

**SECTION 00510 - STRUCTURE EXCAVATION AND BACKFILL**

*(Follow all instructions and make all edits with “Track Changes” turned on. If there are no instructions [purple text] above a subsection, paragraph, sentence, or bullet, then include it in the Project. Delete all purple text before preparing the final document. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)*

Comply with Section 00510 of the Standard Specifications modified as follows:

**00510.00 Scope** - Replace the paragraph that begins “This Work does not include any ...” with the following paragraph:

This Work does not include any earthwork covered under any sections of Parts 00300 or 00400, or any earthwork that may be specifically included and provided for as Incidental Work for particular items or parts of the Work. The construction, measurement, and payment of embankment at bridge ends and engineered fills is according to Section 00330.

**00510.04(a) Defined Shoring Systems** — Replace the sentence that begins “Select Shoring systems...” with the following sentence:

Select Shoring systems for construction from the list of defined Shoring systems provided in Section 16.3.26 of the ODOT GDM.

*(Use the following paragraphs and table when shoring is required.)*

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:*

<i>Beginning Station</i>	<i>Ending Station</i>	<i>Shoring System Type(s) Allowed</i>
<i>Station 1+55 Rt.</i>	<i>Station 2+45 Rt.</i>	<i>All</i>
<i>Station 4+00 Lt</i>	<i>Station 4+40 Lt.</i>	<i>5A</i>

)

Beginning Station	Ending Station	Shoring System Type(s) Allowed
Station (Lt.)(Rt.)	Station (Lt.)(Rt.)	

**00510.04(b) Atypical Shoring Systems** — Replace the paragraph that begins “Shoring systems that are not on the list...” with the following paragraph:

Shoring systems that are not on the list of Shoring types published in Section 16.2.4.2 of the ODOT GDM are considered atypical Shoring systems. If proposing an atypical Shoring system, submit stamped Working Drawings according to 00150.35. The review and response time allowed for the Agency to return the Working Drawings will be 120 Calendar Days. ~~The~~ ~~Submission~~ of calculations and other data ~~must~~ satisfying the requirements of the Specifications and include sufficient detail and explanation of the design for the Agency to process and comment on the Working Drawings. If the Engineer requests additional information or explanation related to the review of the atypical Shoring system the Engineer may restart the 120-Calendar Day review period.

Replace the bullet that begins "A list of supervisory personnel ..." with the following bullet:

- A list of supervisory personnel who are on-site during construction of the atypical Shoring system and documentation of their experience and qualifications to perform the Work.

Replace the paragraph that begins “Geotechnical and structural analysis ...” with the following paragraph:

Geotechnical and structural analysis and design for the Shoring include, but are not limited to the items listed in the Shoring Design Checklist. Submit a completed Shoring Design Checklist and a written Shoring Design Summary, prepared by the shoring design engineer, to accompany the Working Drawings and calculations. Include the following in the Design Summary:

Replace the bullet that begins "Performance requirements (actual threshold ..." with the following bullet:

- Performance requirements (actual threshold limits of tolerable differential foundation settlement and lateral movement). Indicate how the performance requirements are monitored during construction.

**00510.13(1) Material Passing No. 200 Sieve** - Replace the paragraph that begins “The amount of Materials passing ...” with the following paragraph:

Ensure the amount of Materials passing the No. 200 sieve does not exceed 15 percent by weight. Test according to AASHTO T 11.

**00510.13(2) Plasticity Index** - Replace the paragraph that begins “The plasticity index of the ...” with the following paragraph:

Ensure the plasticity index of the Material passing the No. 40 sieve does not exceed 6. Test according to AASHTO T 90.

**00510.40 Clearing, Grubbing, and Removal Work** - Replace this subsection, except for the subsection number and title, with the following:

Perform clearing, grubbing and removal work according to Section 00310 and Section 00320.

Perform clearing, grubbing, and removal at least 10 feet outside of the entire Structure, including the ends of the Structure but within the Right-of-Way.

**00510.41 Structure Excavation** - Replace the paragraph that begins “Concrete placed against steel ...” with the following paragraph:

Concrete placed against steel sheet piles in cofferdams or cribs are considered placed against undisturbed material, whether or not the steel sheets are later removed.

**00510.44(a) Cofferdams and Cribs** - Replace the paragraph that begins “Do not begin cofferdam or crib ...” with the following paragraph:

Do not begin cofferdam or crib construction Work until all submittals have been approved. Upon completion of the cofferdam construction, and immediately after dewatering, field inspect the cofferdam with the cofferdam design engineer of record and accompanied by the Engineer. Do not continue construction until the cofferdam design engineer provides the Engineer a written statement that the cofferdam conforms to the design and will serve the intended purpose.

**00510.44(b) Shoring** - Replace the paragraph that begins “Upon completion of the Shoring construction ...” with the following paragraph:

Upon completion of the Shoring construction, field inspect the Shoring with the shoring design engineer of record, accompanied by the Engineer. Do not continue construction until the shoring design engineer provides the Engineer a written statement that the Shoring conforms to the design and will serve the intended purpose.

**00510.45 Pumping** - Replace the paragraph that begins “No pumping of water from the ...” with the following paragraph:

No pumping of water from the interior of any foundation enclosure is allowed during the placing of concrete or for a period of at least 24 hours thereafter unless an effective means of eliminating moving water through fresh concrete is employed. Water may then be pumped, if approved.

**00510.48(b)(3)(a) Test Pad Method** - Replace the paragraph that begins “Before placing the wall backfill ...” with the following paragraph:

Before placing the wall backfill, determine the number of Passes necessary to achieve the specified density by constructing a test pad that is at least 5 feet wide, 15 feet long, and 3 feet in final depth. Construct test pad fill in layers no more than 8 inches thick using the same Equipment and methods that are used to compact the wall backfill. Perform at least one density test according to AASHTO T 310 on each test pad layer. Construct and test a new

test pad when changes in Material occur or different Equipment is used during the construction of the wall backfill.

**00510.48(d) Reinforced Concrete Box Culverts, Structural Plate Structures and Pipe Culverts Over 72 Inches in Diameter** - Replace the paragraph that begins “Provide bedding, if required ...” with the following paragraph:

Provide bedding, if required, according to 00405.12. Use backfill Materials meeting the requirements of 00510.12 or 00510.13 unless otherwise specified. Place and compact as shown and according to 00405.46. Place backfill up to the surrounding ground surface, to the top of trench, or the upper backfill pay limits shown or as directed.

*(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)
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*(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)
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**00510.90(d) Granular Wall/Structure Backfill** - Replace the paragraph that begins “Payment will be payment ...” with the following paragraph:

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

*(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.

<b>A. Contract Plans, Specifications, Permits, etc.</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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>B. Loads</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>C. Allowable Stresses</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>D. Timber Construction</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>E. Steel Construction</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>F. Compression Members, Bracing Members and Connections</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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. Have 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.

<b>A. General</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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>B. Design Standards</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
1. Does the shoring design comply with standards identified in ODOT GDM 16.3.26.3 and related sections?	_____	_____	_____
2. Is the design standard and edition identified in the shoring design calculations?	_____	_____	_____
<b>C. Loading</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>D. Geotechnical and Structural Analysis</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>E. Materials</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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?	_____	_____	_____
<b>F. Shoring Working Drawings</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
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****YES****NO****N/A**

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?

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\_\_\_\_\_

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2. Has a load testing program been provided for soil nails, tiebacks, or other applicable elements of the shoring system?

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\_\_\_\_\_  
Design Engineer of Record Signature

\_\_\_\_\_  
Date

