SECTION 00510 - STRUCTURE EXCAVATION AND BACKFILL

(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. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)

(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. 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.

	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 16.3.26.3 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