%
Elymus glaucus	Blue Wildrye	10%
Bromus carinatus	California Brome	10%
Festuca roemeri	Roemer's Fescue	10%
Deschampsia cespitosa	Tufted Hairgrass	10%
Agrostis exarata	Spike Bentgrass	10%
Alopecurus geniculatus	Water Foxtail	5%
Deschamsia elongate	Sender Hairgrass	5%

Application rate: 4 lbs. /1,000 square feet or approved equal.

C. Lawn Seed (Turf Areas):

Turf Type Tall Fescue, a minimum of three blends; 8 lb/1,000 sq. ft.

01030.13(g) Availability - Add the following sentence to the end of this subsection:

Submit the seed and seed mixes to be used on the project according to 00150.37.

01030.14(b)(2) East of the Cascades – Add the following sentence to the end of this subsection:

Within wellhead protection areas, applications should only be performed when a soil test confirms a need, and if need is determined, limit the nitrogen application rate to 30 pounds per acre.

01030.14(b)(3) Statewide, Near Water – Add the following paragraph to the end of this subsection:

Applications within 50 feet of open water should only be performed when a soil test confirms a need. Given that the Deschutes River is nitrogen-limited, limit the nitrogen application rate to 30 pounds per acre within subbasins in the City's MS4 area or directly adjacent to the Deschutes River.

(Use the following subsection .15 and bullet(s) to specify other types of mulch not listed in the Standard Specifications, or when hydromulch may be used for temporary erosion control seeding. Delete "(s)" or parentheses as applicable, such as composted yard debris. Use the generic name for the mulch and include Specifications, or cite the ODOT QPL if applicable. Obtain information from the Erosion Control Designer.)

01030.15 Mulch - Add the following paragraph*(*s*)* and bullets to the end of this subsection:

Use the following paragraph and bullet(s) to specify other types of mulch not listed in the Standard Specifications, such as composted yard debris. Use the generic name for the mulch and include Specifications, or cite the ODOT QPL if applicable. Obtain information from the Erosion Control Designer.)

Furnish mulch for seeding according to the following:

•

(Use the following paragraph and bullets when hydromulch may be used for temporary erosion control seeding. Obtain the Erosion Control Designer's approval before using.)

Furnish straw mulch for all temporary roadside erosion control seeding, except hydromulch may be used under the following conditions:

- Slopes are steeper than 1V to 2H and longer than 16 feet.
- Residential or commercial sites with low erosion potential such as sidewalk, median, or parking lot planter strips.

Projects that have variable slopes may include straw mulch and hydromulch when approved.

(Use the following subsection .42 to list Specified Weeds and plant species to be removed. Obtain list from the Erosion Control Designer.)

01030.42 Weed Control - Add the following paragraph and bullets after the paragraph that begins "If a pesticide has been approved for…" and before subsection (a):

The Specified Weeds and plant species to be removed include noxious weeds identified on the Deschutes County weed list.

Add the following subsection:

01030.43(c) Seed Application

- Place seed at a rate to provide 80-90% coverage over the disturbed area.
- For immediate germination, application shall occur when the ground is not frozen, preferably when temperatures are between 75 and 85 degrees from daytime high. Hydroseeding should not occur on snow unless approved by the City Engineer.
- Hydroseed shall be a Bonded Fiber Matrices (BFM) containing tackifier with seed and fertilizer. Install to manufacturer's specifications or to a minimum 2,000 pounds per acre on slopes flatter than 2H:1V, 3,000 pounds per acre on 2H:1V slopes or steeper, whichever is most stringent.
- Prior to hydroseed placement:
    - Track-walk the full extent of the slope
    - Install erosion control matting/blankets, fiber rolls/waddles, or other erosion control method per manufacturer's recommendations.

(Use the following subsection .60 when the "Plant Seeding, ____" or "Native Plant Seeding, ____" Pay Items are included in the Schedule of Items. Delete "(s)" or the parentheses as applicable.)

01030.60 General - Add the following sentence*(*s*)* after the last bullet:

(Use the following paragraph when the "Plant Seeding, ____" pay item is included in the Schedule of Items. Obtain information from the Erosion Control Designer and fill in the blank.)

The minimum living plant coverage for woody or other plant seeding is ____ percent of ground surface.

(Use the following paragraph when the "Native Plant Seeding, ____" Pay Item is included in the Schedule of Items. Obtain information from the Erosion Control Designer and fill in the blank. Minimum 75 percent)

The minimum living plant coverage for native plant seeding is ____ percent of ground surface.

End of Section

Section 01040 - Planting

Comply with Section 01040 of the Standard Specifications modified as follows:

(Use the following subsection .02 when weed control is required.)

01040.02 Definitions - Add the following definition:

Weed Free - See 01030.02 for weed free definition

01040.04(a) Planting Work Plan –

Replace the bullet that begins “Contract Growing Plan…” with the following:

- Contract Growing Plan or securing plants documents according to 01040.19(g)

Replace the bullet that begins “Plant installation and establishment” with the following:

- Plant installation and establishment plan including a maintenance schedule for weeding, watering, pruning (no shearing), pest treatment, replacement of failing plants, raking, and mulching to establish plant health

Add the following subsection:

01040.14(d) Amended Topsoil – Furnish thoroughly blended topsoil with the following constituents:

- 50-60% clean sand
- 20-30% weed-free topsoil
- 5-20% certified compost and/or peat

(Use the following subsection .19(g) when a contract growing agreement is required.)

01040.19(g) Contract Growing Plant Materials - Add the following sentence to the end of this subsection:

This Project requires a contract growing agreement.

(Use the following subsection .48 when weed control is required.)

01040.48 Planting Area Preparation - Replace the sentence that begins ”Identify, kill, and remove…” with the following sentence:

Identify, kill, and remove Weeds according to 01030.62(b)(3).

(Use the following subsection .71 to include minimum watering frequencies for trees and shrubs. Obtain information from the Designer. Delete what does not apply.)

01040.71 Plant Care and Success Criteria - Add the following to the end of this subsection:

The following watering frequencies are required:

- Deciduous trees that are 1 1/2 inch and larger, water at a frequency of _____.
- Conifer trees that are over 4 feet tall, water at a frequency of _____.
- All shrubs, water at a frequency of _____.

(Use the following subsection .77(d) when sod lawn is required. Obtain the schedule from the Designer.)

01040.77(d) Sod Lawn - Add the following to the end of this subsection:

Provide sod lawn feeding, mowing, and general treatment as follows:

-

End of Section

Section 01050 - Fences

Comply with Section 01050 of the Standard Specifications.

End of Section

Section 01069 - Metal Handrail and Pedestrian Fence

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

(This Section requires SP00593, SP02830, and SP02831.)

Section 01069, which is not a Standard Specification, is included in this Project by Special Provision.

Description

01069.00 Scope - This Work consists of furnishing and installing metal handrails and pedestrian rail units as shown or directed.

Materials

01069.10 Materials - Furnish Materials meeting the following requirements:

Commercial Grade Concrete	00440
Metal Handrail	02830
Pedestrian Fence	02831

Construction

01069.40 Metal Handrail and Pedestrian Fence:

(a) Handrail Fabricate and install imbedded and bolted down metal handrail as shown.

(b) Pedestrian Fence - Fabricate and install pedestrian fence units as shown.

01069.41 Welding - Welding, welder qualifications, prequalification of weld details and inspection of welds shall conform to AWS D1.1 or AWS D1.2. Submit all welding procedure specifications 7 Days prior to fabrication to the Engineer for approval.

01069.42 Concrete Footings - Dimensions of footings shall not be less than shown and shall fill the excavated areas. Place the concrete with contact against firm Soil at the sides and bottom and tamp around the posts and brace ends after the posts and braces have been brought to and firmly held in proper position. Strike off, slope or crown and smooth the surface of the concrete at the ground level to shed water. Allow to cure for at least 5 Calendar Days before subjecting the posts to strain.

Excavate for concrete footings to reasonably Neat Lines, but not less than the specified dimensions in Soil, or not less than 18 inches deep in Rock. Prevent disturbance of original ground at the sides and bottom of the excavation.

Dispose of Materials removed under these provisions, including excess excavation, in a satisfactory manner.

01069.43 Bolt Holes:

(a) Punched Holes - Use a die with a diameter not exceeding the diameter of the punch by more than 1/16 inch. Ream holes that are required to be enlarged to admit the anchor bolts. Make clean cut holes without torn or ragged edges.

(b) Accuracy of Punched Holes - After punching the holes in the plate, stack the plates with the edges even and insert a cylindrical pin, 1/8 inch smaller in diameter than the nominal size of the punched hole, through the punched holes perpendicular to the face of the plate. No drifting of the rod while passing through each of the punched holes in the stack is allowed. Ensure that the edges of the stack stay in alignment. Non-conforming pieces will be rejected.

Measurement

01069.80 Measurement - The quantities of Work performed under this Section will be measured according to the following:

- **Length Basis** - Metal handrail will be measured on the length basis, by measuring along the top rail member, from center of end post to center of end post.

- **Unit Basis** - Pedestrian fence will be measured on the unit basis. Pedestrian fence will be counted for each 62 inch long unit.

Payment

01069.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Metal Handrail, _____ Rails	Foot
(b) Pedestrian Fence	Each

In item (a), the number of rails will be inserted in the blank.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

End of Section

Section 01070 - Mailbox Supports

(This Section requires SP02510 if epoxy coated reinforcement is required.)

(Use the following lead-in paragraph when none of the following subsections are included in the project.)

Comply with Section 01070 of the Standard Specifications.

(Use the following lead-in paragraph when any of the following subsections are included in the project.)

Comply with Section 01070 of the Standard Specifications modified as follows:

(Use the following subsections .00, .80, and .90 when existing mailbox supports are reused. Use only when the existing mailbox supports, brackets, hardware, and post sockets are crash worthy and meet current standards. Check with the Designer.)

01070.00 Scope - Add the following paragraph to the end of this subsection:

This Work includes removing, maintaining, and reinstalling existing mailboxes and existing supports.

01070.80 Measurement - Add the following paragraph to the end of this subsection:

The quantities of mailboxes and supports removed, maintained, and reinstalled will be measured on the unit basis, regardless of type, installed in permanent locations.

01070.90 Payment - Add the following Pay Item to the Pay Item list:

(d) Remove and Reinstall Mailbox Supports ..... Each

Item (d) includes removing mailboxes and supports, maintaining them at temporary locations, and reinstalling them at their permanent locations.

End of Section

SP01100 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 01100 – WATER SUPPLY SYSTEMS

Section 01120 – Irrigation Systems

Comply with Section 01120 of the Standard Specifications modified as follows:

01120.01 Qualifications – Replace this subsection with the following:

01120.01 Contractor Requirements - Contractors are required to be properly certified in the installation of automatic irrigation equipment and/or be able to demonstrate the knowledge, skills, and ability to work with the City of Bend, subcontractors, and/or vendors in order to properly install smart irrigation equipment. An independent outside consultant may be hired by the Contractor to fulfill the requirement.

Add the following subsection:

01120.02 References - Always reference the latest version of the following information:

(a) American Society for Testing and Materials

- ASTM D 2241-89: Poly Vinyl Chloride (PVC) Pressure - Rated Pipe (SDR –PR)
- ASTM D 2464-89: Threaded (PVC) Plastic Pipe Fittings, Schedule 40
- ASTM A 5: Steel Pipe and Tubing
- ASTM D 2564-89: Solvent Cements for PVC Plastic Pipe and Fittings
- ASTM D 2774-72: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping (R 1983)
- ASTM D 2855-83: Standard Practice for Making Solvent-Cemented Joints PVC Pipe and Fittings

(b) American Water Works Association

- AWWA C 800-84: Underground Service Line Valves and Fittings with Appendix on Collected Standards for Service Line Materials.

(c) National Electrical Manufacturers Association

- NEMA 250-85 : Enclosures for Electrical Equipment (1000 Volts Maximum) (R1-1986, R-2-1988)

(d) Underwriters' Laboratories, Inc.

- UL 651-89: Schedule 40 and 80 Rigid PVC Conduit

(e) International Assoc. of Plumbing and Mechanical Officials

- UPC-1988 Uniform Plumbing Code

01120.10 General – Add the following before the sentence that begins "Furnish only commercial…":

To facilitate standardization, the City of Bend requires Rain Bird products or the equivalent and/or smart compatible irrigation equipment, installation, and components. Submit alternate products for approval by the City of Bend before installation.

Add the following subsection:

01120.11(d)(3) Swing Joint Riser – PVC ST Ells (Marlex) - 6504 /5004 Installations (3). The swing arm assembly shall be three PVC ST Ells (Marlex) designed to rotate in all directions, as shown on drawings. The nipple length shall be 10 inches.

a. Swing Pipe Tubing - 1800 spray head and 1300 bubbler installation only:
The swing pipe shall be flexible black tubing constructed of virgin linear low-density polyethylene material. The tubing shall have a wall thickness of 0.090 inch It shall have an inside diameter of 0.0490 inch for use with SB Series spiral barb fittings without the necessity of glue or clamps. The model number and logo shall be printed at 12-inch intervals along the length of the tubing. Each 18-inch length of tubing shall be capable of pressure testing at the rate of 100 pounds per square inch (psi) per second to a minimum burst pressure of 475 psi. The tubing shall have an operating pressure rating of 80 psi at 110 degrees F. See standard detail drawing.

Add the following subsection:

01120.11(e) Conduit for Control Systems - Conduit shall be Schedule 40, rigid polyvinyl chloride conduit, meeting the requirements of UL 651. Condulets shall be PVC. Size as required.

01120.12 Automatic Controllers –

Flow Sensor - Add the following to end of definition:

Flow sensor shall be FS-100P, FS-150P, FS-200P, FS-300P, FS-400P, or approved equal. Size as required.

Pulse Decoder: - Add the following to end of definition:

Pulse decoder shall be DEC-PUL as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California.

Add the following definitions:

Freeze Clicks – Used on spray and rotor zones where there is a potential of applying water on to any hard surface in freezing temperatures. In most installations, the sensor acts as a switch to break the circuit to the solenoid valves of the irrigation system when temperatures approach freezing. This allows the timer to advance as scheduled but stops the valves from activating. Once temperature periods are above 37°F, the switch closes, allowing normal operation.

Flow Meter – Model PT #1502 wall mount in NEMA cabinet, as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California.

Add the following subsection:

(a) Automatic Irrigation Controllers
The controller shall be weather-based ET controller, with a built-in scheduling engine. The irrigation controller shall be a hybrid type that combines electro-mechanical and microprocessor-based circuitry capable of both fully automatic and manual operation. The ET controller will be approved by The City of Bend and have the following minimum specifications:

(1) Hardware - The Controller shall be UL-listed and have a minimum 3-year warranty.

(2) Weather Data

- Weather data shall be provided for local area at a resolution of 1 square kilometer or better.
- Weather data shall use data from local Bend weather stations to determine weather conditions for each controller.
- Weather data shall be delivered daily and wirelessly to each controller from a local or onsite weather sensor to calculate accurate ET.
- The communication system shall be able to detect if weather data is received by the controller and engage a backup process to re-send weather data as needed
- The controller shall have the capability to be compatible with any controller-associated weather data sensors and equipment such as “Freeze Clicks,” soil moisture sensors, flow sensors and other weather or water conservation-related data collectors and sensors.

(3) Controller Programming

- Controller shall have station-/zone-specific scheduling capability
- Controller shall include a scheduling engine that uses plant, soil, slope, sprinkler precipitation rate and sun exposure settings to automatically calculate a daily irrigation schedule.
- Controller shall use a maximum allowable depletion (MAD) model FOR EACH ZONE to determine watering days and ‘skip’ (non-watering) option days.
- MAD shall be able to be custom programmed by user or automatically generated by controller.
- Controller shall provide ‘water rationing’ that assures each zone gets a rationed minimal amount of water, if a defined ‘water window’ is insufficient to allow watering to be completed to all zones. Controller shall automatically create cycle and soak sequences for user, based on soil and slope settings.
- Controller shall have the ability to be % (percent) adjusted plus (+) or minus (–) per each station. Controller shall have the ability to run multiple programs at the same time (overlap).
- Controller shall calculate and allow for run times at a resolution of 10-second intervals or smaller.
- Controller shall allow for two programs using set day pattern assignments, including day of week and odd /even day interval. Controller shall allow ET mode to be ON or OFF by station.
- Controller shall have a ‘Rain Pause’ feature that allows a pause for up to 100 days.
- Controller shall be capable of being operated manually at any time.

- Controller shall have an internal non-volatile memory that will retain the irrigation schedule for a minimum of 10 years without power. A 9 VDC rechargeable battery and recharging circuit shall be included for counting down the program-in-progress during a power outage and shall allow programming of the controller when it is disconnected from the main power supply.

(4) History

- Controller shall be approved by The Irrigation Association's SWAT, (Smart Watering Advanced Technology) Testing Protocol of 100% efficiency and 0% runoff.
- SWAT protocol test results must include actual method of sending/receiving ET to the controller, in the manner being deployed in the field, as part of test results
- Controller shall have a minimum of five public agency studies proving quantified water savings and dry weather runoff reduction.

01120.17(h)(2) Automatic Control Valves – Add the following to the subsections:

a. Remote Control Valves – 100-PE-B, 150-PE-B, 200-PE-B-By Rain Bird Sprinkler Mfg. Corporation, Glendora, California. Provide a scrubber valve (PE-S) for applications where the water supply is not from a potable water source (i.e., dedicated irrigation wells or from surface supplies such as canals) for the 1-inch, 1-½-inch, and 2-inch electric remote control plastic valves.

b. Valve Tags – Each valve shall be number-tagged (Rain Bird Part No. VID1Y24 or brand and part number corresponding to approved equal.)

01120.18 Valve Boxes and Valve Protective Sleeves – Add the following to the end of the subsection:

(a) Carson Box Model 1730 – for Bermad, Kennedy, or double check valves. These shall be one-piece plastic with fiber-reinforced plastic cover. Provide brick supports, one (1) under each corner of the box.

(b) AMTEK 12STD PLS – for Remote Control Valves or Manual Valves. These shall be one-piece plastic, 11 x 17-inch, with fiber-reinforced plastic cover, marked with "IRRIGATION." Provide brick supports, one (1) under each corner of box.

Add the following subsection:

01120.22 Sprinklers:

(a) 6504 Full or Part Circle Pop-Up Rotor – Falcon 6504 by Rain Bird Sprinkler Mfg. Corp., I-25 by Hunter Industries, or approved equal. The sprinkler shall have the following:

- The sprinkler shall have a screen attached to the drive housing to filter inlet water, protect the drive from clogging, and simplify its removal for cleaning and flushing the system.
- The sprinkler body shall have a double-wall construction 1-inch Female National Pipe Thread (FNPT) bottom inlet.

- The sprinkler shall have a standard rubber cover that designates the full circle sprinkler from the top, as well as designates each adjustment opening from the top.
- The sprinkler shall have a factory-installed nozzle as specified on the drawings.
- The angle of trajectory shall be 25 degrees from the horizontal.

(b) 5004-PC SAM 5004-FC-SAM Full or Part Circle Pop-up Rotor – 5004-PC SAM 5004-FC-SAM by Rain Bird Sprinkler Mfg. Corp., PGP Ultra by Hunter Industries, or approved equal. The sprinkler shall have the following:

- Must have internal pressure regulation R-series
- Arc adjustment from the top
- Water-lubricated gear drive design
- Standard rubber cover
- 40-360 degree arc rotation and reversing full circle rotation
- Standard angle nozzle providing 23 to 40 feet distance of throw
- Radius adjustment screw allows 25% radius reduction without changing nozzle
- 4-inch pop-up
- Additional o-rings and seals for extra protection in “gritty” water
- 3/4-inch NPT female bottom-threaded inlet
- Seal-A-Matic pressure regulating check valve option included
- Nozzle as shown on drawing

(c) 1804-SAM-PRS, 1806-SAM-PRS, 1812 SAM-PRS spray heads – 1804-SAM-PRS, 1806-SAM-PRS, 1812 SAM-PRS by Rain Bird Sprinkler Mfg. Corp., Pro-Spray PRS40 by Hunter Industries, or approved equal. The sprinkler shall have the following:

- Seal-A-Matic pressure regulating pop-up spray sprinkler: 4-inch, 6-inch, or 12-inch pop-up spray shall be used when indicated on the design
- Sprinklers shall have a Seal-A-Matic check valve and a pressure-regulating device. These units shall be identifiable from the top with SAM-PRS markings on the cap.
- 4-inch and 6-inch pop-up spray shall use the bottom inlet
- Pro-Spray PRS 40 shall only be used with Rain Bird PRS 45 bodies. The PRS 40 spray head shall not be mixed with Rain Bird PRS 30 bodies.

(d) MP1000, MP2000, and MP3000 – MP Rotator Adjustable arc, adjustable radius matched precipitation rate sprinkler – By Walla Walla Sprinkler Company, a subsidiary of Nelson Irrigation Corporation, Walla Walla, Washington, or approved equal. The sprinkler shall have the following:

- The sprinkler shall be the viscous fluid brake rotary type and produce multiple rotating streams.
- The sprinkler shall produce and maintain a matched precipitation rate no greater than 0.6 inch per hour throughout the arc adjustment range and radius adjustment range (up to 25% of radius reduction) when spaced at 50% wetted diameter.
- The part circle sprinkler shall have an infinitely adjustable arc between 90 and 210 degrees or between 210 and 270 degrees, depending on the model selected. The full circle sprinkler shall irrigate a full 360 degrees.
- Full or part circle sprinklers shall be capable of up to 25% radius reduction using a stainless steel radius adjustment screw on top of the nozzle. The radius reduction screw shall have a slip clutch mechanism to prevent internal damage if

turned past the minimum or maximum radius settings. The radius reduction screw shall reduce the pressure and flow upstream of the nozzle, thereby maintaining stream integrity.

- Part circle sprinklers shall have arc adjustment capabilities using a stainless steel ring at the top edge of the nozzle. The adjustment ring should be effective only while the sprinkler is popped up and ineffective while the sprinkler is not popped up. When turned past the minimum or maximum arc limits, the adjustment mechanism shall have a slip clutch action to prevent internal damage. This same slip clutch shall allow the orientation of the fixed edge of the variable arc when installed on a fixed riser or in a pop-up body. This is independent of and in addition to any ratchet that may exist in a pop-up body.
- The sprinkler shall have a pop-up that occurs at approximately 15 psi of water pressure. Upon cessation of water pressure, the sprinkler shall pop down. When installed in a pop-up body, the sprinkler pop-up shall occur after the pop-up of the body stem. Upon decreasing pressure, the sprinkler pop- down shall occur before the pop-down of the body stem.
- The sprinkler nozzle orifice shall be manufactured from urethane material for durability. The sprinkler shall be fitted with a detachable filter stem.
- Sprinkler assembly models MP1000, MP2000, and MP3000 shall be able to be installed in pop-up spray head bodies having a 5/8-27 UNS male threaded stem (Rain Bird) and nominal pop-up heights of 2”, 3”, 4”, 6”, or 12”. Sprinkler assembly shall also be able to be attached to a ½ FIPT x 5/8-27 UNS male threaded adapter (Rain Bird) for use on fixed pipe risers. Models MP1000T, MP2000T, and MP3000T shall be able to be installed in pop-up sprayhead bodies having a 5/8-28 UNS female threaded stem (Toro) and nominal pop-up heights of 2”, 3”, 4”, 6”, or 12.” Sprinkler assembly shall also be able to be attached to a ½ FIPT x 5/8-28 UNS female threaded adapter (Toro) for use on fixed pipe risers.(e) PA-80 Plastic Adapter – The plastic adapter shall have a ½-inch Male National Pipe Thread (MNPT) outlet and a fine threaded female inlet that will accept an 1800 pop-up stem, thus adapting the 1800 Series sprinkler for use with various ½-inch FNPT sprinklers and nozzles.

Add the following subsection:

01120.23 Double Check Backflow Prevention Assemblies – Install Watts 007 Series or approved equal on all new systems. Size as required. Permanent test fittings with threaded protective caps to keep out debris shall be installed.

Add the following subsection:

01120.40(a)(3) Blowouts – Install a blowout connection point to facilitate winterization by the use of compressed air on all electric solenoid controlled underground irrigation systems. The entire system shall be manually drainable. Install blow out fittings after the Double Check Valve assembly. The end point of each underground mainline circuit 4 inches or larger shall be equipped with a 4-inch x 2-inch mechanical tap cap, 2-inch x 36-inch galvanized nipple, 90 degree fitting, and a brass ball valve. The valve shall be installed with a valve box. See typical drawings for installation details.

01120.43 Piping – Add the following paragraphs to the end of the subsection:

Provide for thermal movement of components in the system. Use threaded nipples for risers to each sprinkler to facilitate easy replacement. Use swing joint riser or swing pipe as specified.

Concrete thrust blocks shall be provided at changes in direction of mainline piping and at the end of mainline piping with the bearing surface against undisturbed soil normal to the direction of the thrust on pipes 3 inches or greater in diameter.

01120.44(c) PVC Pipe – Replace this subsection, except for the subsection number and title, with the following:

All pipe joints shall be solvent welded and made according to ASTM D 2855-83 Standard Practice for Making Solvent-Cemented Joints with PVC Pipe and Fittings. Solvent welded joints shall be installed by workers qualified and experienced in the joining of PVC pipe and materials. Threaded joints shall be made with polytetrafluoroethylene sealant. Mechanical joints shall be installed on pipe larger than 3 inches in diameter. Irrigation valves on mainlines 3 inches and larger shall be installed using FIPT FLO PVC saddles sized appropriately. (Example: 4-inch pipe would use a 4-inch x 2-inch FIPT.)

Add the following subsection:

01120.45(h) Drain Pockets – Excavate a minimum of 10 cubic feet. Backfill with drain gravel to 12 inches below grade. Cover with geotextile and 6 inches of topsoil.

01120.46 Low Voltage Electrical Installation – Add the following paragraphs to the end of the subsection:

Provide one control circuit for each zone. All wiring, including low voltage control wiring, shall be in conduit. Provide a 2-inch minimum conduit for future phone or telemetry connections.

Provide 16-gauge insulated ‘trace wire’ for locating lateral irrigation lines. All splices shall be waterproof. Coil wire ends in the valve box.

01120.49 Backfill – Add the following paragraph to the end of the subsection:

The minimum horizontal clearance between lines for piping 2 inches or less is 4 inches, and 12-inch minimum clearance for 2-1/2-inch and larger pipe. The minimum vertical clearance between pipe shall be 4 inches.

End of Section

Section 01140 - Potable Water Pipe and Fittings

Comply with Section 01140 of the Standard Specifications modified as follows:

01140.00 Scope – Replace this subsection, except for the subsection number and title, with the following:

The Contractor shall secure and comply with all applicable City, County, and State permits including Construction Safety and Health Standards. Prior to installing a water facility in an unimproved street, the street shall be brought to subgrade to ensure that adequate bury, depth of cover, and utility separation is provided.

This section covers the work necessary for furnishing and installing water pipe and fittings normally used for water distribution systems. Water line depth from finished grade to top of pipe shall be a minimum of 36 inches and a maximum of 72 inches.

Proposed corrosion protection measures shall be approved by the City Engineer prior to final design.

01140.10 Materials – Replace this subsection, except for the subsection number and title, with the following:

Furnish Materials meeting the following requirements:

- Unless otherwise specified, all materials shall be new of U.S.A. domestic manufacture with the certification of the country of origin. Materials shall meet all AWWA standards and applicable City, County, and State code requirements, for the specified materials.
- Piping materials used in pump station, meter vault, or control valve applications shall be approved by the City Engineer on a case-by-case basis.
- All fittings being purchased by suppliers shall be purchased directly from the Manufacturer.
- Mechanical joint C153 ductile iron fittings shall be marked with the Manufacturer's name.
- Mechanical joint water main fittings with accessories, 4-inch through 36-inch, shall be manufactured in accordance with and meet all applicable terms and provisions of standards ANSI A21.10 and AWWA C110 and ANSI A21.11 and AWWA C 111, current revisions. Mechanical joint fittings 4- through 24-inch shall be rated for 350 psi working pressure and fittings 30- and 36-inch shall be rated for 250 psi working pressure. Mechanical joint fittings with 14-inch or larger caps and plugs shall be rated for 250 psi working pressure, and 4- through 12-inch minimum size UL listed and marked for Fire Main Equipment. Cement-lined and seal-coated fittings shall meet ANSI A21.4 and AWWA C104 standards. All coated and lined fittings shall meet requirements of NSF-61.
- Approved Manufacturers: Tyler Pipe, Union, Clow, and American Iron Pipe Co.

(a) Ductile Iron Pipe – Ductile iron pipe shall be centrifugally cast in metal molds and cement-lined in accordance with AWWA specification C151-76. Push-on type joint pipe shall be used except where conditions require mechanical joints as shown and approved on plans. No material shall be shipped inside coated pipe. Pipe shall meet the following specifications:

(1) 4-inch through 12-inch I.D., Class 52 Ductile, AWWA Specification C151-76 DI pipe.

(2) 14-inch I.D. and larger, Class 50 Ductile, AWWA Specification C151-76 DI pipe.

Approved Manufacturers: U.S. Pipe, Pacific States Pipe, American Pipe and Griffin Pipe.

(b) Service Pipe – Service lines from the main to the meter stops and 6 feet beyond meter box shall be as follows:

I.D.	Type
1” and smaller	Type K soft annealed copper tubing (non-rigid)
1 1/4 ” and larger	Ductile iron or rigid copper (Type K-hard)

(c) Service Saddles – Service saddles for 2-inch water services shall be used on existing and new water lines. Where service saddles are allowed, they shall be Mueller double strap DR2S, or as approved by the City Engineer. The brass nipple between saddle and valve is to be installed horizontally; saddle bolts shall be torqued to manufacturer’s specifications. If a 1-1/2-inch service is desired by the customer, this reduction shall be made within the 2-inch meter setter.

(d) Saddle Tap – Bit size shall be as follows: ¾-inch tap – 11/16-inch bit, and for a 1-inch tap – 15/16-inch bit. All bits to be Mueller or equal, and approved for tapping cast iron, DI, galvanized and steel pipe.

The tapping machine shall be a Mueller #E-5, #D-5, or equal.

(e) Direct Tap – All bits to be Mueller AWWA tapered thread combined drills and taps or equal, and must be approved for tapping cast iron and DI water mains. All taps shall be made with a Mueller B-101 drilling and tapping machine or equal.

(f) Pipe Fittings

(1) Buried – Buried ductile iron fittings with mechanical joints shall meet ANSI 21.10, 250 PSI working pressure, with full body glands (AWWA C-110/C-153), bolts, and gaskets in accordance with ANSI 21.11. A non-toxic vegetable soap lubricant shall be supplied in sufficient quantities for installing the pipe. Lubricant must meet the appropriate AWWA Standards.

(2) Aboveground – Aboveground ductile fittings with threaded flanged joints or restrained joint meeting appropriate ANSI specifications, 250 PSI working pressure, bolts and gaskets in accordance with appropriate ANSI specification.

(3) Solid Sleeves – Solid sleeves 4- to 12-inch in diameter must be a minimum of 12 inches long; 14-inch-diameter or larger must be the long pattern. All solid sleeves must be standard Pacific States (Union /Tyler Foundry) or U.S. Pipe M.J. DI sleeve. Appurtenances shall be of same manufacturer.

(g) Plugs/Caps – Shall be mechanical joint DI and properly restrained.

(h) Special Coatings and Linings – Special coatings and linings shall be approved by the City Engineer prior to the time of purchase.

(i) Concrete for Thrust Blocking – Concrete for thrust blocking shall conform to ASTM C 94, Alternate 2, and shall be proportioned to obtain a 28-day compressive strength of 2500 pounds per square inch. “Sacrete” type products are not allowed.

(j) Marking Tape – Marking tape shall consist of inert polyethylene plastic impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the Soil. Marking tape must be minimum 2 inches wide, APWA blue, and stretchable to a minimum of seven times its original size. The tape shall be imprinted continuously over its entire length in permanent black ink with the words "Caution - Water".

01140.11 Handling Pipe and Fittings – Add the following to the end of the subsection:

No more pipe material shall be strung on job than can be installed in one shift. Material that is rejected at the point of delivery because of defects or damage shall be replaced by the Contractor. Material damage subsequent to acceptance by the Engineer or the City shall be replaced by the Contractor.

01140.41 Laying Pipe – Replace this subsection, except for the subsection number and title, with the following:

(a) General – Lay pipe to the lines and grades shown and established or as directed by the Engineer. Where field conditions require deflection or curves not shown, the Engineer will determine methods to be used. Fittings, valves, air release valves, and hydrants shall be installed at the designed locations with joints centered, spigots fully inserted, and valve and hydrant stems plumb.

(b) Push-on Joint Pipe – Ductile iron pipe with rubber gasket Tyton and/or Fastite type joints shall be laid and jointed in strict accordance with the manufacturer’s recommendations and in accordance with the requirements of these Specifications. Deflection limits shall conform with Figure 1. For pipe sizes not listed, maximum deflection shall be one-half the manufacturer’s maximum deflection.

Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer.

Once installed, rubber gaskets cannot be recovered and reused and must be discarded.

(1) Push-on Joint Restraints for Ductile Iron Pipe – Push-on joints shall be restrained using Field Lok gaskets for Tyton joint pipe and fast grip gaskets for Fastite joint pipe, using stainless steel locking segments vulcanized into the gaskets.

(2) Approved Manufacturers of Mechanical Restraints – EBBA Iron 1100 Series “Mega-Lug,” and Romac “Romagrip”.

Maximum Deflection of Tyton Gasket Joint Pipe (Based on 18-Foot Pipe Length)

Pipe Size	Bend in One Joint Angle	Deflection in Inches	Approx. Radius in Feet of Curve

	A	D	Produced by Succession Of Joints
6”	2° 00’	8”	450’
8” through 12”	2° 00’	8”	450’
14” through 24”	1° 30’	6”	650’

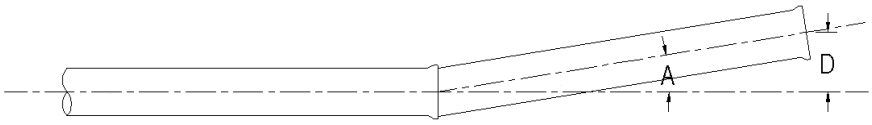

FIGURE 1
Pipe Deflection

(c) Screw Joint Pipe – Screw joint pipe threads shall be thoroughly cleaned by wire-brushing, swabbing, or other approved method. Approved joint compound shall be applied to the threads prior to making the joint. Joints shall be watertight at test pressures before acceptance.

(d) Installation of Mechanical and Flexible Couplings – Mechanical and flexible couplings shall be provided where indicated on the plans and shall be installed in accordance with the manufacturer’s recommendations. Before pipe lengths are joined, the ends of each pipe shall be thoroughly cleaned of oil, scale, rust, and dirt for a minimum distance of at least 8 inches from the end. Gaskets shall be wiped clean and lubricated with pipe lubricant for installation on the pipe ends. Coupling bolts shall be tightened progressively, drawing up bolts on opposite sides until all bolts have a uniform tightness. Workers tightening bolts shall be equipped with torque-limiting wrenches or other approved wrench type. Mechanical and flexible couplings shall be tested when the tests on the adjacent pipe are made. If the couplings do not pass the requirements of the leakage tests, the couplings shall be removed and reassembled on the pipe, and the leakage test shall be repeated. Deflection shall be in conformance with Figure 1. For pipe sizes not listed, maximum deflection shall be one-half the manufacturer’s maximum deflection.

Maximum Deflection of Mechanical Joint Pipe
Safe Deflection for 150 PSI[1] based on 18-Foot Pipe Length (see Figure 1)

Pipe Size	Maximum Joint Angle A	Deflection in Inches D	Approx. Curve Radius produced by maximum angle
8”-12”	2º 00’	8”	450’
14”-16”	1º 45’	7”	590’
18”-20”	1º 30’	5”	685’
24”	1º	4”	1000’

NOTES:
1. For test pressures above 150 psi, reduce the tabulated deflection by 10% for each additional 150 psi.

(e) Tapping – Tapping of City mains shall be done when the air temperature is at least 35°F and rising. When the air temperature is between 20°F and 35°F, taps may be permitted by the Engineer if the tapping bit is protected and heated to 35°F or above. If a heated tapping bit is used, the work must be backfilled immediately upon completion.

(f) Hot Taps – When appropriate and/or shown on the plans, branches and large services may be connected to existing City of Bend water lines by using a tapping sleeve and tapping valve. This procedure shall be performed only by a City-approved contractor and said approval shall be obtained from the City Engineer or their authorized representative at least 48 hours in advance of performing the hot tap. No pipe shall be exposed for tapping without a City representative onsite.

All hot tap sleeve and tee assemblies shall be air tested prior to start of tapping operation.

(Update paragraph below if there are specific hot taps that need to occur outside of the stated hours.)

Hot taps shall be scheduled only during the hours of 7:30 AM to 3:00 PM, Monday through Friday, including trench backfill.

(g) Tapping Sleeve Requirement – Match sleeve types as shown in the table with the type of main being tapped. Tapping sleeves shall be as manufactured by JCM, Mueller, Romac, or Smith Blair and as specified below:

(1) Epoxy-coated Fabricated Steel Sleeve; JCM 532 or equal.

(2) Stainless Steel Sleeve; JCM 432; Romac SST III (with stainless steel flanges); Mueller H-304; Smith Blair 665, or equal.

NOTE: Numbers in tables below correspond to accepted sleeve types.

For Taps Other Than Size-on-Size					
Type of Main Being Tapped	**Main 8" and Under**	**Main 10" or 12" Tap 8" and Under**	**Main 12" 10" Tap**	**Main 14" and Over Tap 8" and Under**	**Main 14" and Over Tap 10" and 12"**
C-900 Plastic	2	2	2	N/A	N/A
Steel Size Plastic	2	2	N/A	N/A	N/A
Ductile Iron	2	2	2	1	
Cast Iron (spun)	2	2	2	1	1
Cast Iron (pit cast)	2	2	2	1	1
Steel	2	2	2	1	1

01140.44 Thrust Restraint – Replace this subsection, except for the subsection number and title, with the following:

(a) Thrust Blocking – All additions and alterations to the City of Bend water system shall incorporate mechanical restraint systems into their design. Thrust blocking and the use

of a deadman to supplement mechanical restraints are only allowed with the approval of the City Engineer and must be designed by the Engineer of Record and detailed on plans.

(b) Thrust Blocking Materials – Refer to Section 01140.10(i) above.

(c) Anchorage – Reaction or thrust blocking shall be placed as shown on the plans. Blocking shall be placed between the undisturbed ground and the fitting to be anchored. Reaction blocking shall be placed so as to allow access to fitting joints unless specifically shown otherwise on the Plans. The pipe and joint fittings shall be wrapped with 6 mm plastic sheeting before placing concrete.

(d) Existing Thrust Blocks – No existing thrust blocks shall be removed by Contractor unless a City of Bend representative is on site for inspection and coordination.

01140.45 Marking Tape and Wire – Replace this subsection with the following subsection:

01140.45 Marking Tape – Install marking tape over all mains and services. Place marking tape 1 foot above the top of pipe for its full length, centered on the pipe.

01140.48 Maintaining Service – Add the following:

(c) Connections of new mains shall be made within 30 days of acceptable chlorination and pressure testing unless otherwise approved by the City Engineer.

01140.49 Backfilling – Replace this subsection, except for the subsection number and title, with the following:

(a) Pipe Bedding – The trench shall be excavated to a minimum depth of 6-inches below the pipe to provide minimum bedding. The pipe bedding shall be uniform, at grade, and compacted prior to placing pipe. Trench foundation shall meet the requirements of 00405.44.

(b) Compaction Testing – Refer to specification section 00405.46.

(c) Electrical Continuity – When so stated in the Specifications, the Contractor shall provide adequate means to permit an electric current to pass across all pipe joints. The electrical connection shall be made by driving silicon-bronze wedges between the barrel and the bell of joints using rubber gaskets. Two wedges shall be installed per joint on opposite sides of the pipe on the horizontal centerline. The wedges shall be approximately 1-inch square and shall be tapered from 1/8-inch to 1/16-inch, approximately. The wedges shall have serrated edges to provide good contact. The voltage drop at 500 amperes current flow shall not exceed 1.0 volt per joint.

01140.50 Filling and Flushing - Delete this subsection.

01140.51 Hydrostatic Testing - Delete this subsection.

01140.52 Disinfecting - Delete this subsection.

Add the following subsection:

01140.53 Filling, Flushing, and Hydrostatic Testing:

(a) Certification – The Contractor's employee responsible for conducting these tests shall be approved by the City of Bend. This person shall be present at and shall supervise all phases of these procedures.

Prior to testing, the Contractor shall be certified by the City of Bend Water Division. This Certification shall be contingent upon the Contractor passing a standard test prepared by the City. This test shall prove the Contractor's organizational ability of the steps required for chlorinating/flushing/testing; and a field demonstration of their techniques.

The metering device used in chlorination and/or pressure test procedures must have been certified by the City Water Division within 6 months of the test.

(b) Testing Procedures – Testing shall not occur until the following conditions have been met: 1) All excavation, installation, and backfill of structures, piping, and utilities has been completed, and 2) All compaction tests have been received and reviewed by the City. Testing procedures shall be conducted between 7:30 AM and 3 PM, Monday through Friday. Pressure testing shall be scheduled so completion is within these normal working hours. Chlorine and pressure tests shall be performed between 10 AM and 5 PM when the temperature is, or is expected to be, no less than 33ºF. Chlorine tests require a minimum of 24 hours duration.

When testing cannot occur during the times noted above, submit a written request to the City at least 7 Calendar Days prior to the test noting the requested start and end time of and a description of why the test cannot be completed within the times noted above.

The Contractor shall not operate any valve connected to City water lines or take any action that would affect the operation of the existing system except with a City representative present, and only at that representative's express direction.

For flushing and testing of water service connections 2-inches and smaller, refer to Specification Section 01170.50 and 01170.51.

(c) Length of Test Section – Limit sections to be tested to 1,000 feet, unless otherwise approved.

(d) Flushing – The Contractor shall be responsible for all pipeline flushing, including but not limited to flushing air from service and main lines at time of chlorination, flushing chlorination water after all chlorination and rechlorination. System flushing procedures shall meet all State and Federal requirements for discharge and disposal.

Following removal of all air in the system, the Contractor shall thoroughly flush all lines with potable water. Flushing velocity shall not be less than 2 feet per second (fps). Flushing is considered completed when the system chlorine residual matches the background chlorine residual level of the City system at that point.

A portion of the flushing process for chlorinated systems may, after start-up with the Inspector, be completed by the Contractor without the Inspector being present. After chlorine residual testing on the City system and the chlorinated systems has been done and the inspector has operated the necessary valves, the Contractor may independently

complete the test. The Contractor will be furnished with appropriate forms to be completed as verification that the test results have been completed and the results are in compliance with City's Standards & Specifications.

(e) Chlorination – The Contractor shall be responsible for installation of chlorine taps at the terminal points of all lines, including all dead end lines. Taps may also be required on high points to vent trapped air. Tap location and placement shall be coordinated and observed by the City of Bend. With Inspector approval, fire hydrants may be used as a chlorination injection point.

At connections to existing mains, the maximum allowable distance for hand chlorination of the new main shall be 20-feet.

Before chlorination, the City Representative shall witness all valves being opened in the system being chlorinated.

The City Representative shall collect all samples for chlorine residual testing as follows:

(1) After chlorination (beginning of test initial value).

(2) Prior to the chlorination solution being flushed at the end of the 24-hour test period (finish value).

(3) After the system has been thoroughly flushed and refilled.

A maximum of 60 parts per million (ppm) and a minimum of 25 ppm of free residual chlorine are the acceptable limits for the initial test. Any residual above or below acceptable initial limits shall be grounds for restarting the chlorination test. If the finished residual value varies by 60% or more than the starting value, the test shall be deemed to have failed and rechlorination shall be required after thoroughly flushing the line.

If after three chlorinations no passing level is obtained, the line shall be deemed contaminated, be removed, and replaced by the Contractor at their expense.

(f) Bacteriological Testing – Comply with AWWA C651.

(g) Pressure Testing – Comply with AWWA C600.

(h) Flow Testing – The Contractor shall flow test all services and hydrants for a minimum of 2 minutes prior to acceptance of the system by the City. Flow testing equipment shall be checked and approved by the City and the test conducted under direct supervision of the City. Test reports shall provide the following information:

- Hydrant flow in gallons per minute (gpm)
- Hydrant static pressure
- Station of hydrant
- Service line flow in gpm
- Lot and block of service

(i) Other Tests – The City Representative may require other tests, such as volatile organic compounds, inorganic chemicals, or synthetic organic chemicals, if there is reason to believe the line has been contaminated by such compounds. The costs of these tests can be substantial and shall be borne by the Contractor. Failure to pass such other tests shall be grounds to reject the work and cause it to be replaced.

(j) Cleanup – Upon completion of the testing and acceptance of the tests by the City of Bend, the Contractor shall clean the area as directed by the City.

01140.80 Measurement – Replace this subsection, except for the subsection number and title, with the following:

(a) Pipe – Pipe length shall be measured horizontally from centerline to centerline of valves, fittings or to the end of the pipe, whichever is applicable. Measurement of the various depth classes as stated in the Bid Schedule shall be from the pipe invert as constructed to the design subgrade elevation or the finished ground surface at the point of measurement.

(b) Fittings Measurement – Measurement of fittings shall be made on a unit price basis for the type, kind, and size specified and installed. No separate or additional payment shall be made for couplings, joint lubricant, nuts, bolts, washers, and other fitting-related hardware or supplies.

(c) Thrust Blocks – Measurement for thrust blocks shall be made on a unit price basis for each thrust block installed.

(d) Testing and Disinfection – When neither specified nor listed in the proposal for separate payment, flushing, chlorination, and testing shall be considered incidental work for which no separate payment shall be made.

(e) Incidental Basis – Items not listed in the Bid Schedule shall be considered incidental work for which no separate payment shall be made.

End of Section

Section 01150 - Potable Water Valves

Comply with Section 01150 of the Standard Specifications modified as follows:

01150.10 Materials – Replace this subsection, except for the subsection number and title, with the following:

(a) Resilient Seated Epoxy Coated Gate Valves – Buried epoxy-coated iron body gate valves shall meet AWWA standards (C-509), have non-rising stems, be rated at 200 pounds (lb) working pressure and 350 lb hydrostatic pressure, open left – 2-inch-square operating nuts, resilient seat, with brass fittings, "O" ring stem pressure seals, non-directional, mechanical joints with full body glands (AWWA C-110); as manufactured by Mueller, Kennedy, Waterous, CLOW, or American Flow Control, and as approved by the City Engineer.

Aboveground or in-vault gate valves shall be equipped with hand wheels.

(b) Butterfly Valves – Butterfly valves shall meet the requirements of AWWA C-504 latest revision, Class 150B mechanical joint etc., except worm gear operators are not permitted. To reduce the number of different valves in the system, the Mueller line seal seat in body, or equal, shall be the preferred valve. The valve can be domestic or non-domestic, unless contractually obligated otherwise. Where 18 inches of cover cannot be obtained from operating nut to finish grade, butterfly valves shall be required. Butterfly valves shall be used on all water lines of 10-inch size and larger, or where 24 inches of cover cannot be obtained on smaller mains.

Aboveground or in-vault butterfly valves shall be equipped with hand wheels.

(c) Valve Boxes – Valve boxes shall be an East Jordan Iron Works #00363912 18-inch box rated at 3500 psi (see Standard Drawing W-30). The valve box shall have a 7-inch I.D. with a 12-inch flange on the top, and a lid with raised letters on the top reading: "Bend Water" as shown in the Standard Drawings.

The East Jordan Iron Works series #00363912 shall have a section of PVC 3034 placed below the 18- inch box with a 6-inch to 12-inch overlap. It shall be cut to the proper length to allow adjustment in the depth of cover.

(d) Check Valves

(1) Swing Check Type – Swing check valves shall be bronze-mounted with cast or ductile iron body with outside lever and spring unless otherwise specified.

(2) Spring Loaded Plug or Disc Type – Spring-loaded plug or disc type check valves shall be bronze-mounted with bronze, cast, or DI body, bronze plug or disc, stainless steel spring, and resilient seal suitable for clear cold water service. The plug or disc of the check valves shall be easily removed and replaced.

(3) Hydraulic Cushion Type – Hydraulic cushion type check valves shall be of bronze, cast or ductile iron, with bronze disc and disc faces, seat rings, and pivot pins.

The valve shall provide drop-tight sealing. The valve shall be provided with an adjustable speed, integrally mounted oil dashpot mechanical snubber system.

01150.40 General – Add the following to the end of the subsection:

(d) General – Before installation, valves shall be cleaned of all foreign material and inspected in open-closed position. Unless otherwise indicated, gate valves shall be mounted with the stem vertical. Butterfly valves shall be mounted with the stem vertical and on the 'curb' side of the main. Horizontal valves shall be mounted in such a manner that adequate clearance is provided for operation. Installation practices shall conform to the manufacturer's recommendations.

(e) Valve Boxes – A metal valve box shall be provided for every valve unless the valve is located in a vault. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve. The box cover shall be flush with the surface of the finished pavement or such level as may be directed by the Inspector.

01150.80 Measurement – Add the following subsection:

(a) Incidental Basis – When neither specified nor listed in the proposal for separate payment, valves shall be considered incidental work for which no separate payment shall be made.

01150.90 Payment – Delete the paragraph that begins "No separate or additional…" and replace with the following:

No separate or additional payment will be made for:

- earthwork not covered under other Pay Items
- jointing
- blocking of valves
- protective coatings
- valve boxes
- valve box extensions
- valve operator extensions
- valve reconnections
- hydrostatic testing

When neither specified nor listed in the proposal for separate payment, valves shall be considered incidental work for which no separate payment shall be made.

End of Section

Section 01160 – Hydrants and Appurtenances

Comply with Section 01160 of the Standard Specifications, modified as follows:

01160.10 Materials – Replace this subsection, except for the subsection number and title, with the following:

(a) Hydrants - Traffic model fire hydrants shall meet AWWA specification C-502-64 with dry top. They shall have a center stem compression, 5-¼-inch valve opening, (2) 2-½-inch hose and (1) 5-1/4-inch steamer nozzles with National Standard Threads, 6-inch mechanical joint inlet connection, open left (1) 1-½-inch pentagon operating nut, and gaskets in nozzles. The bury line shall be used as control to ensure proper installation of hydrants. At no time shall finish grade be less than 3 inches below the bury line, or higher than the bury line of the hydrant. If a hydrant is not provided with a bury line, the bottom flange of the hydrant shall be used as control and finish grade shall be set at exactly 4 inches below the bottom flange, or as directed by the City's representative. The Mueller Super Centurion 250 is the preferred hydrant to be placed in the City's water system. A brass seating ring is required.

(b) Hydrant Extensions - Hydrant extensions shall not be allowed on any City of Bend fire hydrant.

(c) Drain Rock – Drain rock for under fire hydrants shall be commercially available 2" – 4" crushed or river run drain rock free of organic matter, sand, loam, clay, and other small particles that shall tend to restrict water flow through the gravel.

01160.40 Setting Hydrants – Replace this subsection, except for the subsection number and title, with the following:

Inspect all hydrants upon delivery in the field to ensure proper working order. Install hydrants as shown or directed.

(a) Location - Hydrants shall be located as shown on the Plans or as directed by the City Engineer. All hydrants shall have two (2) reference points (swing ties) indicating the face of hydrant, tops of curb, and face of curb. The center of the operating nut on the hydrant barrel shall be set a minimum of 42 inches from face of curb as shown in the Standard Drawings. Hydrants shall be placed outside the pedestrian path of travel so that pedestrians, including people with disabilities, will have access to sidewalks and pedestrian paths.

Hydrants susceptible to traffic shall be protected by a 6-foot-by-6-foot concrete pad and bollards if deemed necessary by the City Engineer.

(**b) Position** –

(1) No hydrant shall have more than a 6-foot bury. If deeper, no extensions; use bends to gain appropriate height.

(2) All hydrants shall be installed plumb with their nozzles parallel with or at right angles to the curb with the pumper nozzle facing the curb. Hydrants shall be set to

the established grade. All hydrants shall be surrounded by a concrete pad as shown on the Standard Drawings. Hydrant pads shall be placed flush with sidewalks and curbs at 2% grade.

(c) Hydrant Drainage – Unless otherwise specified in the Plans or Special Provisions, hydrant drainage shall be provided at the base of the hydrant by placing a geotech mat against the native earth and drain rock from the bottom of the trench to at least 6 inches above the waste opening in the hydrant and to a distance of 1 foot around the bowl. No drainage system shall be directly connected to a storm or sanitary sewer.

(d) Painting – All hydrants shall be re-painted with one coat of rust-preventive paint, at least 6 mils dry film thickness. Paint shall be applied with a brush only. Keep paint off brass components. Color shall be TNEMEC Safety Red #F02H-SC09. For a typical hydrant drawing, see Standard Drawings. Steel bollards shall be painted TNEMEC Safety Red #F02H-SC09.

(e) Service – All out-of-service hydrants shall be provided with a white ring with the words "Out of Service" inscribed on it. Disks shall be 8-inch-diameter plastic supplied by the Contractor. Rings shall be affixed to the steamer nozzle immediately after installation and shall remain on hydrant until the hydrant passes inspection and is placed in service.

(f) Hydrant Operation – Following installation, no person shall operate a City of Bend fire hydrant without first obtaining a City of Bend hydrant meter permit.

01160.80 Measurement – Replace this subsection, except for the subsection number and title, with the following:

Measurement shall be made on a unit basis for the type of hydrant specified and installed. When not listed in the Bid Schedule for separate payment, fire hydrants shall be considered incidental work for which no separate payment shall be made.

New pipe for hydrant connections to existing mains and lateral tees will be measured according to Section 01140.80. Gate valves will be measured according to 01150.80.

End of Section

Section 01170 – Potable Water Service Connections, 2 Inch and Smaller

Comply with Section 01170 of the Standard Specifications modified as follows:

01170.10 Materials – Replace this subsection, except for the subsection number and title, with the following:

(a) Refer to Specification Section 01140.10 for service pipe and saddle material requirements. Any services larger than 1 inch shall be attached to the main line using a saddle connection. Service taps on C-900 shall be installed using a Ford S90 tapping saddle or equal.

(b) Fittings for copper pipe shall be CC 110 Compression type Mueller or approved equal.

(c) Meters – The meter will have no moving parts and constructed of a noncorrosive material. The meter will utilize an electromagnetic or ultrasonic measurement system. The meter must meet federal low lead requirements and be compliant with American water works Standard C-700, C-710, NSF/ANSI Standard 61 Annex F-G. The meter must be capable of measuring water flow in cubic feet and show reverse flow. The meter must operate with a maximum working pressure of 175 PSI without leakage, damage or effect on accuracy. A 1" meter will have an allowable pressure loss not to exceed 4 PSI at 30 GPM. The ¾" meter shall guarantee 1.5% accuracy rate at normal operating flows of 3 GPM for the service life of the meter. The 1" meter shall guarantee 1.5% accuracy rate at normal operating flows of 4 GPM for the service life of the meter. The meter will fit within the City of Bend Premises Isolation Program specification. The meter and register must be fully compatible with all ACLARA MTU firmware, factory constructed NICOR ends, Extended Range 2-way transmitting system and the newest available version of ACLARA MTU. The meter shall also be 9" lay length for ¾" meters and 11-inch lay for 1" meters.

When provided by the Contractor, water meters shall be brought to the City for identification stamping prior to installation.

(d) Meter Setters - All 1.5- to 2-inch meters shall use a meter setter series # B-2423-99000 with a 12-inch setter height as shown in Standard Drawing W-5A.

(e) Corporation Stop – Corporation stops shall be Mueller #B-25008 full port ball valve or approved equal. 2-inch corporation stops shall be Mueller #B-25028N 110CTS X MIP Ball Corp Stop (Low Lead) or approved equal

(f) Meter Stop – Meter stops shall be Mueller #B-24258 ball angle meter valve, or approved equal.

(g) Meter Boxes – All boxes shall include a CI reader lid. Meter vaults shall be traffic rated. Meter boxes approved by the City of Bend Water Division include:

- Armorcast:
  - Box: 17 x 30 x 18 Polymer Concrete (A6001640)
  - Lid: 17 x 30 Cover with Cast Iron Hinged Lid
- Quazite:
  - Box: 17 x 30 x 18, Flared, Polymer Concrete (PT1730BA18)

- Lid: 17 x 30 Cover with Hinged Cast Iron Reader Door

01170.40 General – Replace this subsection, except for the subsection number and title, with the following:

(a) All services shall have 3 feet of cover.

(b) Bedding and pipe zone material shall be placed at least 7 inches below and 12 inches above all pipes. The material shall be compacted with hand-held compaction equipment to 95% density as determined by AASHTO T-99, Standard Proctor.

(c) All services shall be flushed of all foreign objects before connecting double check valve.

(d) All services shall be flushed and checked for flow.

(e) Services installed during water line construction and prior to meter placement shall be constructed with temporary meter jumpers and supplied by the Contractor.

(f) Service runs between the corporation stop and the meter setting shall not contain fittings unless approved by the City Engineer.

(g) Electrical continuity shall be provided on all services as shown in the Standard Drawings.

(h) Existing water services to be abandoned must be cut at the corporation stop and removed from the right-of-way. Place a watertight cap on the existing corporation stop. Corporation stops on services larger than 1 inch shall be removed and replaced with a plug at the water main. Whenever possible the water service line including any fittings and valves shall be physically removed from the right-of-way.

(i) All property that is subject of a site plan, or any new construction that is being served by an inadequate water service, shall be required to upgrade the existing water service to City standards.

(j) Detection tape shall be installed on all services.

(k) Temporary water use during construction must be metered and shall be protected from backflow using an approved backflow protection device.

(l) Meter boxes shall be installed at each meter. Meter boxes shall be installed as shown on the Standard Drawings. The box shall be elevated to existing ground level or proposed finish grade. Water service meter boxes shall be set with a minimum distance of 18 inches between each water service box. Meter boxes shall be located in landscape areas where possible and shall only be installed within hardscape when approved by the City Engineer. All water services shall have a minimum of 10 feet horizontal separation from any sanitary sewer in the public right-of-way.

(m) Meter Installations – Meter installations shall be constructed as shown in the Standard Drawings. When a meter is not installed at time of completion, a jumper spacer

set to the dimension of the proposed meter and backflow prevention device shall be installed to provide service. This jumper shall be a galvanized nipple or Schedule 80 polyvinyl chloride (PVC).

All meter installations shall be constructed with an electric wire jumper of not less than 10 gauge. The material of the electric jumper shall be the same or galvanically compatible with the material of the water service; that is, galvanized wire on galvanized pipe and copper wire on copper pipe.

(n) In areas where new concrete curb is being installed over a water service, stamp all water service locations on the top of the curb with brand "W" for water per Specification Section 00759.50(b).

Add the following subsection:

01170.43 Fire Services – All fire line backflow prevention assemblies, whether Double Check or Reduced Pressure Principle Device, shall include a detector assembly complete with a bypass line with double check or reduced pressure principle device assembly inline and a meter that meets City of Bend specifications.

Backflow assemblies may be installed in the vertical position, provided that the assemblies are spring-loaded and meet the following criteria:

- 4-inch diameter or smaller, and/or specifically listed in the Oregon Health Division's Approved Backflow Prevention Assembly List.
- Recommended by the manufacturer for vertical installation.
- Has the normal flow upward.
- Fire lines shall require backflow protection commensurate with the degree of hazard (per UPC Chapter 6).

Add the following subsection:

01170.44 Backflow Requirements – All services shall have an approved backflow prevention assembly installed commensurate with the degree of hazard for the premises it serves. Backflow prevention shall be in accordance with OAR 333-061-070/UPC Chapter 6 and conditions set forth in the City of Bend Cross Connection Ordinance. Assembly shall be installed on the Owner's side of meter. If approved by the City of Bend Cross Connection Specialist, and the backflow assembly is a Reduced Pressure Principle Device Assembly, it may be installed immediately inside the building being served. In all cases, the device must be installed upstream of the first branch line leading off the service line. See examples from Standard Details W-15, W-15A, W-15B. Such backflow prevention device assembly(s) shall be installed and approved before water service shall be provided.

Double-check valves to be installed at the time the meter is installed.

All backflow prevention device assemblies, once installed, shall be inspected by the City of Bend Cross Connection Inspector or authorized agent. Prior to acceptance and initiation of service, the device shall be tested by an Oregon State Certified backflow tester with the results forwarded to and received by City of Bend Public Works Cross Connection Program.

(Designer to consider whether backflow prevention device assemblies [e.g. double check valves] should be paid for under Specification Section 01150, 01170, or be incidental to other work and include clarifying language in the appropriate specification measurement and payment sections. Consider application [e.g. residential, commercial, irrigation] and whether installation is new or a retrofit. Consider including a pay item (length basis) for the tail if the length may vary by location when connecting to existing services. May have multiple bid items by service and type of work being performed. Also consider noting which property is associated with a particular bid item.)

01170.50 Flushing and Disinfecting – Replace this subsection with the following:

01170.50 Flushing and Sampling– Before tapping the main for installation of service connections and sampling stations to existing water mains, flush the service connections and sample stations according to Section 01140. For installation of service connections and sampling stations concurrent with new water mains, flush service connections and sampling stations according to Section 01140. Sample all service connections according to Section 01140. Disinfection of 2-inch and smaller service lines is not required.

End of Section

SP02000 (Special Provisions for the 2021 Book) (Last updated: 12-10-2021)

PART 02000 – MATERIALS

(Follow all instructions and make all edits with "Track Changes" turned on. If there are no instructions [orange text] above a subsection, paragraph, sentence, or bullet, then include it in the project. Delete all orange text before preparing the final document.)

Section 02001 - Concrete

(This Section requires SP02030 and SP02690.)

Comply with Section 02001 of the Standard Specifications modified as follows:

02001.02 Abbreviations and Definitions: Replace the sentence that begins "**Pozzolans** - Fly ash, silica fume…" with the following sentence:

Pozzolans - Fly ash, natural pozzolans, silica fume, and high-reactivity pozzolans.

Replace the sentence that begins "**Supplementary Cementitious Materials** - Fly ash, silica fume…" with the following sentence:

Supplementary Cementitious Materials - Pozzolans and ground granulated blast furnace slag.

02001.15(a) Current Mix Designs - Replace this subsection, except for the subsection number and title, with the following:

Mix designs that meet the requirements for the specified class of concrete and are currently being used or have been used within the past 24 months on any project, public or private, may be submitted for review. Provide individual test results that comprise the average if more than one data point exists. For paving designs the flexural strength testing must be from within the last two years. For HPC designs the length change and permeability tests must be from within the last two years.

02001.20(a) Strength - Replace Table 2001-1 with the following Table 2001-1:

Table 02001-1

Concrete Strength and Water/Cementitious Material (w/cm) Ratio		
Type of Concrete	**Strength f'_c (psi)**	**Maximum w/cm Ratio**
Structural	3300	0.50
	3300 (Seal)	0.45
	4000	0.48
	4000	

	(Drilled Shaft)	
	HPC4500	0.40
	HPC(IC)4500	
	5000 +	
Paving	5000	0.44
PPCM's (with cast-in-place decks and no entrained air)	5000	0.48
	5500	0.44
	6000 +	0.42

02001.30(e)(1) HPC Coarse Aggregate Content - Delete the paragraph that begins "Two or more Aggregate products or sources…"

End of Section

Section 02015 – Portland Cement Concrete Repair Material

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Comply with Section 02015 of the Standard Specifications modified as follows:

Add the following subsection:

02015.60 Portland Cement Concrete Repair, Resurfacers - Furnish PCC resurfacers from the QPL.

End of Section

Section 02030 – Supplementary Cementitious Materials

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Comply with Section 02030, of the Standard Specifications modified as follows:

02030.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

This Section includes the requirements for fly ash, natural pozzolans, silica fume, ground granulated blast furnace slag and high reactivity pozzolans used in portland cement concrete.

02030.10 Fly Ash - Replace this subsection, except for the subsection number and title, with the following:

Furnish Class C and Class F fly ash from the QPL and conforming to AASHTO M 295 (ASTM C618).

Add the following subsection:

02030.15 Natural Pozzolans - Furnish Class N natural pozzolans from the QPL and conforming to AASHTO M 295 (ASTM C618).

02030.50 Metakaolin - Replace this subsection with the following:

02030.50 High Reactivity Pozzolans - Furnish high-reactivity pozzolans from the QPL and conforming to AASHTO M 321.

End of Section

Section 02050 - Curing Materials

Comply with Section 02050 of the Standard Specifications modified as follows:

02050.10 Liquid Compounds - Replace the paragraph that begins “Furnish liquid membrane-forming curing…“ with the following paragraph:

Furnish liquid membrane-forming curing compounds from the QPL and meeting the requirements of ASTM C309.

End of Section

Section 02221– Repair, Resurfacing, and Lining Materials for Manhole Rehabilitation

Section 02221, which is not a Standard Specification, is included in this Project by Special Provision.

Description

02221.00 Scope - This Section includes the requirements for cleaning, repair, and lining system materials used in manhole rehabilitation.

02221.01 Reference Standards - Furnish materials conforming to the requirements of:

- ACI 506.2-77: Specifications for Materials, Proportioning, and Application of Shotcrete
- ASTM C109: Compressive Strength Hydraulic Cement Mortars
- ASTM C579: Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars
- ASTM C1583M: Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-Off Method)
- ASTM D638: Tensile Properties of Plastics
- ASTM D790: Flexural Properties of Unreinforced and Reinforced Plastics
- ASTM D695: Compressive Properties of Rigid Plastics
- ASTM D2240: Durometer Hardness, Type Shore D 80 – 85%
- ASTM D4541: Pull-off Strength of Coatings Using a Portable Adhesion Tester
- ASTM D7234: Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
- ASTM D2584: Volatile Matter Content.
- ASTM D543:Resistance of Plastics to Chemical Reagents

02221.02 General - Use materials meeting the following minimum requirements:

(a) All component materials shall be easily transportable by common carriers.

(b) Packing of component materials shall be compatible with field storage requirements.

(c) Components shall be packed in such a fashion as to provide for maximum worker safety when handling the materials and minimize spillage when preparing for use.

(d) Mixing of the components shall be compatible with field applications, not require precise measurements, and be within the limits recommended by the manufacturer.

(e) Catalyzation shall take place at the point of repair.

(f) Cleanup shall be done without inordinate use of flammable or hazardous chemicals.

Materials

02221.11 Wall Cleaning:

(a) Use clean water.

(b) Use detergent or muriatic acid capable of removing dirt, grease, oil and other matter which would prevent a good bond of lining material to wall. Apply in accordance with the manhole rehabilitation system manufacturer's recommendations.

02221.12 Repair and Resurfacing Products - Repair materials must be compatible with the specified rehabilitation system and applied in accordance with the manufacturer's recommendations.

(a) General - The following products may be accepted and approved as compatible repair and resurfacing products for use:

(1) 100% solids, solvent-free epoxy grout specifically formulated for polyurethane or epoxy topcoating compatibility.

(2) When approved for use by the manufacturer, factory blended, rapid setting, high early strength, fiber reinforced, non-shrink repair mortar that can be trowelled or pneumatically spray applied may be approved if specifically formulated to be suitable for topcoating with the specified rehabilitation product(s).

(b) Repair and Resurfacing – Use repair materials compatible with the specified rehabilitation method and applied in accordance with the recommendations of the manufacturers of both the repair material and the rehabilitation material.

The following products may be accepted and approved as compatible repair and resurfacing basecoat materials:

(1) Repair Mortar - When approved for use by the rehabilitation material manufacturer, factory blended, rapid setting, high early strength, non-shrink repair mortar that can be troweled or pneumatically spray applied may be approved if specifically formulated to be suitable for topcoating with the specified rehabilitation product(s). Such repair mortars shall not be used unless the rehabilitation system manufacturer(s) provides information as to its compatibility with the rehabilitation system products. Project-specific submittals shall be provided including application, cure time and surface preparation procedures that permit optimum bond strength with the rehabilitation material.

(2) Wall Patch - Wall patch shall be a quick-setting cementitious material and compatible with the rehabilitation material. Mix and apply according to manufacturer's recommendations. Wall patch shall have the following minimum physical properties:

Property	Minimum Value
Compressive Strength (ASTM C 109B)	1,400 psi, 1 hour, 2,000 psi, 24 hours
Shrinkage (ASTM C 596)	< 0.06% at 90% R.H.
Bond Strength (ASTM C 321)	900 psi, 24 hours
Flexural Strength	500 psi, 24 hour, 900 psi, 28 days
Cement	Sulfate resistant
Density, when applied	105 +/- 5 pcf

(c) Leak Control – Use hydraulic cement (a rapid setting cementitious product specifically formulated for leak control) to stop minor water infiltration. Mix and apply according to manufacturer's recommendations. Hydraulic cement must have the following minimum physical properties:

Property	Minimum Value
Compressive Strength (ASTM C-109)	600 psi, 6 hours, 2,000 psi, 24 hours
Shrinkage (ASTM C 596)	<0.06% at 90% R.H.
Bond Strength (ASTM C 321)	40 psi, 1 hour, 80 psi, 24 hours

The hydraulic cement shall require no additives, set in 45-90 seconds, be dimensionally stable, and freeze/thaw and sulfate resistant.

02221.13 Primer – Use primers for specific substrates as recommended by the rehabilitation system manufacturer, or as listed below:

(a) Concrete: Sikaflex 429 primer, or approved equal

(b) Metal: Sikaflex 260 primer, or approved equal

(c) Plastic: Sikaflex 449 primer, or approved equal

02221.14 Corrosion Inhibitor for Reinforced Steel – Use a water-based epoxy resin, anti-corrosion coating and bonding agent such as Armatec 110 EpoCem, manufactured by the Sika Corporation, or approved equal.

02221.15 Rehabilitation Materials - Engineered materials applied as a system to restore or augment the structural capacity of existing manholes and/or protect against corrosion.

(a) Structural Lining Material - Material shall have the following minimum physical properties:

Property	Minimum Value
Compressive Strength (ASTM C109)	4,000 psi, 24 hours, 9,000 psi, 28 days
Flexural Strength (ASTM C293)	400 psi, 24 hours, 1,250 psi, 28 days
Tensile Strength (ASTM C496)	700 psi, 28 days
Shrinkage, RH 90% (ASTM C596)	0.01%, 28 days
Bond Strength	Substrate failure
Freeze/Thaw after 300 Cycles (ASTM C666)	No visible damage after 300 cycles

The physical requirements must be verified by an independent, certified, third-party testing laboratory within the last five years. The material shall have zero sag when applied in a single coat of 1-inch or less.

Product and manufacturer:

- Mainstay ML-72, Madewell Products Corporation
- Strong Seal MS-2A, Strong Seal Systems
- or approved equal.

(b) Protective Coating Material - Furnish protective coating materials resistant to hydrogen sulfide. Approved materials for hydrogen sulfide resistance include epoxy, multi-layer polyurea lining systems, and polyurethane materials.

Epoxy shall have the following minimum physical properties:

Property	Value
Compressive Strength (ASTM D695)	16,000 psi min.
Flexural Modulus (ASTM D790)	600,000 psi min
Flexural Strength (ASTM D790)	8,000 psi min.
Tensile Strength (ASTM D638)	7,600 psi min.
Elongation (ASTM D638)	3% min.
Hardness, Shore D (ASTM D2240)	88 min.
Acid Exposure	pH 1, H_2SO_4
Adhesion, Concrete (ASTM D7234)	Substrate Failure
Abrasion (ASTM D4060)	112 mg loss/1,000 cycles, max.

The physical requirements must be verified by an independent, certified, third-party testing laboratory within the last five years. The material shall be 100% epoxy solids (by volume), with zero shrinkage (wet film thickness and dry film thickness shall be the same) and be 100% free of Volatile Organic Compounds. Minimum dry film thickness shall be 125 mils.

Product and manufacturer:

- Raven 405, Raven Lining Systems
- SewerGard 210, Sauereisen
- or approved equal.

The multi-layer polyurea lining system shall be a multi-layer lining system in accordance with the following requirements:

1. The liner system shall be a multi-component stress skin panel liner system as described below:

Layer	Material	Minimum Thickness
Moisture Barrier	Modified Polymer	100 mils
Surfacer	Polyurethane/Polymeric blend foam	500 mils
Corrosion barrier	Modified Polymer	150 mils
Total Installation		750 mils

2. The modified polymer shall be sprayable, solvent free, two-component polymeric, moisture/chemical barrier specifically developed for the wastewater environment with the following physical properties:

Parameter	Method	Value

Tensile Strength, psi	ASTM D412	>2,400
Elongation, %	ASTM D412	>300
Tear Strength, PSI	ASTM D624	>500
Shore A Hardness	ASTM D2240	>96
Flexural Modulus	ASTM D522	>2,400

3. The polyurethane/polymeric blend foam shall be a rigid structure foam, low viscosity two-component blend with the following physical properties:

Parameter	Method	Value
Density, lbs/ft3	ASTM D1622	4-10
Compression Strength, psi	ASTM D1621	90-150
Closed Cell Content, %		>95
Shear Strength, psi	ASTM C273	225-250

Product and manufacturer:

- Spectrashield, CCI Spectrum, Inc.

Polyurethane shall have the following physical properties:

Property	Value
Flexural Modulus (ASTM D790)	735,000 psi min.
Long Term Flexural Modulus of Elasticity (ASTM D6992)	529,000 psi min.
Compressive Strength (ASTM D695)	18,000 psi min.
Tensile Strength (ASTM D638)	7,450 psi min.
Elongation (ASTM D638)	2% min.
Acid Exposure	pH 1, H_2SO_4
Abrasion (ASTM D4060)	17.7 mg loss/1,000 cycles, max.
Hardness, Shore D (ASTM D2240)	85 min.

The physical requirements must be verified by an independent, certified, third-party testing laboratory within the last five years. The material shall be 100% polyurethane solids, self-priming, and free of Volatile Organic Compounds.

Product and manufacturer:

- SprayWall, SprayRoq
- or approved equal.

Finishing, Cleaning Up, and Testing

02221.70 Acceptance - Acceptance of repair, resurfacing and lining materials for manhole rehabilitation will be according to 00165.35 and this Section.

End of Section

Section 02415 – Plastic Pipe

Comply with Section 02415 of the Standard Specifications modified as follows:

02415.40 Polypropylene Pipe - Replace the sentence that begins "Dual wall polypropylene pipe …" with the following sentence:

Dual wall polypropylene pipe and fittings ..... ASTM F2764

End of Section

Section 02450 – Manhole and Inlet Materials

Comply with Section 02450 of the Standard Specifications modified as follows:

02450.30 Metal Frames, Covers, Grates, and Steps – Add the following to the end of the subsection:

Furnish cast iron frames and grates conforming to the requirements of ASTM A536. Furnish ductile iron frames and grates conforming to the requirements of ASTM A48.

Add the following subsection:

02450.31 Composite Frames and Covers - Composite frames and covers shall be secured to protect against unauthorized access and to restrict movement of the cover. Covers shall be fabricated of corrosion resistant composite materials have a quarter turn security bolt locking mechanism machined from 17-4PH H900 stainless steel. Covers shall have a minimum load rating of H-20. Secure frames to structure with concrete anchor bolts with a minimum ultimate pullout strength of 2,500 lbs and a minimum ultimate sheer strength of 3,000 lbs. Apply a closed cell, hydrophobic polyurethane water repellant sealer around the entire frame circumference prior to tightening concrete anchor bolts.

Frame and Cover Product and manufacturer:

- EJ Composite Access Solutions by EJ USA, Inc.
- or approved equal.

Security Lock Product and manufacturer:

- TITUS TwistLIFT by TITUS Industrial Group, Inc
- or approved equal.

End of Section

Section 02451 – Polymer Concrete Manholes

Section 02451, which is not a Standard Specification, is included in this Project by Special Provision.

Description

02451.00 Scope – This Section includes requirements for polymer concrete manholes.

Materials

02451.10 Polymer Concrete Manhole Sections – Furnish polymer concrete manhole risers, cones, flattops, grade rings and base sections design to meet the loading requirements of ASTM C478, ASTM C857 and ACI 350-06 as modified for polymer concrete manhole design as follows:

1. Polymer Concrete Mix Design shall consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix. All sand and aggregate shall be inert in an acidic environment.
2. Reinforcement – Use acid resistant reinforcement (FRP Bar) in accordance with ACI 440.1R-06 as applicable for polymer concrete design.
3. The wall thickness of polymer concrete structures shall not be less than that prescribed by the manufacturer's design by less than 95% of stated design thickness.
4. Each polymer concrete manhole component shall be free of all defects, including indentations, cracks, and foreign inclusions that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. The nominal internal diameter of manhole components shall not vary more than 2%.
5. Marking and Identification - Each manhole shall be marked with the following information - Manufacturer's name or trademark, Manufacturer's location and Production Date.
6. Manhole joints shall be assembled with a bell/spigot or shiplap butyl mastic and/or rubber gasketed joint (ASTM C990) so that on assembly, manhole base, riser and top section make a continuous and uniform manhole. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.
7. Minimum clearance between wall penetrations and joints shall be per manufacturer's design.
8. Construct invert channels to provide smooth flow transition with minimal disruption of flow at pipe-manhole connections. Invert slope through manhole is as indicated on drawings. All precast base sections to be cast monolithically. Polymer bench and channel are to be constructed with all polymer concrete material, monolithically. Extended ballast slab requirements for buoyancy concerns can be addressed with cementitious concrete material.
9. Provide resilient connectors conforming to requirements of ASTM C923. All connectors are to be watertight. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.

10. Furnish tops to support AASHTO HS-20 or HL-93 or vehicle loading or loads as required and per Section 02450.30.

02451.20 Grouting – All materials needed for grouting and patching will be a polyester mortar compound provided by the manufacturer or an approved equal.

End of Section

Section 02452 – Crystalline Waterproofing Additive

Section 02452, which is not a Standard Specification, is included in this Project by Special Provision.

Description

1.01 SUMMARY

A. Section Includes: Furnishing of all labor, materials, services and equipment necessary for the supply and installation of crystalline waterproofing additive to concrete structures as indicated on the drawings and as specified herein. The crystalline waterproofing material shall be added to concrete during the mixing cycle and shall be used in above or below-grade walls and slabs, including liquid retaining structures where enhanced chemical resistance is required.

1.02 REFERENCES

A. Applicable Standards: The following standards are referenced herein:

1. American Society for Testing and Materials (ASTM)
2. Army Corps of Engineers (CRD)
3. American Concrete Institute (ACI)
4. NSF International (NSF)

1.03 SYSTEM DESCRIPTION

A. Crystalline Waterproofing Additive: Concrete waterproofing system shall be of the crystalline type, defined by the ACI 212.3R – 10 Report on Chemical Admixtures for Concrete as a “PRAH” type hydrophilic admixture. It shall react such that it chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. The system shall cause the concrete to become sealed against the penetration of liquids from any direction and shall protect the concrete from deterioration due to harsh environmental conditions.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. Testing Requirements: Crystalline waterproofing system shall be tested in accordance with the following standards and conditions, and the testing results shall meet or exceed the performance requirements as specified herein. Independent tests verifying these results shall be submitted prior to approval.

B. Independent Laboratory: Testing shall be performed by an independent laboratory meeting the requirements of the recognized specifying body of the country in which the testing is performed. Testing laboratory shall obtain all concrete samples and waterproofing product samples.

C. Crystalline Formation: Crystallizing capability of waterproofing system shall be evidenced by independent SEM (Scanning Electron Microscope) photographs showing crystalline formations within the concrete matrix at a magnification no greater than 2,000 times.

D. Water Permeability: Independent testing shall be performed according to U.S. Army Corps of Engineers CRD-C48 - Mod “Permeability of Concrete” and the European Standard EN-12390-8. Under CRD-C48 treated concrete samples shall be pressure

tested to 150 psi (350-foot head of water) or 1.05 MPa (106 m head of water). The treated samples shall exhibit no measurable leakage against control samples which shall exhibit full saturation and measurable leakage. EN-12390-8 testing shall show at least a 75 percent reduction in depth of water penetration for Admixture treated concrete as compared to the control concrete.

E. Petroleum Product Permeability: Independent testing shall be performed according the European EN – 12390-8. Treated samples shall show a more than an 80% reduction in depth of penetration for both diesel and unleaded gasoline as compared to a control concrete.

F. Acid Resistance: Independent testing shall be performed to determine “Sulfuric Acid Resistance of Concrete Specimens”. Treated concrete samples (dosage rates of 3%) shall be and tested against untreated control samples after 40 days of curing. All samples shall be immersed in 7% sulfuric acid and weighed daily until a control sample reaches a weight loss of 50%. At this time on final weighing the percentage weight loss of the 3% treated samples shall be 40% or lower.

G. Chloride Resistance: Independent testing shall be performed according the European Nordtest, NT Build 443 or other chloride penetration ponding test. Treated samples shall show a 50 percent or greater reduction in the chloride diffusion coefficient as versus the control concrete. Further, service life modeling based in testing shall show at least a doubling in expected time to corrosion for the reinforcing steel in the treated samples versus the control concrete.

H. Sulfate Resistance: Independent testing shall be performed against Australian Standard AS 1141.24, US Bureau of Reclamation - Procedure for Length Change of Hardened Concrete Exposed to Alkali Sulfates or another recognized international standard for weight loss and length change. Samples exposed to Ammonium Sulfate solution for 25 weeks shall show a weight loss of at least 25 percent less than the control concrete and a length change of - 0.01 percent or less than the control.

I. Freeze Thaw Resistance Testing: Independent testing against JUS U.M1.016, ASTM – C-666 or other recognized international standard for durability of air entrained treated samples shall show at least a 60 percent improvement for treated concrete versus that of a control concrete when subjected to 250 freeze thaw cycles.

J. Salt Scaling Resistance: Independent testing against JUS U.M1.055, ASTM C667 or other recognized international standard for salt scaling resistance shall show no visible scaling for treated sample versus a control sample which shall show showing scaling to a depth of at least 0.5 mm when samples are subjected to 25 freeze thaw cycles.

K. Compressive Strength: Independent testing shall be performed according to ASTM C39 “Compressive Strength of Cylindrical Concrete Specimens.” Concrete samples containing the crystalline waterproofing additive shall be tested against untreated control sample. At 28 days, the treated samples shall exhibit an increase in compressive strength over the control sample.

L. Concrete Shrinkage: Independent testing against Australian Standard AS 1012.13, ASTM C-157 or other recognized international standard for concrete shrinkage shall show reduced shrinkage for admixture modified concrete as compared to a control sample.

M. Fire Testing: Independent testing against a recognized international standard for fire testing shall show negligible difference between admixture treated concrete versus control concrete when slabs are exposed to a hydrocarbon fire.

N. Potable Water Approval: Independent testing shall be performed according to NSF Standard 61 and approved for use of waterproofing material on structures holding potable water shall be evidenced by NSF certification.

1.05 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer's specifications, installation instructions, and general recommendations for waterproofing applications. Also include manufacturer's certification or other data substantiating that products comply with requirements of Contract Documents.

C. Test Reports: Submit, for acceptance, complete test reports from approved independent testing laboratories certifying that waterproofing system conforms to performance characteristics and testing requirements specified herein.

D. Manufacturer's Certification: Provide certificate signed by manufacturer or manufacturer's representative certifying that the materials to be installed comply in all respects with the requirements of this specification.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer to have no less than 10 years' experience in manufacturing the crystalline waterproofing additive for the required work and be capable of providing field service representation during construction phase. Manufacturers that cannot provide the performance test data specified herein will not be considered for the project. Manufacturer to be ISO 9001 certified.

B. Applicator: Installer of crystalline waterproofing additive shall be approved by the manufacturer or manufacturer's representative in writing.

C. Pre-Installation Conference: Prior to installation of waterproofing, conduct meeting with Architect/Engineer, owner's representative, applicator (concrete supplier), concrete placer and waterproofing manufacturer's representative to verify and review the following:

    1. Project requirements for waterproofing as set out in Contract Document.

    2. Manufacturer's product data including application instructions.

D. Technical Consultation: The waterproofing manufacturer's representative shall provide technical consultation on waterproofing application.

1.07 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Delivery: Deliver packaged waterproofing materials to project site in original undamaged containers, with manufacturer's labels and seals intact.

C. Storage: Store waterproofing materials in dry, enclosed location, at temperature and humidity conditions recommended by manufacturer.

1.08 WARRANTY

A. Project Warranty: Refer to conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Manufacturer shall provide standard product warranty executed by authorized company official. Term of warranty shall be 1 year from Date of Substantial Completion.

Materials

2.01 MATERIALS

A. Acceptable Manufacturer: Xypex Chemical Corporation, 13731 Mayfield Place, Richmond, B.C., Canada V6V 2G9; Telephone 800-961-4477, 604-273-5265; Fax 604-270-0451; E-mail info@xypex.com; Website www.xypex.com.

B. Proprietary Products: Xypex crystalline waterproofing additives as follows:

1. Xypex Admix C-500 or Xypex Admix C-1000
2. Xypex Concentrate

C. Substitutions: No substitutions allowed without submission of test data proving that performance of requested substitute product is equal or better than the specified materials.

D. Source Quality: Obtain proprietary crystalline waterproofing products from a single manufacturer.

E. Or approved equal

2.02 DOSAGE AND MIXING

A. General: Xypex Admix must be added to concrete mix at time of batching.

B. Dosage Rate: Under normal conditions, the crystalline waterproofing powder shall be added to the concrete mix at a rate of 2 to 3 percent by weight of portland cement content. For enhanced chemical protection or meeting specific project requirements, consult with manufacturer or its authorized representative to determine appropriate dosage rates.

C. Waterproofing Construction Joints and Cold Joints Between Pours: Xypex Concentrate, single coat crystalline waterproofing; proprietary compound of Portland cement, silica sand and active chemicals, mixed with water at 3 parts powder to 1 part water or in proportions recommended by manufacturer to achieve full coverage with application method used. Application rate: 2.0 pounds/square yard (1.09 kg/square m).

D. Dry Pack Joint Compound: Dry pack consistency mixture of Xypex Concentrate; proprietary compound of Portland cement, silica sand and active chemicals; and water at 6 parts powder to 1 part water or in proportions recommended by manufacturer.

Construction

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data regarding installation, including technical bulletins, product catalogue, installation instructions and product packaging labels.

3.02 PROJECT CONDITIONS

A. Reinforcement: All reinforcement shall be rib deformed bar in accordance with applicable standards. Exposed concrete decks (joint free) shall contain sufficient reinforcement to minimize thermal movement and control cracking.

B. Setting Time and Strength: Some retardation of set may occur when using Xypex Admix. The amount of retardation will depend upon the concrete mix design, the dosage rate of the Admix, temperature of concrete and climatic conditions. Concrete containing Xypex Admix may develop higher ultimate strengths than plain concrete. Conduct trial mixes under project conditions to determine setting time and strength of the concrete. Consult with manufacturer or manufacturer's representative regarding concrete mix design, project conditions and proper dosage rate.

C. Weather Conditions: For mixing, transporting and placing concrete under conditions of high temperature or low temperature follow concrete practices as referred to in ACI 305R-77 (Hot Weather Concreting) and ACI 306R-78 (Cold Weather Concreting). For flatwork being placed in either hot, dry or windy conditions use of monomolecular film (evaporation retardant) is recommended to control loss of bleed water.

3.03 APPLICATION

A. General: Xypex Admix shall be added to the concrete mix at time of batching. Thorough blending of the Xypex Admix throughout the concrete mix is essential for correct performance of the product and, therefore, care should be taken to ensure that a homogeneous mixture is obtained.

B. Concrete Batching and Mixing: Procedures for mixing will vary according to type of batch plant operation and equipment.

1. Ready Mix Plant - Dry Batching Operation: Add Xypex Admix powder to drum of ready-mix truck, then add 60% - 70% of required water along with 300 – 500 pounds (136 - 227 kg) of aggregate. Mix the materials for 2 - 3 minutes to ensure that the Admix is distributed evenly throughout the mix water. Add balance of materials to the ready-mix truck and mix in accordance with standard batch practices.

2. Ready Mix Plant - Central Mix Operation: Mix Xypex Admix with water to form a very thin slurry (e.g. 15 - 20 pounds or 6.75 - 9 kg of powder mixed with 3 gallons or 13.6 liters of water). Pour the required amount of material in drum of ready-mix truck. The aggregate, cement and water should be batched and mixed in the plant in accordance with standard practices (taking into account the quantity of water that has already been placed in the ready-mix truck). Pour the concrete into the truck and mix for at least 5 minutes to ensure even distribution of the Xypex Admix throughout the concrete.

3. Pre-cast Batch Plant - Pan Type Mixer: Add Xypex Admix to the rock and sand, then mix thoroughly for 2 - 3 minutes before adding the cement and water. The total concrete mass should be blended using standard practices.

C. Construction and Cold Joints:

1. One coat of Xypex Concentrate slurry at a rate of 2 pounds/square yard is to be applied to the entire concrete substrate surface where the existing and new concrete will interface. Allow slurry to set or dry. No curing is required.
2. For hydrostatic conditions also apply sealing strips at each construction joint by filling grooves coinciding with construction joint.
    a. If grooves have not been preformed, at least 1-inch (25-mm) wide and minimum 1.5-inch (37-mm) deep, saw cut and chip grooves to that dimension.
    b. Apply specified slurry coat to slot at rate recommended by manufacturer.
    c. Fill and form surfaces using specified dry pack repair compound while slurry coat is still green, but after slurry coat has reached initial set.
    d. Compact tightly using pneumatic packer or hammer and block.

3.04 CURING

A. General: Concrete containing Xypex Admix shall be moist cured in accordance with ACI Reference 308, “Standard Practice for Curing Concrete”.

B. Curing Compounds: Curing compounds may be used if project requirements or conditions prevent moist curing. Curing compounds shall comply with ASTM C-309.

3.05 PROTECTION

A. Protection: Protect installed product and finished surfaces from damage during construction.

3.06 FIELD QUALITY CONTROL

A. Examination for Defects: Do not conceal Xypex treated concrete before it has been observed by Architect / Engineer, waterproofing manufacturer’s representative and other designated entities. Concrete shall be examined for structural defects such as honeycombing, rock pockets, tie holes, faulty construction joints, cold joints and cracks. Such defects to be repaired in accordance with manufacturer’s repair procedures.

B. Flood Testing for Suspended Slabs:

1. Perform flood test on completed waterproofing installation before placement of other construction.
2. Plug or dam drains and fill area with water to a depth of two inches (50 mm) or to within 0.5 inch (12.5 mm) of top of waterproofing treatment.
3. Let water stand for 24 hours.
4. If leaks are discovered, make repairs and repeat test until no leaks are observed.

3.07 INTERFACE WITH OTHER MATERIALS

A. Backfilling: Normal backfilling procedures may be used after concrete has been cured for at least seven days. If backfill takes place within seven days after concrete placement, then backfill material shall be moist so as not to draw moisture from the concrete. In no event shall backfilling take place before concrete has gained sufficient strength to withstand the applied load.

B. Grout, Cement Parge Coat, Plaster or Stucco: Because concrete containing Xypex Admix forms a relatively smooth surface and the resulting crystalline formation fills the concrete pores thereby reducing suction characteristics of the concrete, it may be necessary to use a suitable bonding agent for proper bonding of cementitious systems.

C. Responsibility to Ensure Compatibility: Xypex Chemical Corporation makes no representations or warranties regarding compatibility of Xypex treated concrete with coatings, plasters, stuccos, tiles or other surface-applied materials. It shall be the responsibility of the installer of the surface-applied material that is to be applied over the Xypex treated concrete, to take whatever measures are necessary, including testing, to ensure acceptance by or adhesion to the waterproofing treatment.

End of Section

Section 02510 - Reinforcement

Comply with Section 02510 of the Standard Specifications modified as follows:

02510.11(c) Coated Reinforcement Ties and Supports - Replace this subsection, except for the subsection number and title, with the following:

Ties and supports for coated reinforcement, including ties for coated to uncoated reinforcement connections, shall be nonmetallic coated.

End of Section

Section 02530 - Structural Steel

Comply with Section 02530 of the Standard Specifications modified as follows:

002530.10 Structural Steel for Bridges - Replace this subsection, except for the subsection number and title, with the following:

Structural steel for Bridges shall conform to the following, as shown or specified:

- AASHTO M 270, Grade 36 (ASTM A709, Grade 36)
- AASHTO M 270, Grade 50 (ASTM A709, Grade 50)
- AASHTO M 270, Grade 50W (ASTM A709, Grade 50W)
- AASHTO M 270, Grade HPS 70 (ASTM A709 Grade HPS 70)
- AASHTO M 270, Grade HPS 70W (ASTM A709 Grade HPS 70W)

Impact test requirements, for both non-fracture-critical tension components (T), and fracture-critical tension components (F), are to be according to Zone 2 requirements of AASHTO M 270 Tables 11 and 12, respectively.

End of Section

Section 02560 - Fasteners

Comply with Section 02560 of the Standard Specifications modified as follows:

02560.30(b) High Strength Tie Rods, Anchor Bolts and Anchor Rods - Add the following paragraph to the end of this subsection:

End stamp all ASTM F1554, Grade 105 according to ASTM F1554 Supplementary Requirements S2 and S3. If the end of the bolt is to be embedded in concrete, the projecting end from the concrete shall be the marked end.

End of Section

Section 02690 - PCC Aggregates

Comply with Section 02690 of the Standard Specifications modified as follows:

02690.20(e) Grading and Separation by Sizes for Prestressed Concrete - Replace this subsection with the following subsection:

02690.20(e) Grading and Separation by Sizes - Sampling shall be according to AASHTO R 90. Sieve analysis shall be according to AASHTO T 27 and AASHTO T 11. Provide aggregates meeting the gradation requirements of Table 02690-1 for structural concrete. Provide a CAgT to perform sampling and testing when required.

Table 02690-1
Gradation of Coarse Aggregates
Percent passing (by Weight)

		Sieve Size											
Size Number	Nominal Size Square Openings	(2½ in.)	(2 in.)	(1½ in.)	(1 in.)	(¾ in.)	(½ in.)	(⅜ in.)	(No. 4)	(No. 8)	(No. 16)	(No. 50)	(No. 200)
3	(2 to 1 in.)	100	90 to 100	35 to 70	0 to 15	—	0 to 5	—	—	—	—	—	**
357*	(2 in. to No. 4)	100	95 to 100	—	35 to 70	—	10 to 30	—	0 to 5	—	—	—	**
4	(1½ to ¾ in.)	—	100	90 to 100	20 to 55	0 to 15	—	0 to 5	—	—	—	—	**
467*	(1½ to No. 4)	—	100	95 to 100	—	35 to 70	—	10 to 30	0 to 5	—	—	—	**
5	(1 to ½ in.)	—	—	100	90 to 100	20 to 55	0 to 10	0 to 5	—	—	—	—	**
56	(1 to ⅜ in.)	—	—	100	90 to 100	40 to 85	10 to 40	0 to 15	0 to 5	—	—	—	**
57	(1 to No. 4)	—	—	100	95 to 100	—	25 to 60	—	0 to 10	0 to 5	—	—	**
6	(¾ to ⅜ in.)	—	—	—	100	90 to 100	20 to 55	0 to 15	0 to 5	—	—	—	**
67	(¾ to No. 4)	—	—	—	100	90 to 100	—	20 to 55	0 to 10	0 to 5	—	—	**
68	(¾ to No. 8)	—	—	—	100	90 to 100	—	30 to 65	5 to 25	0 to 10	0 to 5	—	**
7	(½ to No. 4)	—	—	—	—	100	90 to 100	40 to 70	0 to 15	0 to 5	—	—	**
78	(½ to No. 8)	—	—	—	—	100	90 to 100	40 to 75	5 to 25	0 to 10	0 to 5	—	**
8	(⅜ to No. 8)	—	—	—	—	—	100	85 to 100	10 to 30	0 to 10	0 to 5	—	**
89	(⅜ to No. 16)	—	—	—	—	—	100	90 to 100	20 to 55	5 to 30	0 to 10	0 to 5	**

* Use two or more seperated sizes which when combined meet these gradation limits.

** See 02690.20(a). Do Not evaluate material passing the No. 200 sieve according to 00165.40.

02690.20(f) Grading and Separation by Sizes for Other Concrete - Delete this subsection.

02690.30(g) Grading - In the paragraph that begins “Sampling shall be according to…”, replace the words “AASHTO T 2” with the words “AASHTO R 90”.

End of Section

Section 02830 - Metal Handrail

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 02830, which is not a Standard Specification, is included in this Project by Special Provision.

Description

02830.00 Scope - This Section includes the requirements for the steel in handrail for stairways and pedestrian facilities.

Materials

02830.10 Shapes, Plates, and Bars - Shapes, plates, and bars shall conform to ASTM A36.

Punch anchor plate bolt holes at the locations shown before fabrication.

02830.20 Steel Pipe - Steel pipe shall conform to ASTM A500, seamless, Grade B.

02830.21 Steel Tube - Steel tube shall conform to ASTM A500, seamless, Grade B.

02830.22 Fasteners - Fasteners shall meet the requirements of Section 02560. Machine screws shall be SAE 18 8 stainless steel.

02830.30 Galvanizing - Hot-dip galvanize all handrail components according to AASHTO M 111 (ASTM A123) after shop fabrication.

02830.31 Repair of Hot-Dip Galvanizing - Repair damaged hot-dip galvanizing according to ASTM A780 and ASTM A123. Minimum zinc content for Method A2 is 94 percent on the dry film.

02830.40 Incidentals - Plates, caps, and miscellaneous pieces necessary to complete the rail shall be as shown.

02830.50 Acceptance - Acceptance of handrail Materials will be according to 00165.35 and this Section.

End of Section

Section 02831 - Pedestrian Fence

(This Section is not published in the Oregon Standard. Delete item(s) that are included in the subsection, paragraph, sentence, or bullet that are not required on the Project. In general, do not re-number or re-letter subsections when item(s) are deleted.)

Section 02831, which is not a Standard Specification, is included in this Project by Special Provision.

Description

02831.00 Scope - This Section includes the requirements for the metals in pedestrian fence.

Materials

02831.10 Aluminum Parts - Posts, post caps, post bases, rails, and spindles shall conform to 6061-T6 aluminum. Punch post base bolt holes at the locations shown before fabrication.

02831.20 Fasteners - Fasteners shall meet the following requirements:

Threaded rods –	ASTM A193 Grade B7 Galvanized
1/2 inch dia. steel nuts –	ASTM A194 Grade 8M Galvanized
1/2 inch dia. SAE steel flat washers –	ASTM F436 Type 1 Galvanized

02831.40 Acceptance - Acceptance of pedestrian rail Materials will be according to 00165.35 and this Section.

End of Section

Section 02910 – Sign Materials

Comply with Section 02910 of the Standard Specifications modified as follows:

02910.75 Manufacturer's Warranty – Add the following paragraph to the end of the subsection:

The Agency will date all approved signs at project completion. That date is the start of the Warranty period.

End of Section

Section 02926 - Highway Illumination Materials

Comply with Section 02926 of the Standard Specifications modified as follows:

Add following subsection:

02926.41(f) Electrical Splice Materials - Furnish electrical splice materials meeting the following requirements:

- **Split bolt** - Made of silicon bronze to securely join the wires both mechanically and electrically.
- **Heat-shrink tubing** - Split-resistant and adhesive-lined tube made of polyolefin complying with UL 224 or UL 486D, temperature range -67°F to 230 °F, with 600 V rated inner melting wall or liner to provide void-free encapsulated insulation.
- **Insulating rubber tape** - Electrical grade, nondrying, rubber based, elastic type complying with ASTM D4388.
- **Insulating vinyl plastic tape** - Low temperature (0°F) resistant, vinyl chloride plastic, electrical insulating tape with pressure-sensitive adhesive. Comply with ASTM D3005.

End of Section