

## Bridge CAD Manual

Delivery & Operations Division | Bridge Engineering Section  
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**Oregon Department of Transportation**

Engineering and Technical Services Branch

Bridge Engineering Section, MS#4

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<https://www.oregon.gov/odot/Bridge/Pages/Bridge-Design-Manual.aspx>

### Acknowledgement

This document is the work product of the Bridge Program and Standards Unit of the Bridge Engineering Section. The Section is the technical owner of the content, while the Unit has the stewardship responsibility to keep the content up-to-date and communicate changes to the users of this manual.

Suggested modifications to this document can be made to the Senior CAD Standards Specialist in the Bridge Section, Program and Standards Unit.

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# Revisions

Date	Part	Section	Description
9/12/2022	All	All	Update contents and format – draft version
5/03/2023	100	101	Clarified criteria for which walls are included in the J series; direction to abbreviations and acronyms in the OCM; updated hyperlinks
	200		Edited heading
		203	Added CAD plans review; updated flow chart and process; removed Project Completion section
		204	Changed sheet numbering; added guidance for adding sheets during Final Plans
		205	Table format, heading and text changes
		206	Minor format and text changes; added diameter example
	300	302.2, 302.3, 302.4	Clarifying text; update title block examples; added link to Bridge Naming Rules
		303	Text changes to Location Map description and Figure 303-2 description
	400	402.1, 402.2	Clarifying text
	500	502	Updated text for 501 Bridge Maintenance Plans descriptions and bent labeling
		503-512	Minor text changes; updated and added figures
	600	601	Added clarifying text for requesting structure and drawing numbers
	700	701	Revised process text; revised Figure 701-1

## Part 100 Introduction

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## Section 101 Preface

The Bridge CAD Manual (BCM) is a supplement to the ODOT CAD Manual (OCM), which includes the procedures, methods, and standards for developing and preparing final Bridge construction and maintenance plans. Where the two manuals conflict, the BCM takes precedence. It also provides the standards used in the preparation of these plans using the Computer Aided Drafting (CAD) in MicroStation format to be used by ODOT staff, consultants and outside agency personnel.

ODOT staff and consulting engineer staff working on ODOT Bridge projects will perform bridge CAD services and construction and maintenance plan production using ODOT's current version of Bentley MicroStation or OpenBridge Modeler software, as required.

This publication contains information, instructions and examples for the preparation of major structure plans, such as bridges (including culverts over 20' in diameter/span), tunnels, sound walls attached to a bridge and bridge retaining walls (as defined by the Geotechnical Design Manual (GDM)). Other major structures requiring a BDS number are in the respective discipline's section of the plans and are drawn according to their CAD manual.

Updates to this manual are an ongoing process and revisions are issued as required or every six months in April and October.

## Section 102 Introduction

This manual includes direction and guidance for structure plans development including CAD files, plans layout and development, sheet order and numbering. Example drawings are included for common plan sheets. Abbreviations and acronyms are found in the OCM.

## Section 103 Resources

### *ODOT Manuals and Other Documents*

ODOT CAD Manuals

ODOT Standard Drawings and Details

ODOT Standard Specifications and Bid Items

### *Bridge Section Manuals and Forms*

Bridge Design Manual

Bridge Guidance Documents

1. Includes:

a. Bridge Data System (BDS) User Guide

b. Structure Naming and Numbering

c. Bridge Log

Bridge Forms and Templates

1. Includes:

a. Checklists

b. Structure and Drawing Number Request Form

### *CAD Software and ProjectWise Support*

Engineering Applications Support Team (EAST)

ProjectWise

### *Archived Projects and GIS Data*

ODOT TransGIS

Bridge Data System (BDS) – Contact ODOT Bridge Engineering Section for access

ODOT Map Center (R/W Maps and Contract Plans)

ODOT Engineering Archives

Virtual Highway Corridor (ODOT only)

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## Part 200 General Plans Development

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## Section 201 Introduction

This General section of the Bridge CAD Manual includes information pertaining to structure CAD files and sheets for a set of structure plans included in the “J” series of an ODOT plan set. Standards for other structures not included in this manual can be found in the respective CAD manuals. For general ODOT plans standards, including abbreviations and common terms, see the ODOT CAD Manual (OCM).

## Section 202 Overview

There is a general process that applies to all structural CAD files and drawings. This process ensures that record copies of these CAD files and drawings are maintained for future reference.

## Section 203 CAD Standards Plans Review

The CAD standards plans review will be performed during plans production to assure adherence to the ODOT standards, as well as consistency in the plan set. This does not preclude reviews required by consultant contract.

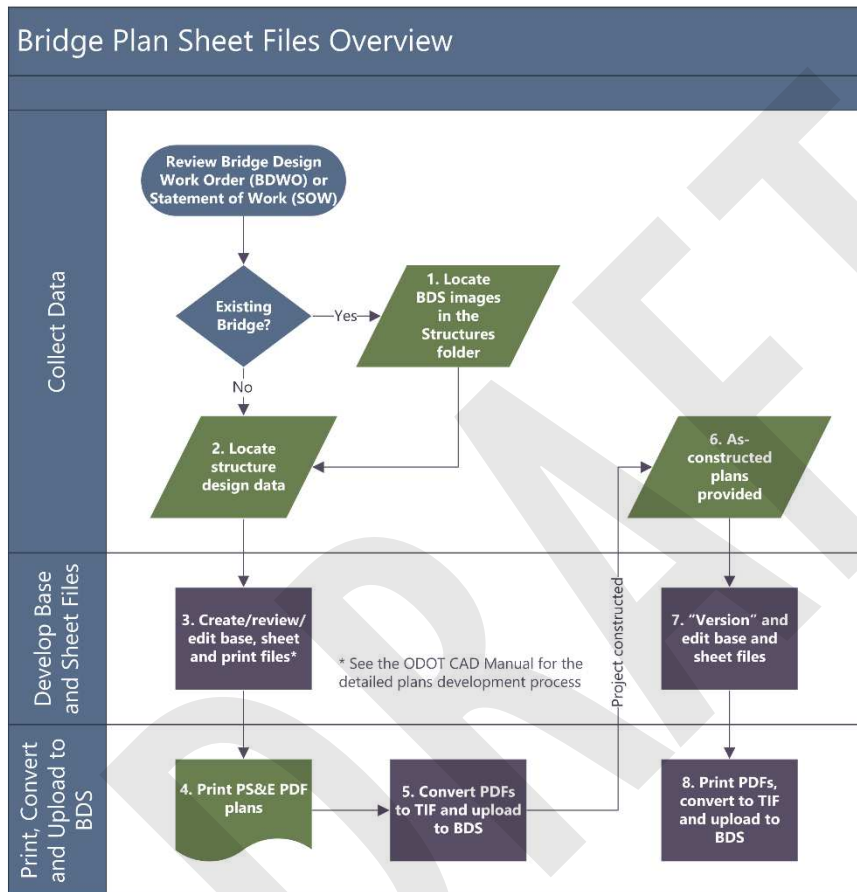
The reviews may be done at any time during the plans development process, however there are scheduled reviews at DAP and Advance plans corresponding to the bridge design “Submit to Reviewer”. The CAD reviewer will be another CAD Tech, other than the one who produced the plans. Large projects may require multiple reviewers. When there are multiple reviewers, a CAD reviewer lead will be designated. District maintenance and other small projects that don’t conform to the same review process as a STIP project have a single review at the final “Submit to Reviewer”.

[Link to CAD Review Checklist](#)



## 203.1 Structural plan sheet development process summary:

Figure 203-1 Bridge Plan Sheet Files Overview Flow Chart



See the ODOT CAD Manual for a more detailed workflow process.

1. Locate the data needed to develop the plans. Create and maintain CAD files in ODOT's ProjectWise folder structure in accordance with the OCM and the ODOT ProjectWise User's Manual. All documents must be named in accordance with the ProjectWise naming conventions and include the structure number(s) in the file attributes.
2. After plans are developed, produce PDFs in the ProjectWise "Structures" folder and provide a link to the designer to access the file for review. Repeat this process until plans are adequately developed for the upcoming milestone review. A link to the PDF is also

made available to the CAD Tech reviewer, according to Section 203 of this manual.

Make edits and continue the edit and review process for each submittal.

3. When the risk of adding or removing sheets is low, typically around the Advance Plans review, the CAD Tech obtains structure numbers from the Bridge Data System (BDS). Immediately prior to Final Plans review the CAD Tech will acquire drawing numbers. See the [Bridge Data System User Guide](#) for details. The Bridge Designer provides the calculation book number from Bridge Section headquarters, as required.
4. At the Plans, Specifications and Estimate (PS&E) milestone, the CAD Tech prints PDFs with the appropriate structure, calculation book and Bridge Data System (BDS) drawing numbers. The Bridge Designer, digitally signs the PDFs. See the OCM for details.
5. At bid opening, the CAD Tech exports the digitally signed PDF files to TIF files (400 dpi) and uploads the images into BDS. See the Bridge Data System User Guide for TIF file settings.
6. When as-constructed comments are provided, the CAD Tech makes edits as directed. See Part 700 of this manual for the As Constructed procedure. When the edits are complete, new TIF images are created and uploaded into BDS to replace the contract plans images.

Digitally signed PDF files, CAD files and all other related documents will remain in ProjectWise with the project documents.

For local agency projects, original signed documents may be kept by the owner of the structure.

## Section 204 Plan Sheet Numbering

In addition to a sheet number, structures also require a BDS drawing number for filing in BDS. (See the [Bridge Data System User Guide](#) for requirements.)

The plan sheet numbering and order are important aspects of the plan set. Users of the plans should be confident in finding the information they need. When there are multiple structures, it is important to be consistent throughout.

See the [ODOT CAD Manual](#) for general sheet numbering guidance. Below are some examples of structure sheet numbering options.

1. Single structure: J01, J02,...J32
2. Multiple structures:
  - a. Structure Layout and Index: J01, J02

- b. Common General Notes: J03
- c. Bridge or Interchange A: JA01, JA02,...JA20 (incl. details specific to the structure)
- d. Bridge or Interchange B: JB01, JB02,...JB32 (incl. details specific to the structure)
- e. Common detail sheets: JZ01, JZ02,...JZ12 (details applicable to multiple structures)
- 3. Single Structure plans over 50 sheets:
  - a. Option 1:
    - i. General sheets: JA01, JA02,...JA05
    - ii. Foundation sheets: JB01, JB02,...JB09
    - iii. Superstructure sheets: JC01, JC02,...JC09
    - iv. Substructure sheets: JD01, JD02,...JD20
    - v. Miscellaneous sheets: JE01, JE02,...JE22.
    - vi. Wall sheets: JE01, JE02,...JE05
  - b. Option 2:
    - i. General sheets: JA01, JA02,...JA05
    - ii. Spans 1 through 4: JB01, JB02,...JB05
    - iii. Spans 5 through 11: JC01, JC02,...JC09
    - iv. Miscellaneous sheets: JD01, JD02,...JD09
    - v. Wall sheets: JE01, JE02,...JE05

When it is necessary to add sheets after Advance Plans, it is acceptable, but not preferable, to add a "-1", "-2", etc. to the sheet number to avoid renumbering sheets in that series. For example: JA01, JA02...JA20, JA20-1, JA20-2, JA21, etc.

## Section 205 Plan Sheet Order

This is a general listing of sheets. The structure may not require all sheet types. There may also be details required that are not listed.

NOTE: Some details and notes may be added to related sheets as space is available.

Table 200-1 Plan Sheet Order

SHEET CATEGORY	SHEET TITLE AND NOTES
GENERAL	<p>Structure Index</p> <ul style="list-style-type: none"> <li>Project overview map identifying the location of each structure and an accompanying table with structure, sheet and drawing number information</li> </ul> <p>Structure Layout</p> <ul style="list-style-type: none"> <li>Plan overview of complex structures, such as interchanges</li> </ul> <p>Plan and Elevation</p> <ul style="list-style-type: none"> <li>Includes Location map</li> <li>The Elevation view may not be required for projects that don't have work below the deck (surfacing projects, for example)</li> </ul> <p>Railroad Data</p> <ul style="list-style-type: none"> <li>Data shown per the railroad's approval</li> </ul> <p>General Notes</p> <p>Live Load and Design Criteria (if not included in the General Notes)</p> <p>Grade Line Profile</p> <p>Superelevation Diagram</p> <p>Clearance Diagram</p> <p>Stage Construction or Construction Sequence and Concrete Pour Sequence</p>



FOUNDATION DETAILS	<p>Geotechnical Data</p> <ul style="list-style-type: none"> <li>Sheet provided by Geotechnical CAD. Uses the Geology naming convention for the sheet file.</li> </ul> <p>Foundation Plan</p> <ul style="list-style-type: none"> <li>Includes seismic details, pile tip data and Foundation Notes</li> </ul> <p>Foundation Details</p> <ul style="list-style-type: none"> <li>Footing, Drilled Shaft Details</li> </ul>
SUPERSTRUCTURE DETAILS	<p>Deck Plan</p> <ul style="list-style-type: none"> <li>Includes deck plan "bubble" notes and rail pay limits</li> </ul> <p>Typical Deck Section</p> <p>Deck Details</p> <p>Diaphragm Details</p> <p>Steel Framing Plan</p> <p>Steel Framing Details</p> <p>Girder Schedule</p> <p>Girder Plan and Elevation</p> <p>Girder Section and Details</p> <p>Camber Diagram</p> <p>Post-tensioning Details</p> <p>Seismic Details</p>
SUBSTRUCTURE DETAILS	<p>Bent # Plan and Elevation</p> <p>Bent # Details</p> <p>Crossbeam Details</p> <p>Bearing and Shear Lug Details</p> <p>Seismic Details</p> <p>Wingwall Details</p> <p>Bridge Retaining Wall Details</p> <ul style="list-style-type: none"> <li>See the Geotechnical Design Manual for the definition of a "Bridge Retaining Wall"</li> </ul>

MISCELLANEOUS DETAILS	<p>Excavation and Backfill Details</p> <p>Concrete Finish Diagram</p> <p>Bridge Approach Slab Details</p> <p>Joint Details</p> <p>Traffic Sign/Signal/Luminaire Mount Details</p> <p>Rail, Rail End Post and Rail Transition Details</p> <p>Protective Screening Details</p> <p>Sound Wall Details</p> <ul style="list-style-type: none"> <li>Sound walls attached to the bridge will be in the bridge plans. If the sound wall extends beyond the bridge approach slab, that portion beyond the slab will reside in the Geotechnical plans.</li> </ul> <p>Slope Paving Details</p> <p>Drainage Details</p> <p>Utility Details</p> <p>Illumination Details</p> <p>Bridge Protective System Details</p> <p>Fall Protection System Details</p> <p>Cathodic Protection Details</p> <p>Protective Coatings Details</p> <p>Mechanical Details</p> <p>Electrical Details</p> <p>Architectural Treatment Details</p> <p>Temporary Concrete Barrier Details</p> <p>Temporary Work Bridge Details</p>
DETAILS COMMON TO MULTIPLE STRUCTURES	<p>When multi-structure projects have common details, place them after the structure sheets and number them using JZ##.</p>

## Section 206 Notes, Annotations and Tables

The general guidance for note formatting and orientation is available in the OCM. This section of the BCM will address the general notes, labels and tables used in structure plans and the CAD tools available for them. When abbreviations are required, use only accepted abbreviations from the OCM.

### 206.1 General Notes and “Floating” Notes

The General Notes are included in nearly all structure project plans. They can range from a few sentences to multiple pages. A Microsoft Word template for the General Notes is downloadable here: [General Notes](#). Some notes have been created as tables in the workspace to control formatting. Use abbreviations sparingly and spell out acronyms the first time they are used.

The diameter symbol ( $\varnothing$ ) may only be used in dimensions and not in notes.

“Floating” notes requiring extra emphasis, may be outlined by a rectangular shape.

Many common notes are available in the Bridge Bubble Note tool (*pending*), Structure Cache and Place Table.

## 206.2 Dimensions and Labels

Dimensions and labels standards are set by the “ODOT ft-in” dimension style, except where decimal format is the industry standard.

Table 200-2 Dimension Precision Table

Item	Tolerance
Structural Steel	$\frac{1}{16}''$
Welds	$\frac{1}{16}''$
Concrete	$\frac{1}{8}''$
Camber Diagrams	$\frac{1}{8}''$

NOTE: If a series of dimensions do not add up to the exact overall dimension, use a plus or minus symbol ( $\pm$ ) following the series dimension (e.g. 25 girder spaces @  $9'-3\frac{1}{8}'' \pm = 231'-7''$ ).

Dimensions of 12 inches or greater are expressed in feet-inches (e.g. 1'-0"). Dimensions of more than one foot with fractions less than one inch require a leading zero (e.g. 1'-0½"). Pipe diameters are always called out in inches.

Intersection angles should be dimensioned as the acute angle centerline to centerline.

Some items use an industry defined format such as steel shapes. \*

- W44x335
- HP18x204
- C4x7.25
- L8x6x¼
- HSS8x4x¼
- HSS6x0.5

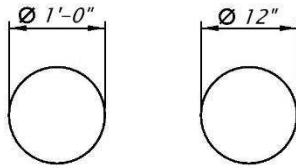
Steel plate is dimensioned as thickness x width x length where thickness and width are expressed in inches and length in feet and inches (e.g. PL¼ x 8½ x 1'-4").\*

\* Some steel callout formats have changed from previous years.

In addition to the diameter and radius options in the ODOT CAD Manual, bridge plans allow the following options:



140 Figure 206-1 Diameter and Radius Dimension examples



141

## 142 206.3 Match Lines

143 *Pending*

## 144 206.4 Tables

145 Tables are to use the standards defined in the OCM for text. Premade tables are available in the  
 146 Bridge Cache or as a seed in the Place Table dialog (may be linked to an Excel file, as desired).

## **Part 300 MicroStation Base Files & Title Block**

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## Section 301 Introduction

This General section of the Bridge CAD Manual includes information pertaining to all or most of the CAD files and sheets for a set of structure plans. For overall ODOT plans standards, see the ODOT CAD Manual.

## Section 302 CAD Files

### 302.1 Overview

All project CAD and associated files are to be produced and maintained in ODOT's ProjectWise folder structure. When a project requires multiple CAD Techs, a CAD Tech Lead is agreed upon to coordinate plans production, review and organization.

### 302.2 Plans Base Reference Files

#### ◆ Base Models

The Design Base file is a **design** type model that contains design line work (2D or 3D) developed by or under the direction of the Bridge designer. The plan view of the structure is coordinate correct may contain some coordinate correct text, such as street/hwy. names, waterway names, and R/W labels. This data may be used for more than one structure plan sheet, as well as used by other disciplines. The Engineer is ultimately responsible for this data and coordinates with the CAD Tech to ensure its accuracy.

If in a separate file, the location map image is considered "base" data and uses the "CAD Base" naming convention in ProjectWise.

The CAD base file is typically a **drawing** type model, set to an annotation scale. It may be generated from 3D graphics. The drawing model references design model line work and may be used by other disciplines. It contains applied patterns and may include annotation.

## ◆ Base Model Graphics From Other Disciplines

Graphics from other disciplines, as available, will be referenced and not copied. A base file that references all other disciplines graphics may be created to be referenced by multiple plan and detail views.

## 302.3 Plan Sheet Files

Sheet files are in the *2\_Plan Sheets* folder and may contain one or more sheet models. Sheet models reference the title block and design or drawing models. It is best practice to use the sheet number as the name of the sheet model, then create a text field for the sheet number in the title block that points to it. The sheet model description may be used for the sheet title in the title block and create a text field in the sheet title to point to it, if not using the titles from the title block file. Annotation in a sheet model applies to that specific sheet, such as the sheet number, the drawing number and general text.

## 302.4 Structure Title Block

The title block file contains design type models for the title block and text common to the sheets. Some sheet titles are pre-populated in the title block file and may be used for the sheet by turning levels on or off. See the ODOT CAD Manual for details about how the title block file is used.

The plan sheet title block gives the reader crucial information about the plan set and the sheets in it. If it is consistent in its layout, then the user can efficiently find the information they need for bidding and construction. The ODOT CAD Manual contains the basic elements that make up the title block. This section provides guidance for the parts of the title block that are specific to structure plans.

## ◆ Plan and Elevation Sheet

Figure 302-1 Example title block for the plan and elevation sheet for a single structure.

**1** Enter the structure name used for the Bridge Data System (BDS). See [Bridge Naming Rules](#)

**2** Include when replacing an existing structure.  
For local agency structures show *Agency, structure name, no. XXXX*

**3** Bridge Data System (BDS) structure number.

**4** BDS drawing number.

**5** Calculation book number provided by the Designer.

**6** ODOT highway number, as applicable. Milepoint at the location of the structure as defined by the BDS naming rules or the applicable design manual.

**7** County where the structure is located.



**8** Month and year of applicable submittal.

**9** The “Accompanied By Dwgs.” appears on the first sheet for each structure and lists the remaining sheets in the plans for that structure, sheets in other sections of the plans and standard drawings required for the structure. The “Not For Construction – Informational Dwgs.” appears on the first sheet for each structure when existing as-

constructed plans are being referenced. These boxes may be located along side or above the title block, but should be kept together when both are required.

## ◆ Detail Sheet

Figure 302-2 Example title block for the remaining sheets for a single structure plan.



<b>1</b> For informational drawings, see sht. J01. For accompanied by drawings, see sht. J01.		STRUCTURE NO. 00000			OREGON DEPARTMENT OF TRANSPORTATION		
		BDS DWG NO. 00000			STRUCTURE NAME PROJECT TITLE PROJECT TITLE PROJECT TITLE HIGHWAY COUNTY		
CALC. BOOK 0000		HWY: 000 M.P.: 000.00-000.00			Designer: Name Reviewer: Name		
COUNTY County Name		DATE MM/YYYY			Drafter: Name Checker: Name		
RENEWS: MM-DD-YYYY FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST		SHEET NO. 00000					

**SCALE WARNING**  
IF THIS SCALE LINE DOES NOT MEASURE ONE INCH, THEN DRAWING IS NOT TO SCALE

**1** Use these notes to refer to the first sheet for the structure (the sheet number callout may be different than shown). The "For informational drawings..." note applies to structures when existing plans are being referenced.

## ◆ Multiple Structures – Location and Index Sheet

Figure 302-3 Example title block for the layout and index sheet for a project with multiple structures.

2	STRUCTURE NO. See table		OREGON DEPARTMENT OF TRANSPORTATION		
	BDS DWG NO. 00000		1	VARIOUS STRUCTURES PROJECT TITLE PROJECT TITLE HIGHWAY COUNTY	
3	CALC. BOOK 0000			Designer: Name Drafter: Name	
SCALE WARNING IF THIS SCALE LINE DOES NOT MEASURE ONE INCH, THEN DRAWING IS NOT TO SCALE	HWY: VARIOUS M.P.: VARIOUS COUNTY Various DATE MM/YYYY		RENEWS: MM-DD-YYYY FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST	STRUCTURE LOCATION AND INDEX	

- 1 When there are multiple structures that the sheet applies to, enter “Various Structures” in place of the structure name.
- 2 Enter “See table”, referring to the table of structures.
- 3 Enter “Various” for highway, milepoint and county as needed.



## ◆ Multiple Structures – Common Detail Sheet

Figure 302-4 Example title block for a common detail sheet for a project with multiple structures.

##### STRUCTURE NAME  
##### STRUCTURE NAME  
##### STRUCTURE NAME  
##### STRUCTURE NAME  
##### STRUCTURE NAME

For informational drawings, see sht. J01.  
For accompanied by drawings, see sht. J01.

STRUCTURE NO.  
See table

BDS DWG NO.  
00000

CALC. BOOK  
0000

HWY: VARIOUS  
M.P.: VARIOUS

COUNTY  
Various

DATE  
MM/YYYY

RENEWALS: MM-DD-YYYY

REGISTERED PROFESSIONAL  
ENGINEER  
PRELIMINARY COPY  
INFORMATION ONLY  
00  
DD, YYYY  
RST I. LAST

OREGON DEPARTMENT  
OF TRANSPORTATION

VARIOUS STRUCTURES  
PROJECT TITLE  
PROJECT TITLE  
PROJECT TITLE  
HIGHWAY  
COUNTY

Designer: Name  
Drafter: Name

Reviewer: Name  
Checker: Name

GIRDER DETAILS

SHEET NO.  
00000

SCALE WARNING  
IF THIS SCALE LINE DOES NOT  
MEASURE ONE INCH, THEN  
DRAWING IS NOT TO SCALE

FINAL ELECTRONIC DOCUMENT  
AVAILABLE UPON REQUEST

- 1 When there are multiple structures that the sheet applies to, enter "Various Structures" in place of the structure name.
- 2 If the sheet applies to multiple structures, list the numbers and names of the applicable structures.
- 3 For multiple structures, enter "See Above" and list the applicable structures above the title block or "See Left" and list the structures left of the title block. If the project identifies the structure by a letter or number, add the appropriate designation in parenthesis after the structure name.
- 4 Enter "Various" for highway, milepoint and county, as required.

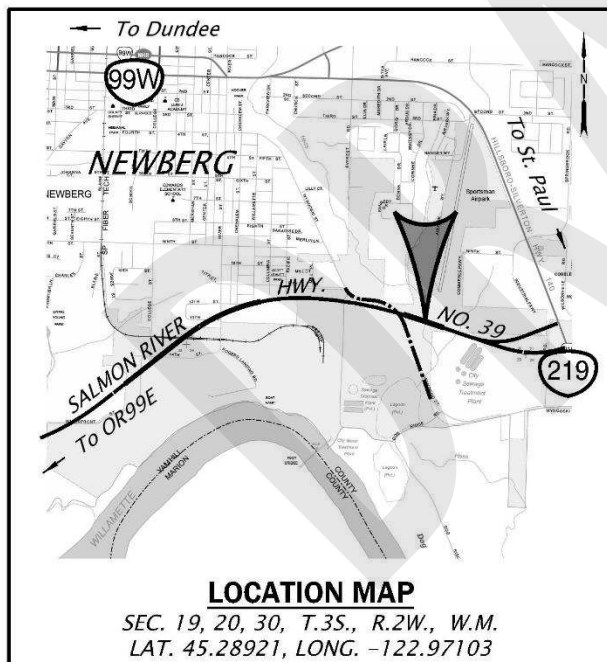
## Section 303 Location Map

A location map is required. It is located in the upper right or lower left of the Plan or Plan and Elevation sheet. The map may be a raster image or a CAD map. Often the text in the map is too small, so text must be added for the highway, city name and other pertinent data must be added. The location marker symbol is placed to mark the location of the structure.

The GIS “[Project Vicinity Mapping Application](#)” may be used to create a mapping image. For larger rural areas, the “Topographic” base map seems to work best. For smaller urban areas, try the “ODOT Streets” base map.

### 303.1 Single Structure

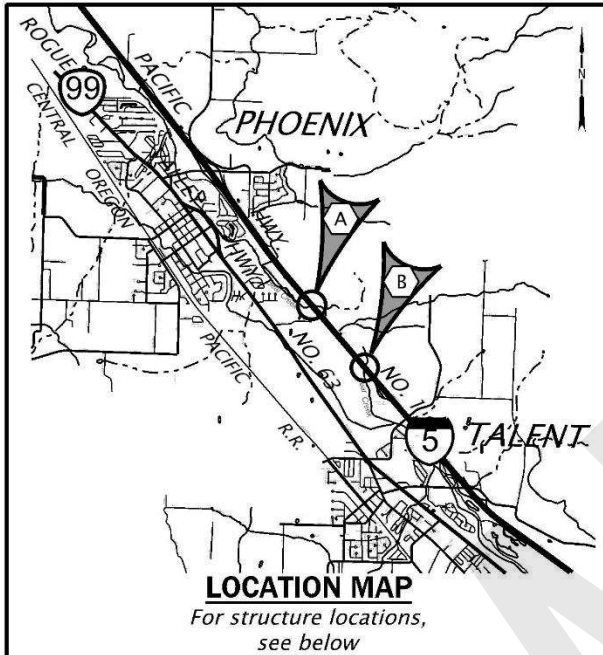
Figure 303-1 Example location map for a single structure plan.



### 303.2 Two Structures on a Single Plan Sheet

More than two structures require a layout and index sheet.

108 Figure 303-2 Example location map for two twin structures (shown) or up to four single  
109 structures plan.



- SEC. 19, 20, 30, T.3S., R.2W., W.M.
- A LAT. 45.26589, LONG. -122.79867 (str. no. 12345) &  
LAT. 45.26594, LONG. -122.79822 (str. no. 12346)
- B LAT. 42.25876, LONG. -122.79006 (str. no. 22345) &  
LAT. 45.25901, LONG. -122.78988 (str. no. 22346)

110

## Part 400 3D Modeling

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## Section 401 Introduction

ODOT Bridge Section is working to develop protocols for developing 3D models of various structures. OpenBridge Modeler (OBM) in coordination with OpenRoads Designer (ORD) is the software used for modeling bridges. MicroStation Connect Edition (MSCE) is also used for components.

## Section 402 Open Bridge Modeler (OBM)

### 402.1 OBM Files

The OBM file is a “design” file created by or under the direction of the Bridge designer, using the OBM seed file and stored in the *Design\_Data* folder in ProjectWise. *(Pending OBM being added to the ODOT workspace)*

### 402.2 Alignments

OBM requires a horizontal and vertical roadway alignment. This alignment is provided by the Roadway designer using OpenRoads Designer (ORD) in coordination with the Bridge designer. Because OBM links the bridge model to the alignment, changes to the alignment will affect the bridge model. The ORD vertical alignment that is used by the bridge model must be set to “active”. If there are no Roadway plans for the project or the model must be created prior to the creation of an ORD alignment, OBM can be used to create a temporary roadway alignment.

### 402.3 Templates

Templates are created and stored in a template library and are used by OBM to extrude or place 3D components. A variety of standard templates have been created and are available in the ODOT template library. Since changes to the templates will affect the model, create a folder in the OBM template library for all templates used for the project. In the project template folder, rename any standard templates used. Name templates for the project using this format: *template name-structure#*.

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## 402.4 Process Overview

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## 1 **Part 500 Plan Sheets**

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## Section 501 Bridge Maintenance Project Plans

Plans for bridge maintenance projects follow the basic standards for CAD drawings and Bridge Data System images. The amount of detail will vary depending on the project scope. For example, overlay and bridge joint projects can provide all the necessary information on a single sheet per bridge. Structural repair projects will typically require much more detail and several detail sheets.

## Section 502 Bridge Bent Labels and Numbering

All supports are designated as a “Bent” and are numbered in the direction of project stationing. Add the label “(BIR Bent 1)” to the first bent by milepoint. If the project stations are in the opposite direction of the milepoints, “BIR” numbers, increasing by milepoint, may be added to all bents.

For existing structures, add the bent numbering note from the Bridge cell library. When the supports are physically numbered on the bridge, show the designation in parenthesis next to the corresponding bent number on the plans.

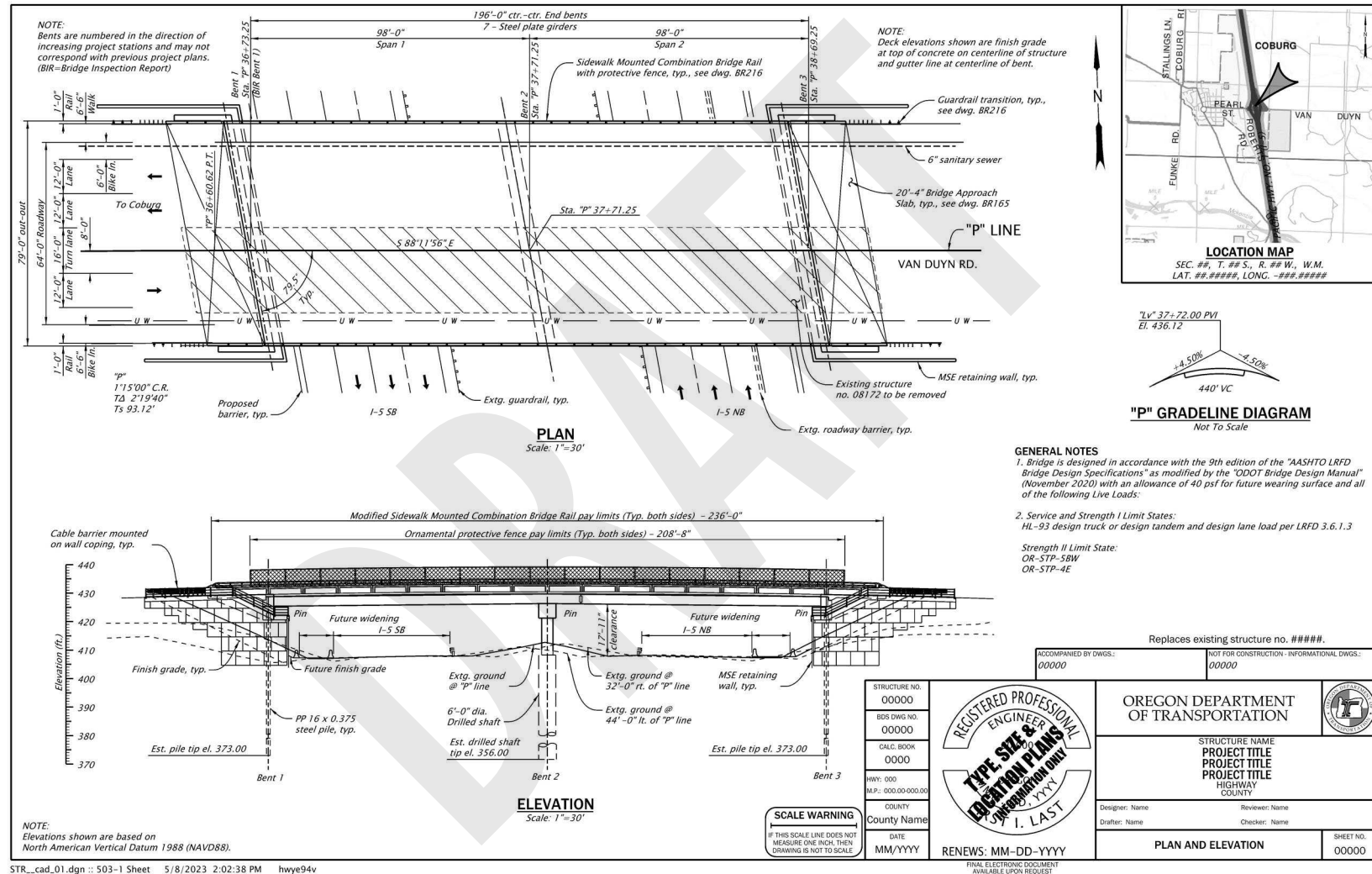
The structure plan views will be shown with project bent numbering increasing from left to right on the sheet.

## Section 503 Type, Size and Location (TS&L)

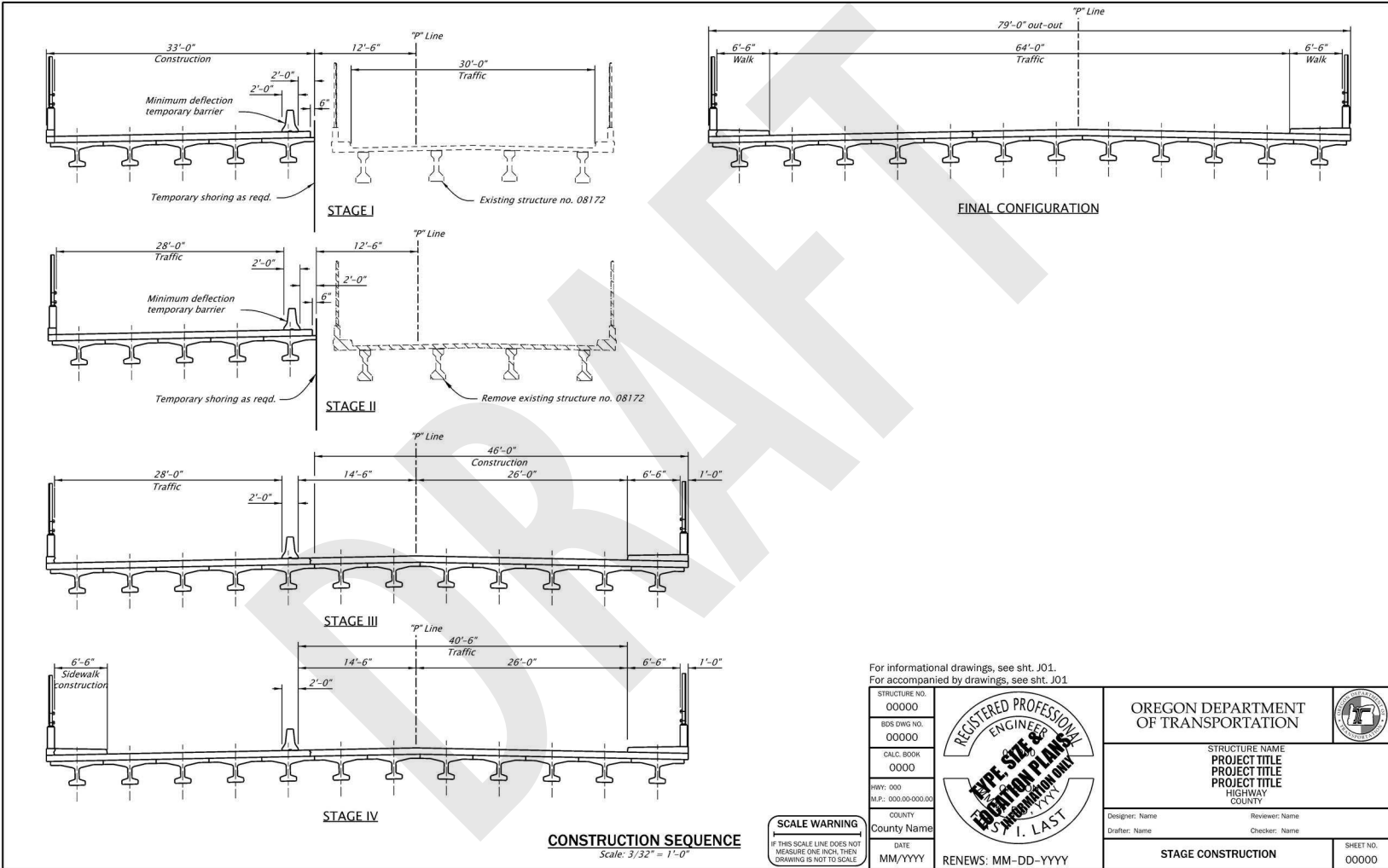
The Type, Size and Location (TS&L) sheets illustrate the footprint and concept of the design of a structure (including alternates as needed) and is usually provided prior to the Design Approved Plans (DAP) milestone. For a more detailed explanation and the required drawings (additional drawings may be needed), see the Bridge Design Manual (BDM), Section 2 - Processes & Roles.



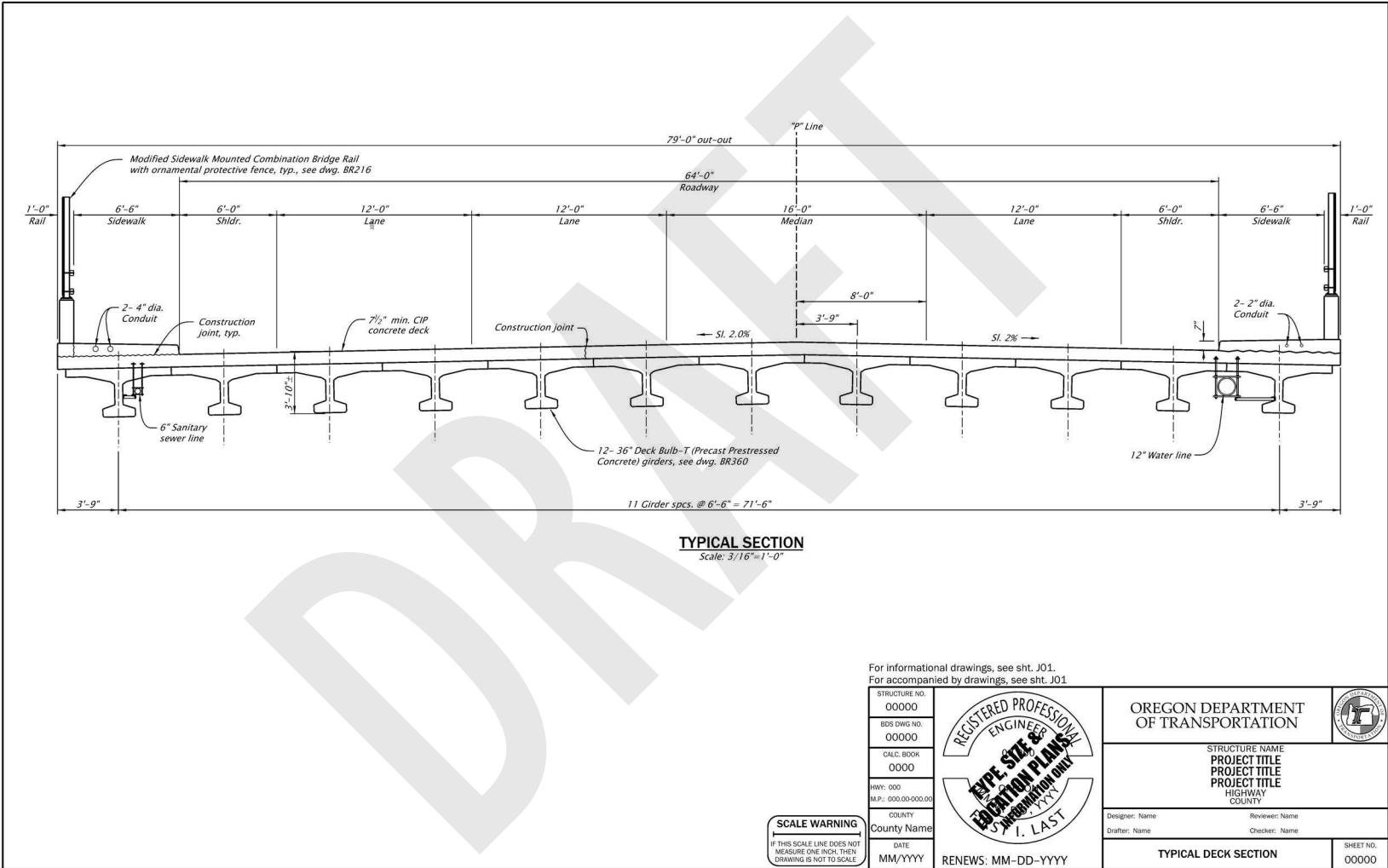
24 Figure 503-1 TS&L Plan and Elevation



26 Figure 503-2 TS&L Stage Construction



28 Figure 503-3 TS&L Typical Deck Section

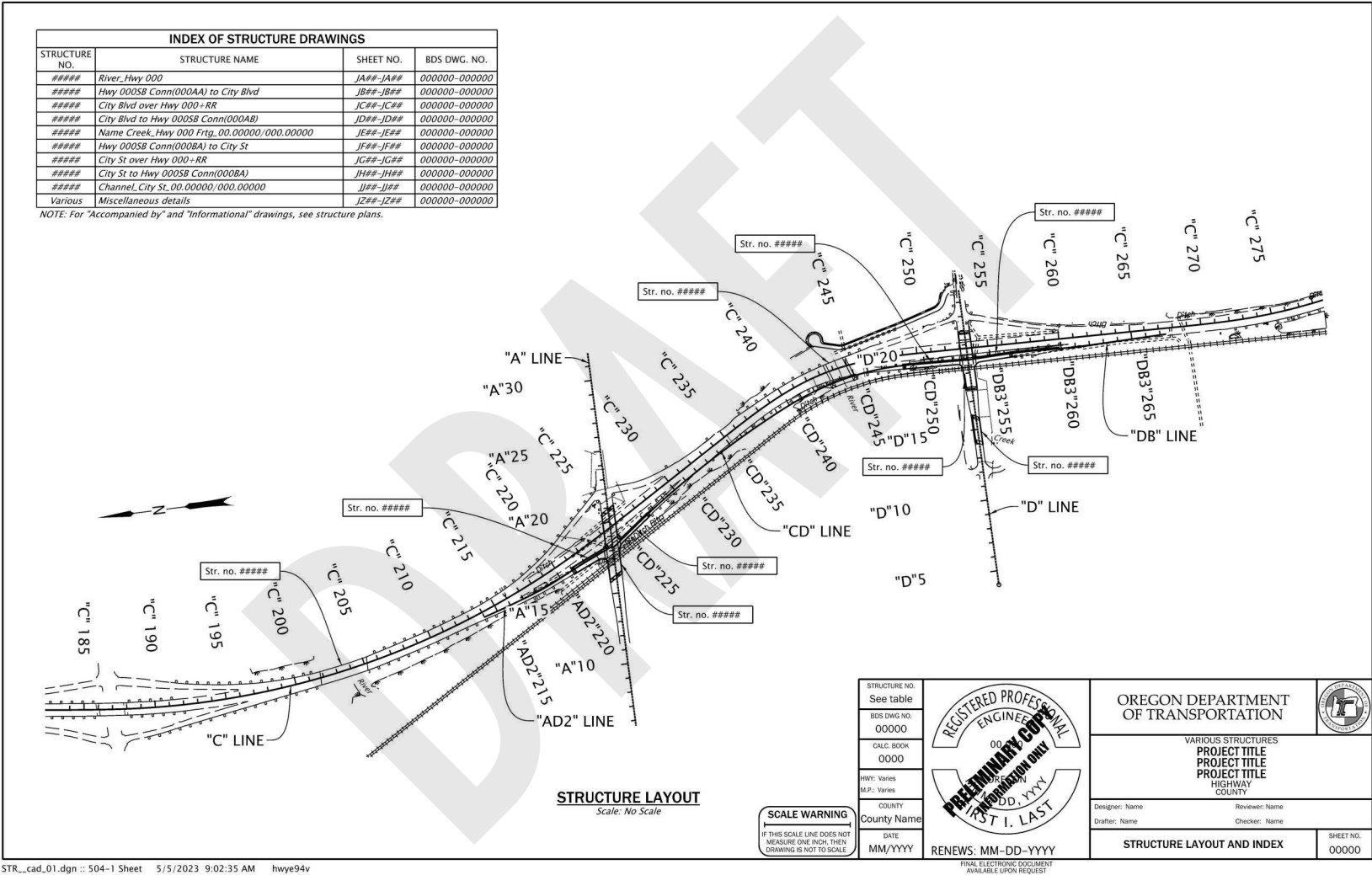


## Section 504 Structure Index

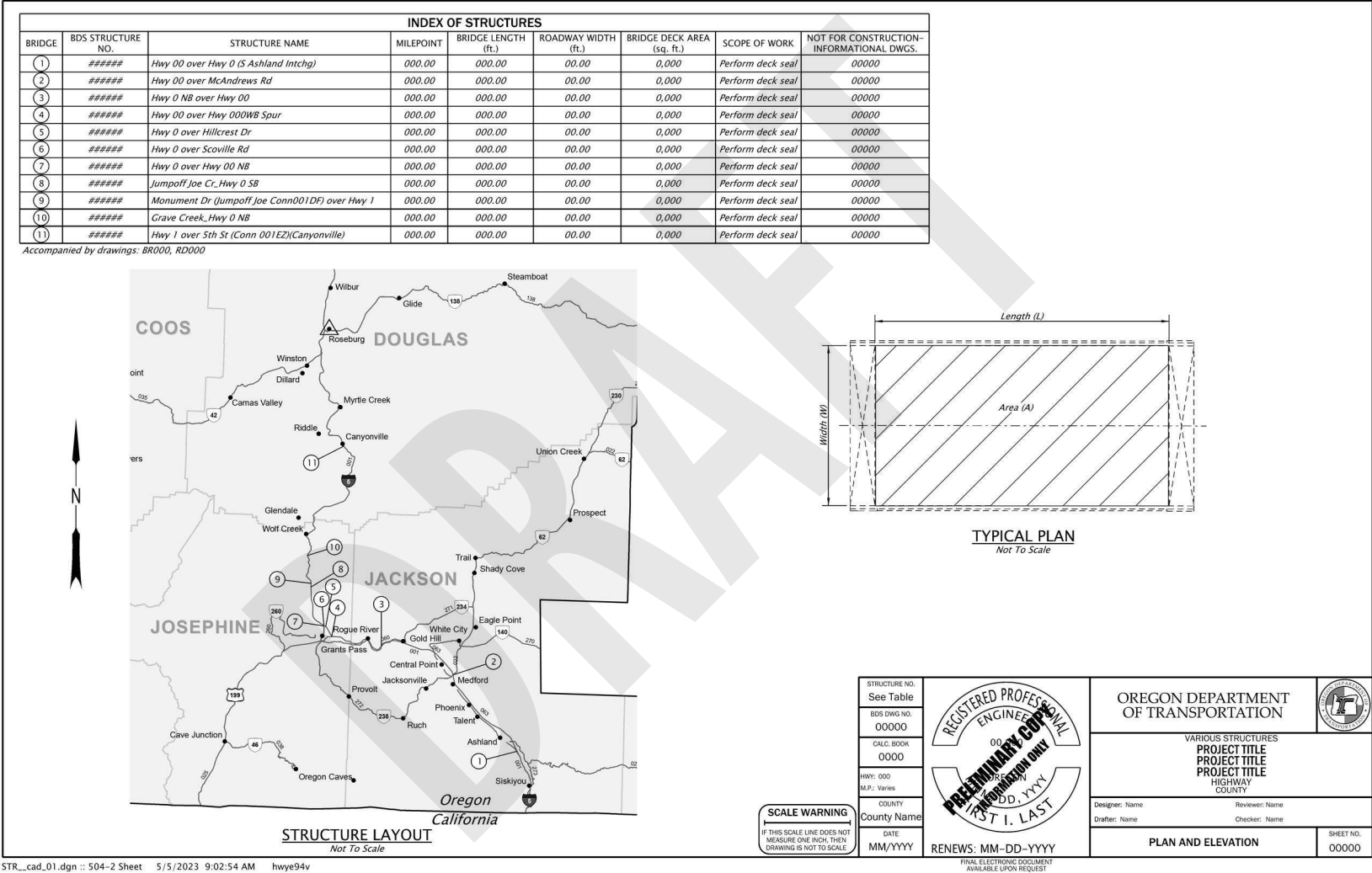
A structure index is provided when there are multiple structures under the same contract. On this sheet, a map showing the locations of the structures and a table including the structure numbers with their corresponding sheet and drawing numbers followed by the standard drawings needed for the project (See OCM for sheet numbering).

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36 Figure 504-1 Structure Index



38 Figure 504-2 Structure Index with Representative Plan





## Section 505 Plan and Elevation

The plan drawing is a view from above with stationing increasing from left to right on the sheet. Milepoints are used if the project is using milepoints in place of stationing. The plan view is paired with an elevation drawing on the same sheet. The elevation drawing is shown as a view of the right side, when facing in the direction of increasing stations of the structure and is placed below the plan view.

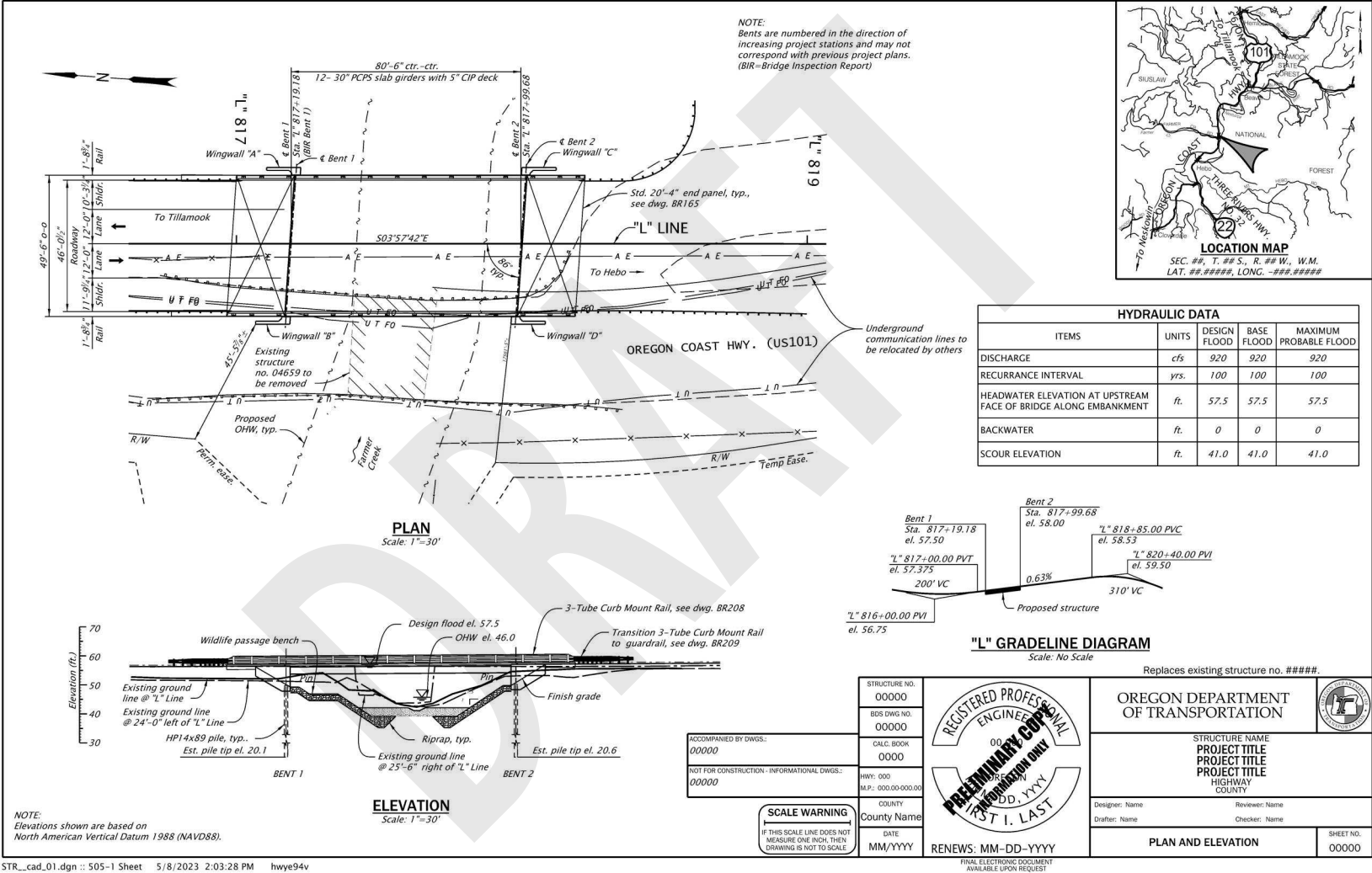
For projects not requiring an elevation view, such as paving and joint repair, the plan view and details are sufficient.

Make the plan and elevation as large as possible, leaving room for the location map in the upper right or lower left corner. If the drawing is still too small, it should be simplified and used as an overview, then add sheets of one or two spans per sheet to show the detail required for the plan and elevation drawings.

If the structure is a retaining wall, half viaduct or other structure where the right side is not visible or the project work is only being done on the left side, then the left side is shown as a "View A-A" and placed above the plan view. Extra annotation and notes are added to clarify that the drawing is shown from the opposite side.

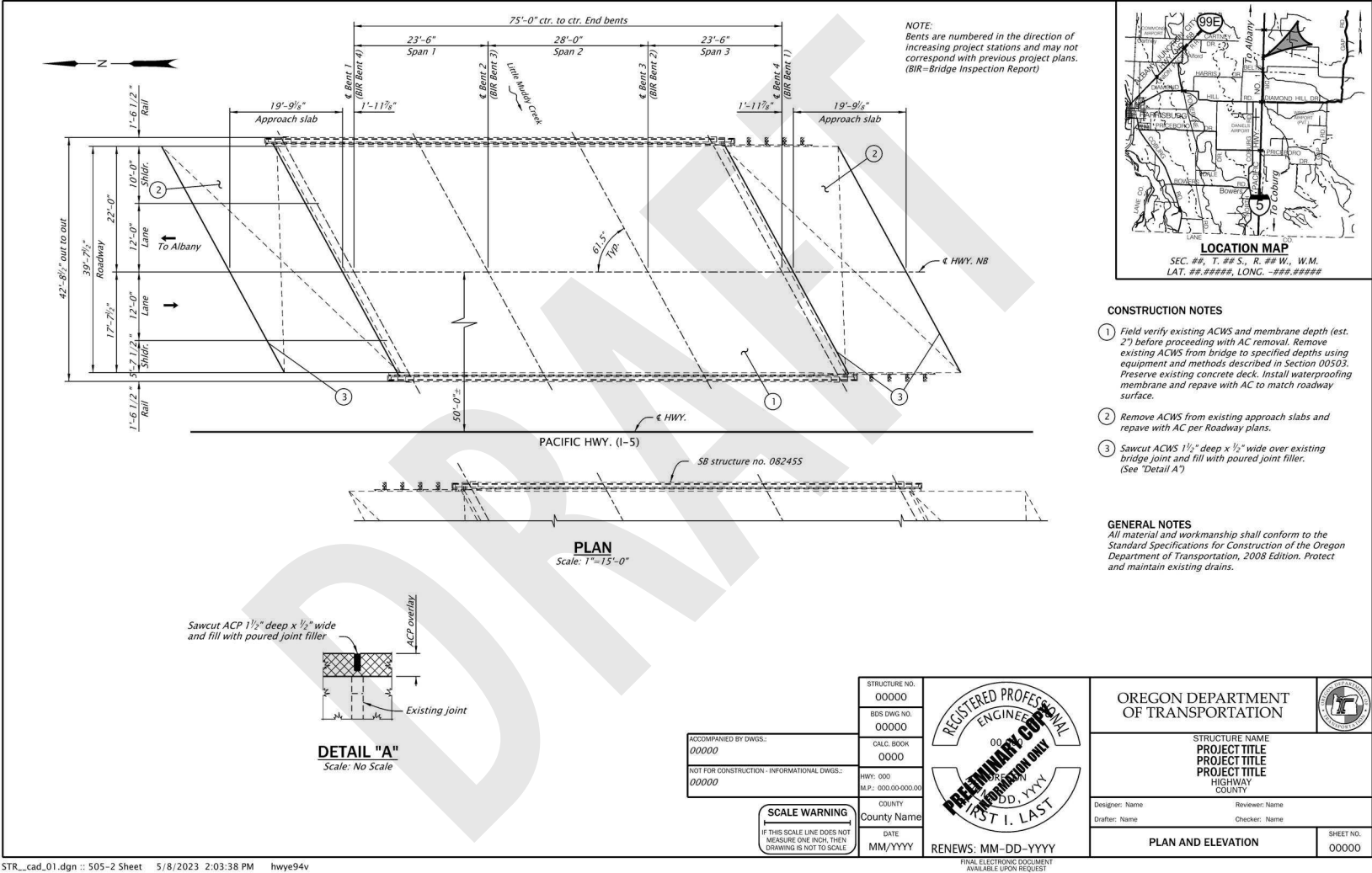
Show the superstructure type on the "out to out" measurement for the bridge on the Plan and Elevation view only. All other notes and dimensions will use "girder" for longitudinal and "beam" for transverse components.

59 Figure 505-1 Plan and Elevation-Structure

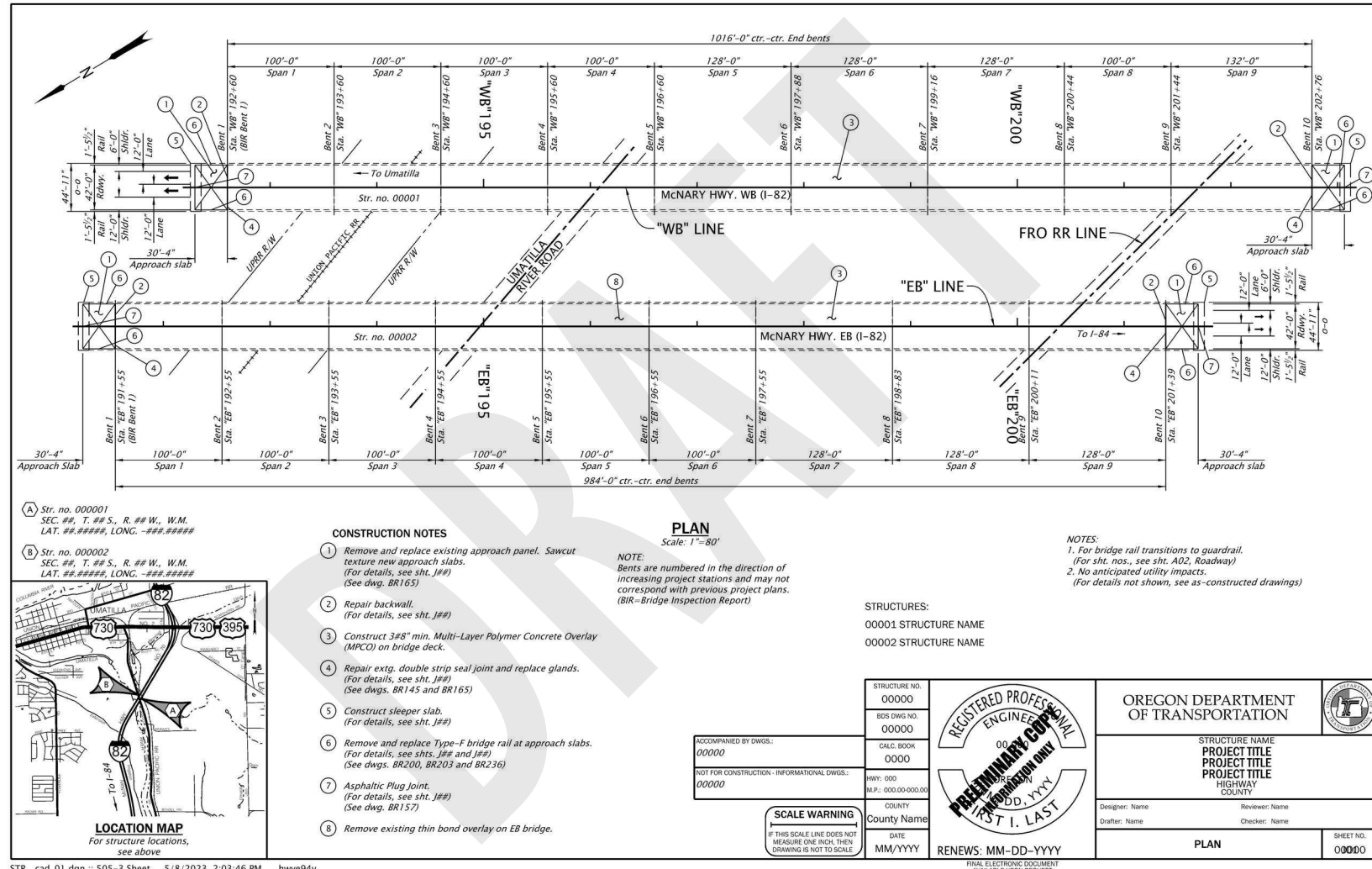




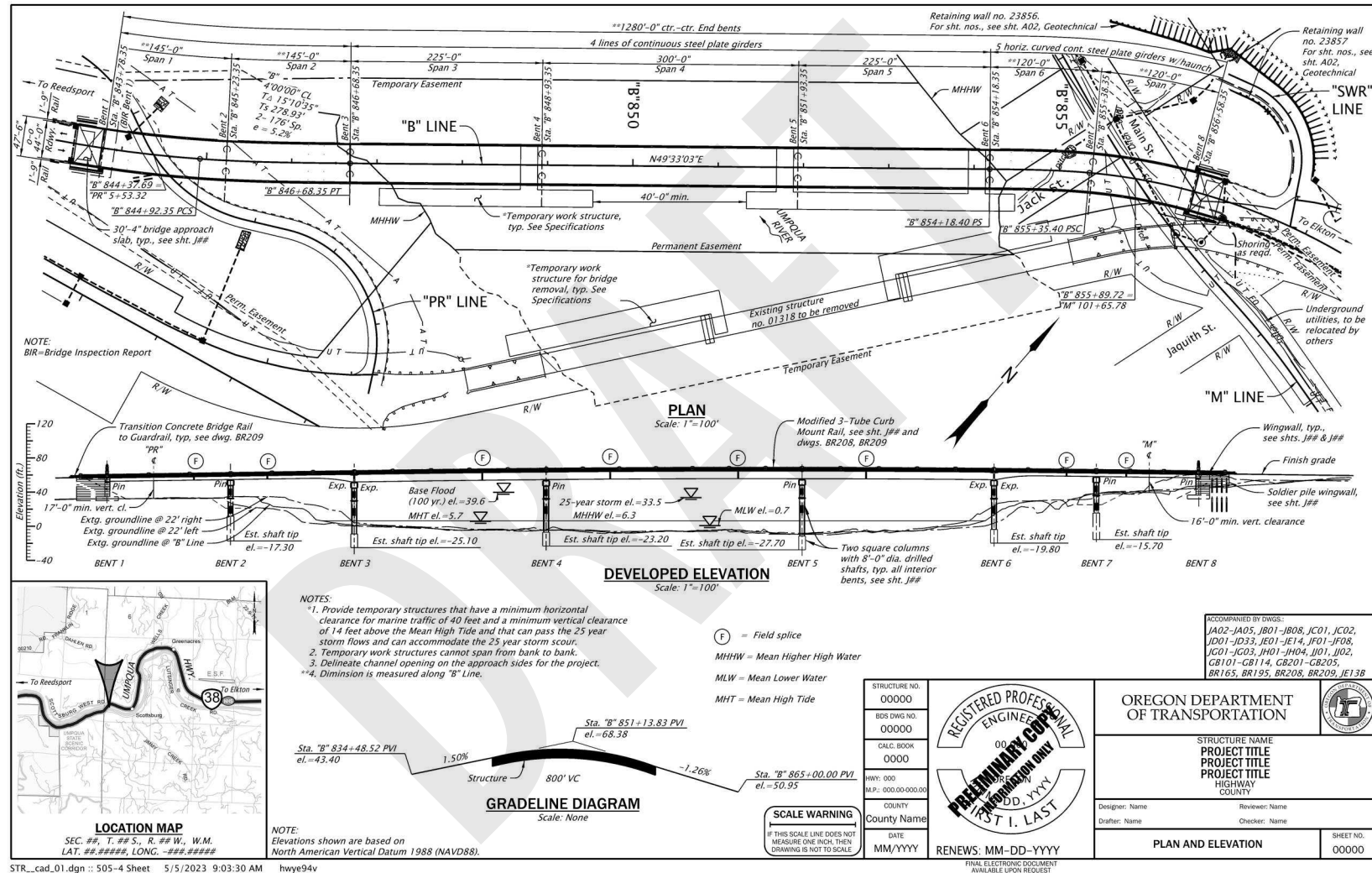
61 Figure 505-2 Twin Structures Separate Plan



63 Figure 505-3 Twin Structures Combined Plan

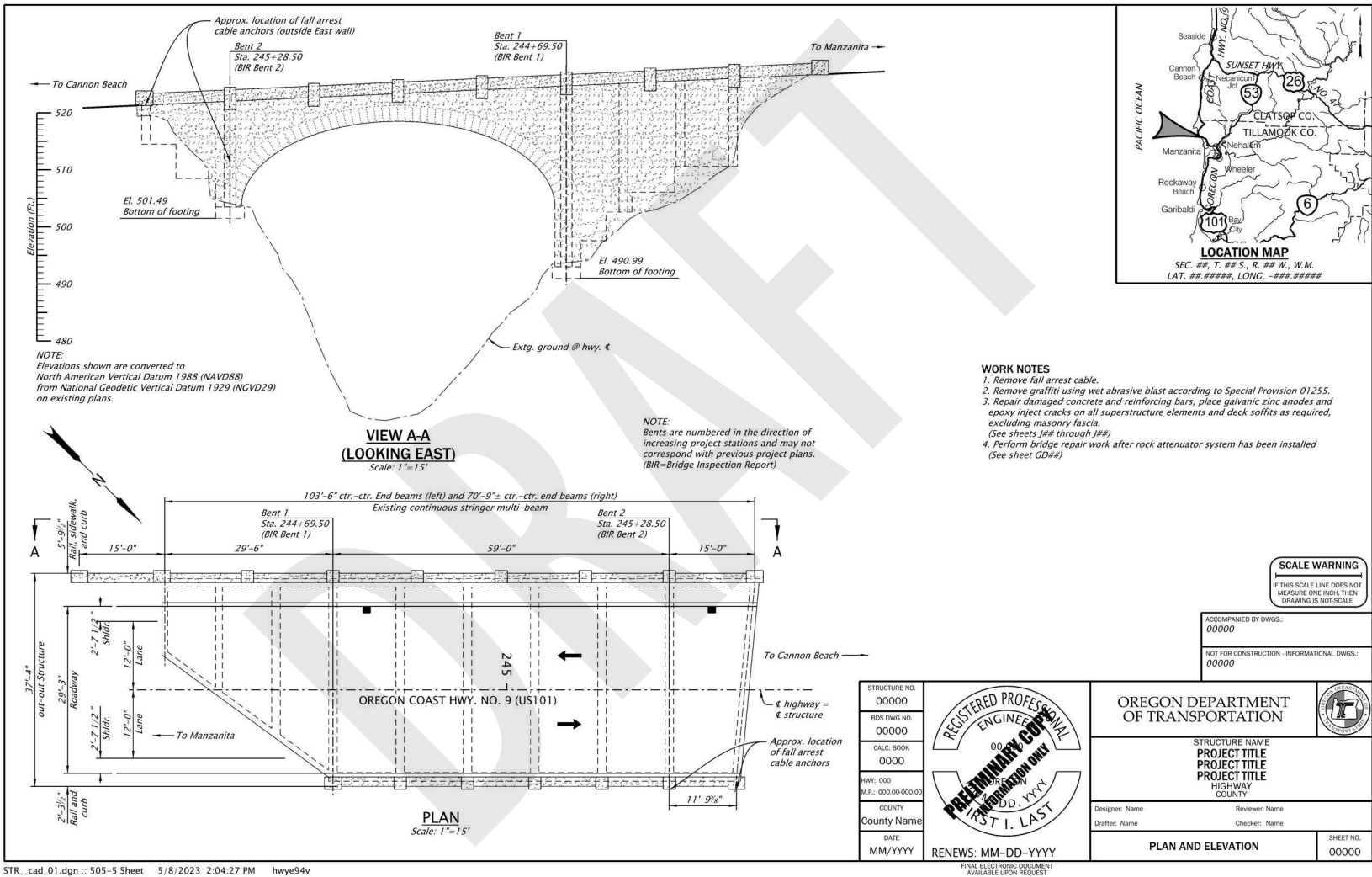


65 Figure 505-4 Plan and Developed Elevation

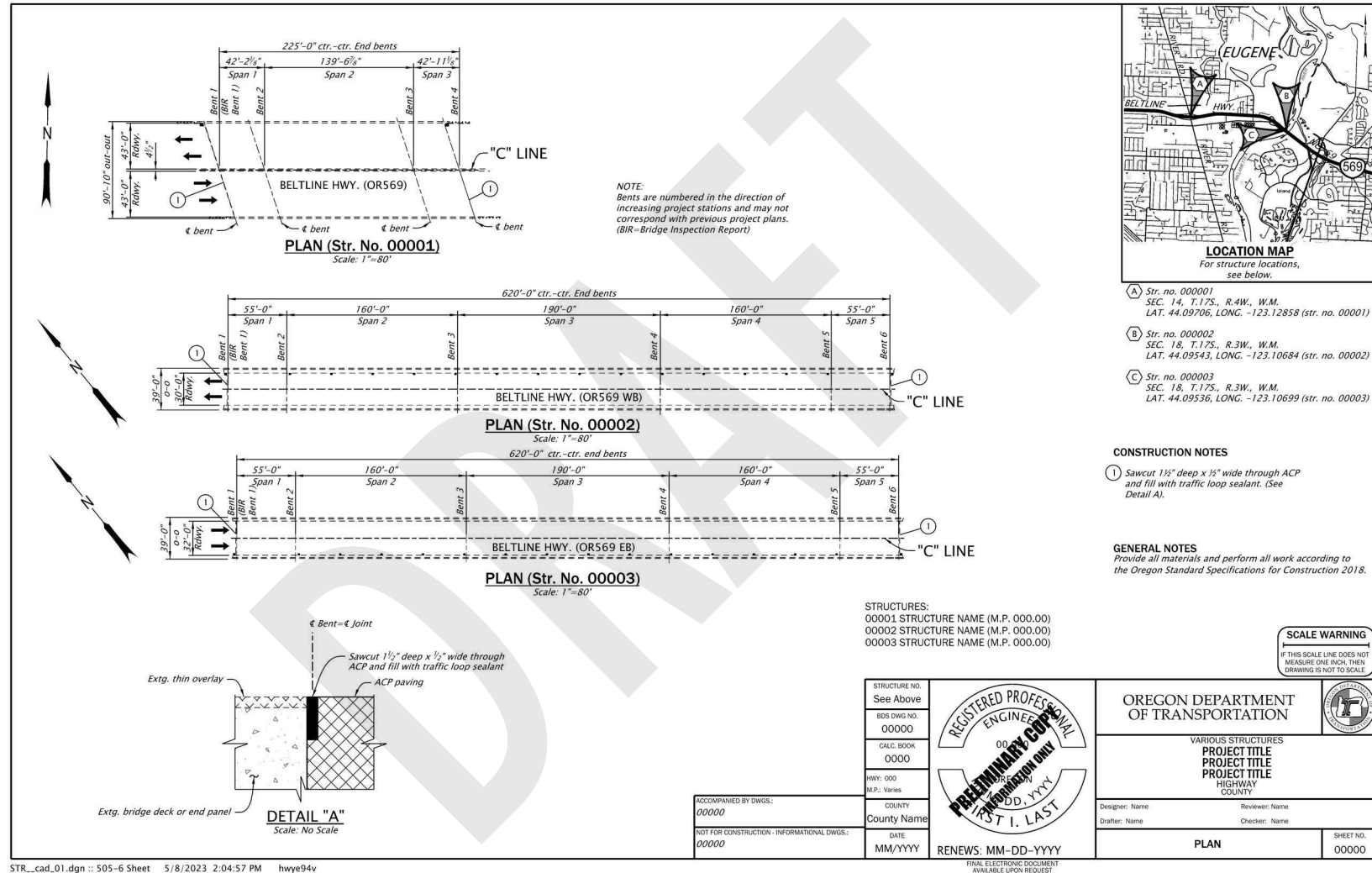




67 Figure 505-5 Plan and View A-A (Elevation)



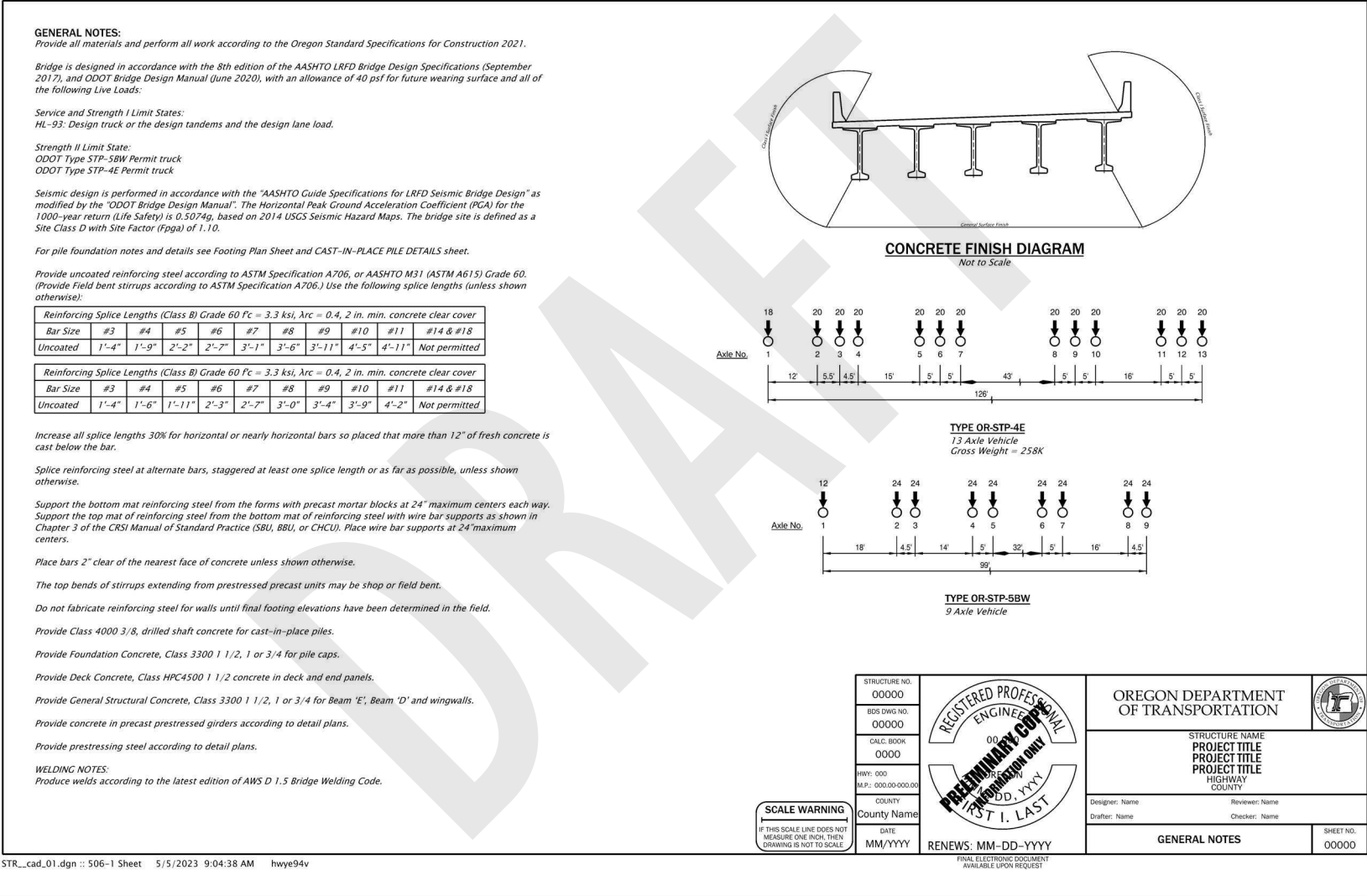
69 Figure 505-6 Multiple Structures Plan



## Section 506 General Notes

The General Notes are typically provided by the designer. A separate General Notes sheet is needed when the notes won't fit on the Plan and Elevation sheet. If there is a General Notes sheet, there may also be room for some diagrams or small details, such as the Bridge Identification Marker information, excavation/backfill, superelevation, concrete finish diagram or similar general detail. A template of the General Notes is available as part of the Bridge Design Manual online.

78 Figure 506-1 General Notes



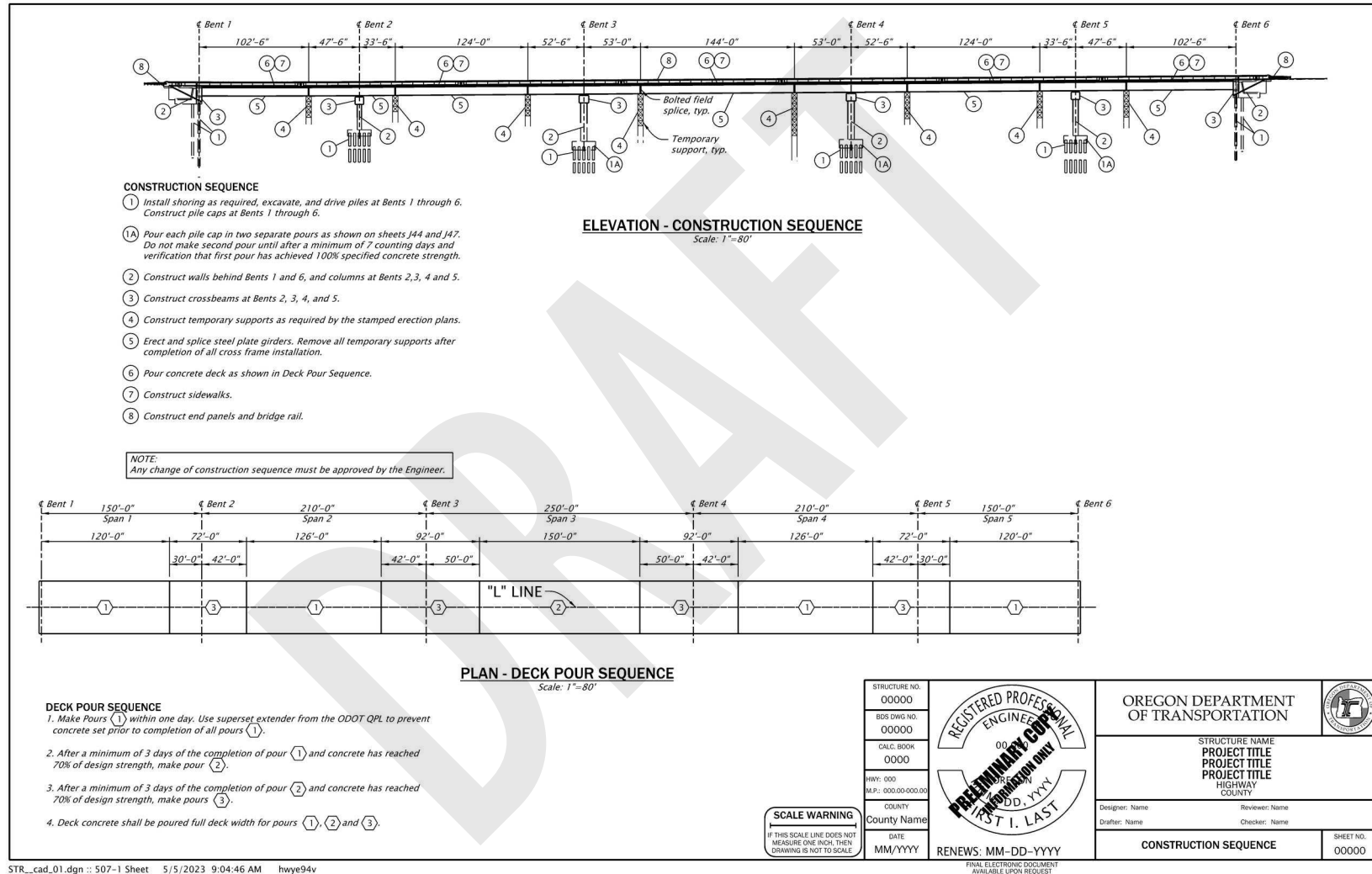
80 **Section 507 Construction Sequence**

81

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82 Figure 507-1 Construction Sequence

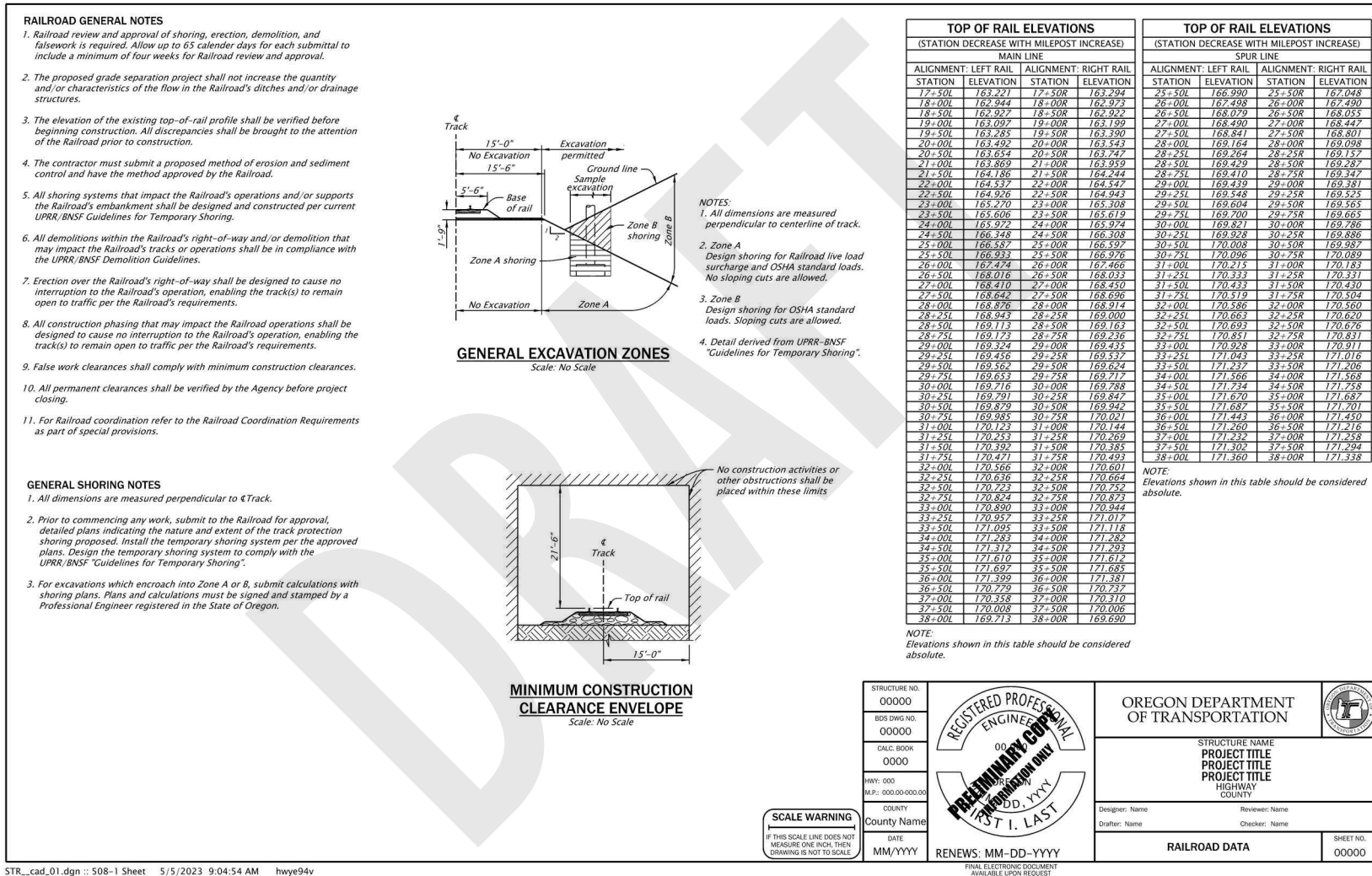


84 **Section 508 Railroad Data**

85

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86 Figure 508-1 Railroad Data



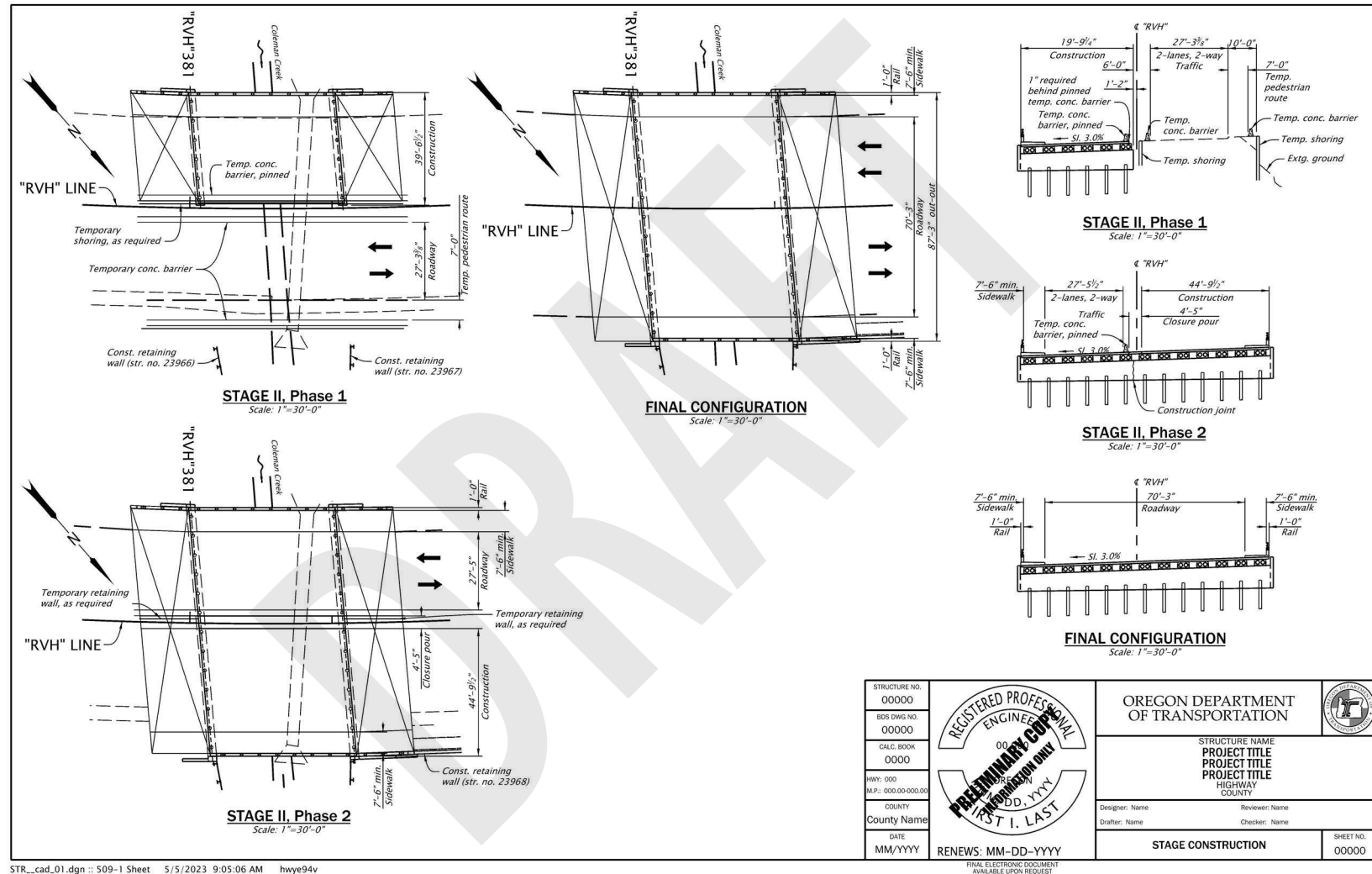
## 88 **Section 509 Stage Construction**

89 Stage construction may be shown in cross section or plan view or both, as required.

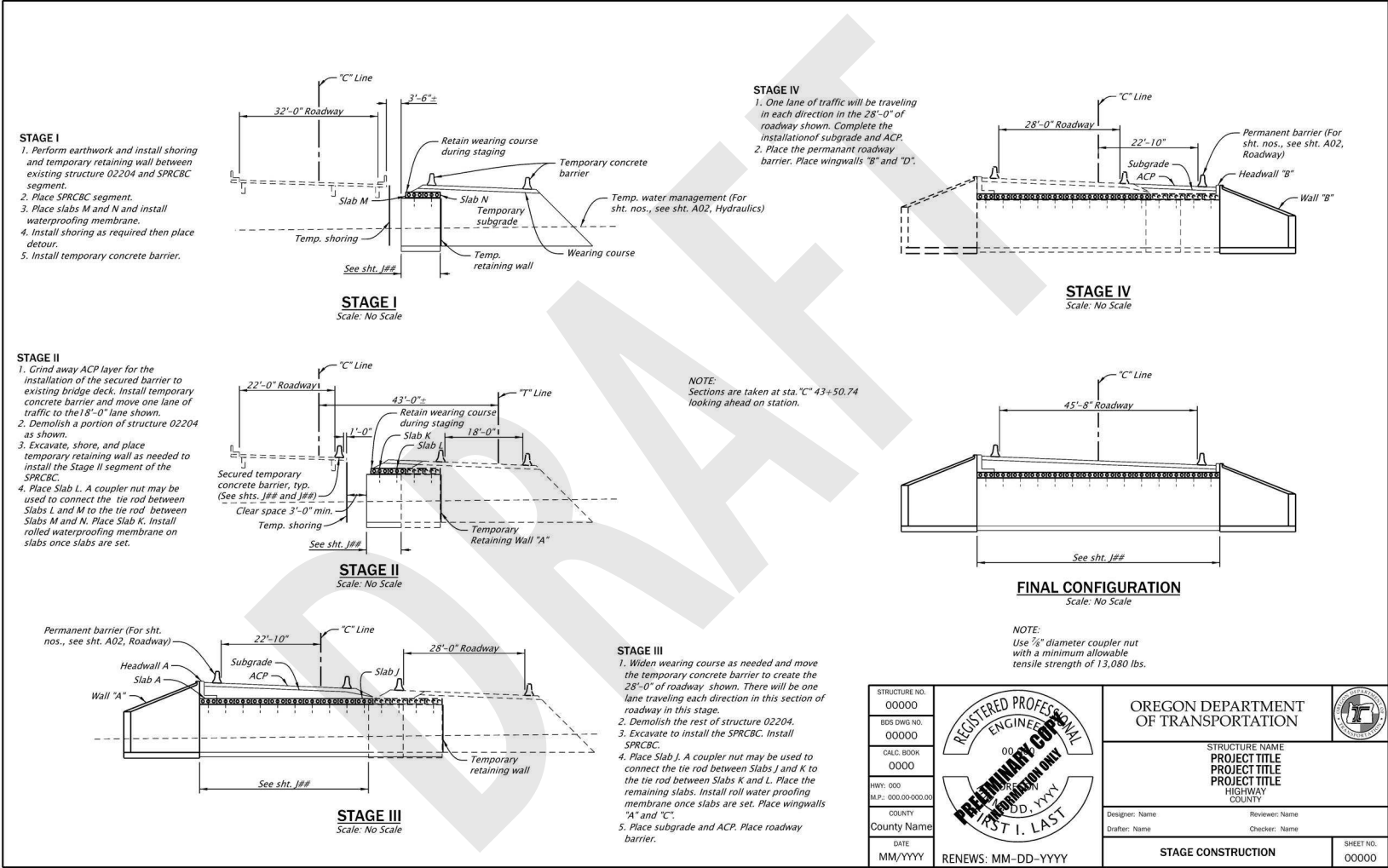
90

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91 Figure 509-1 Stage Construction Plan and Sections



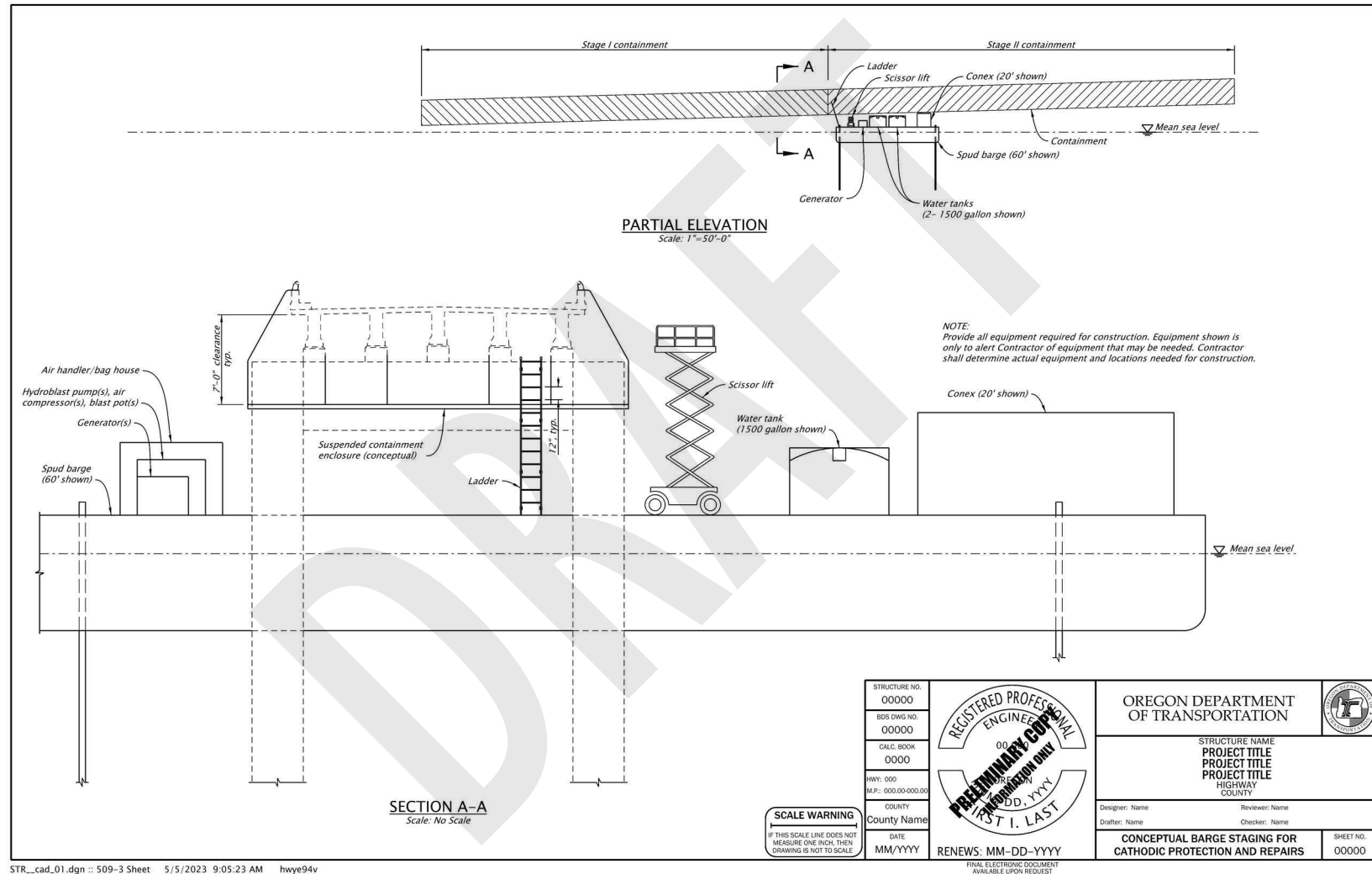
93 Figure 509-2 Stage Construction Sections



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95 Figure 509-3 Stage Construction Preservation Plan Details

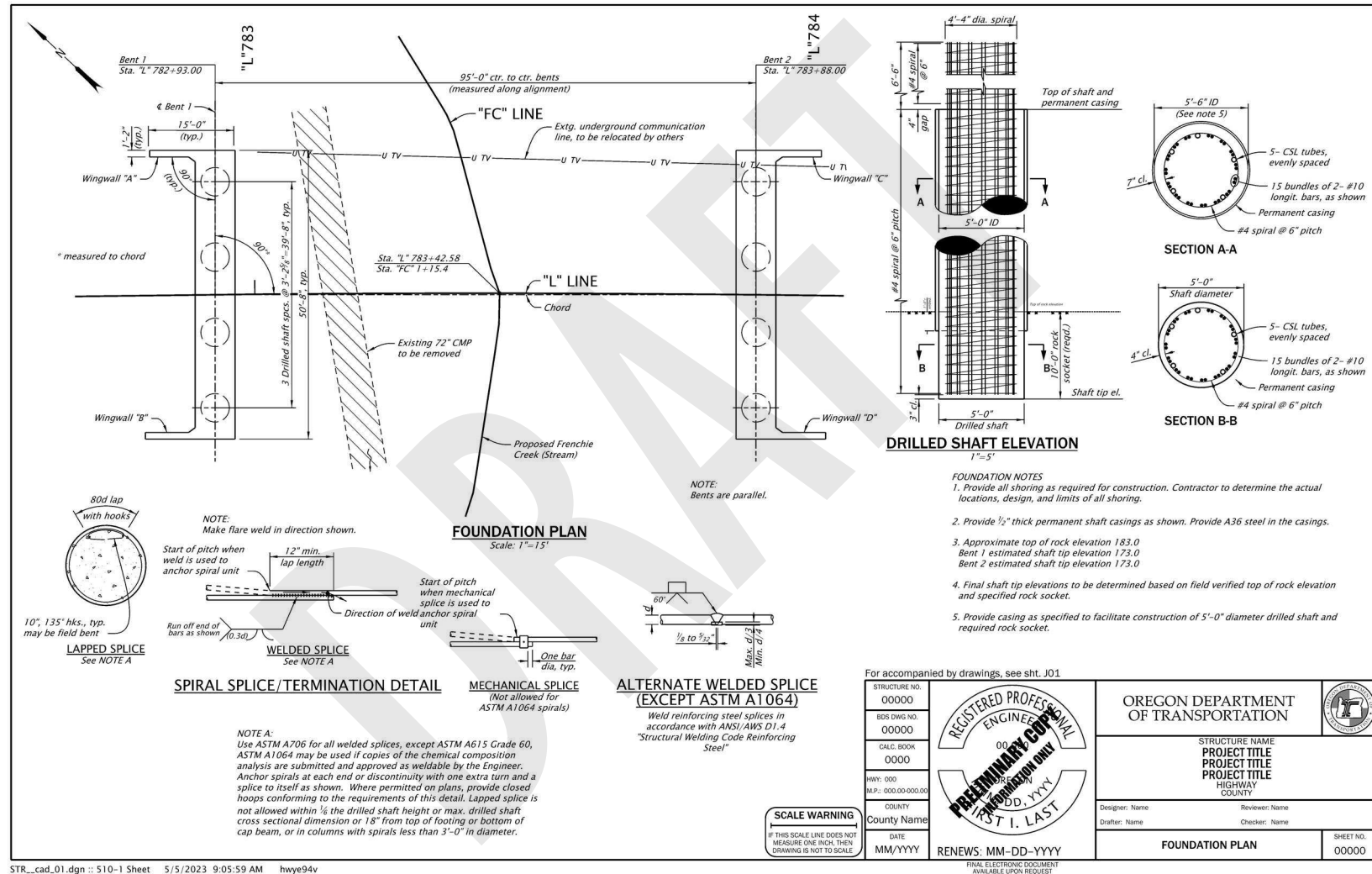


## 97 Section 510 Foundation

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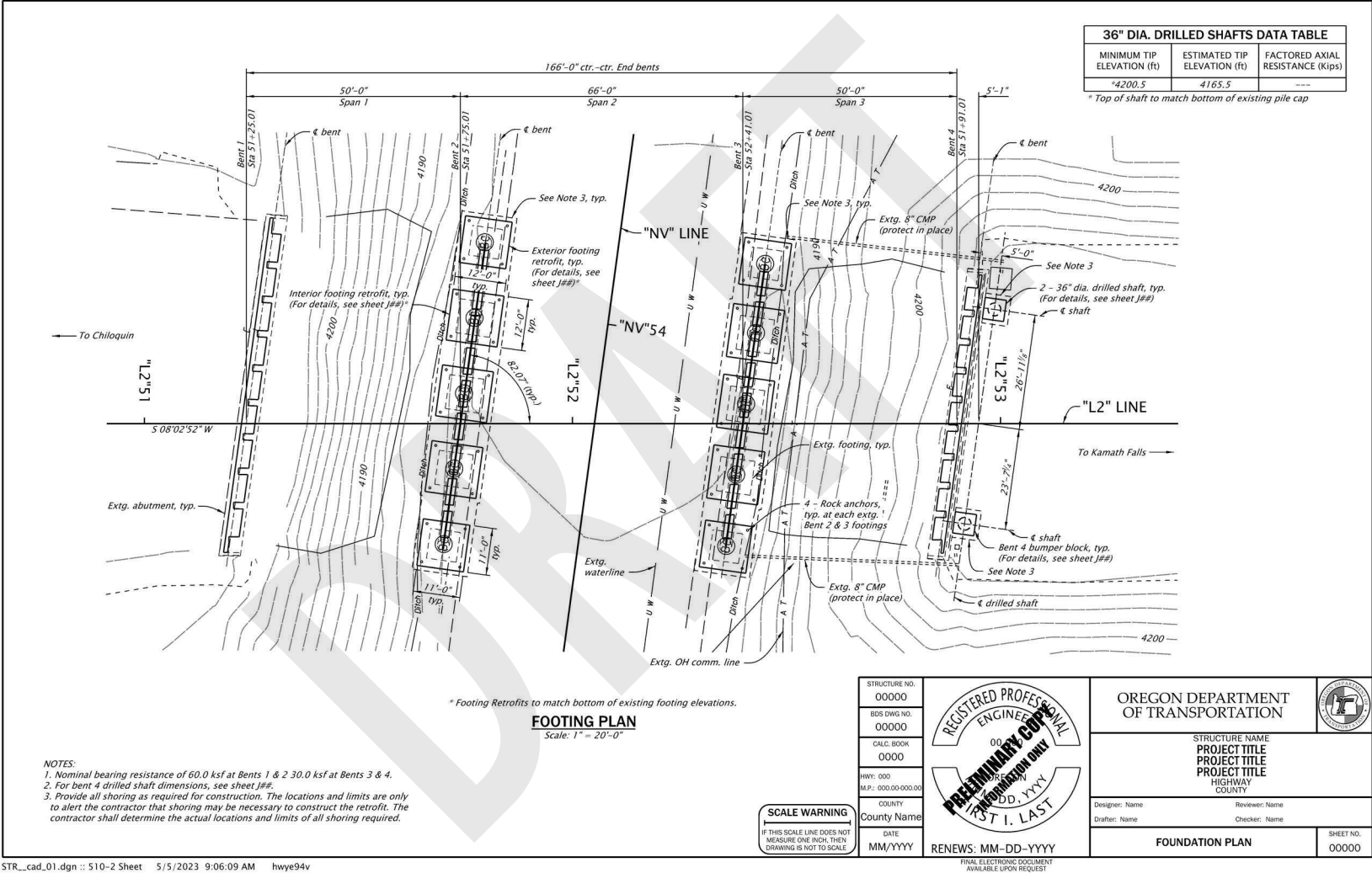


98 Figure 510-1 Foundation Plan with Drilled Shafts

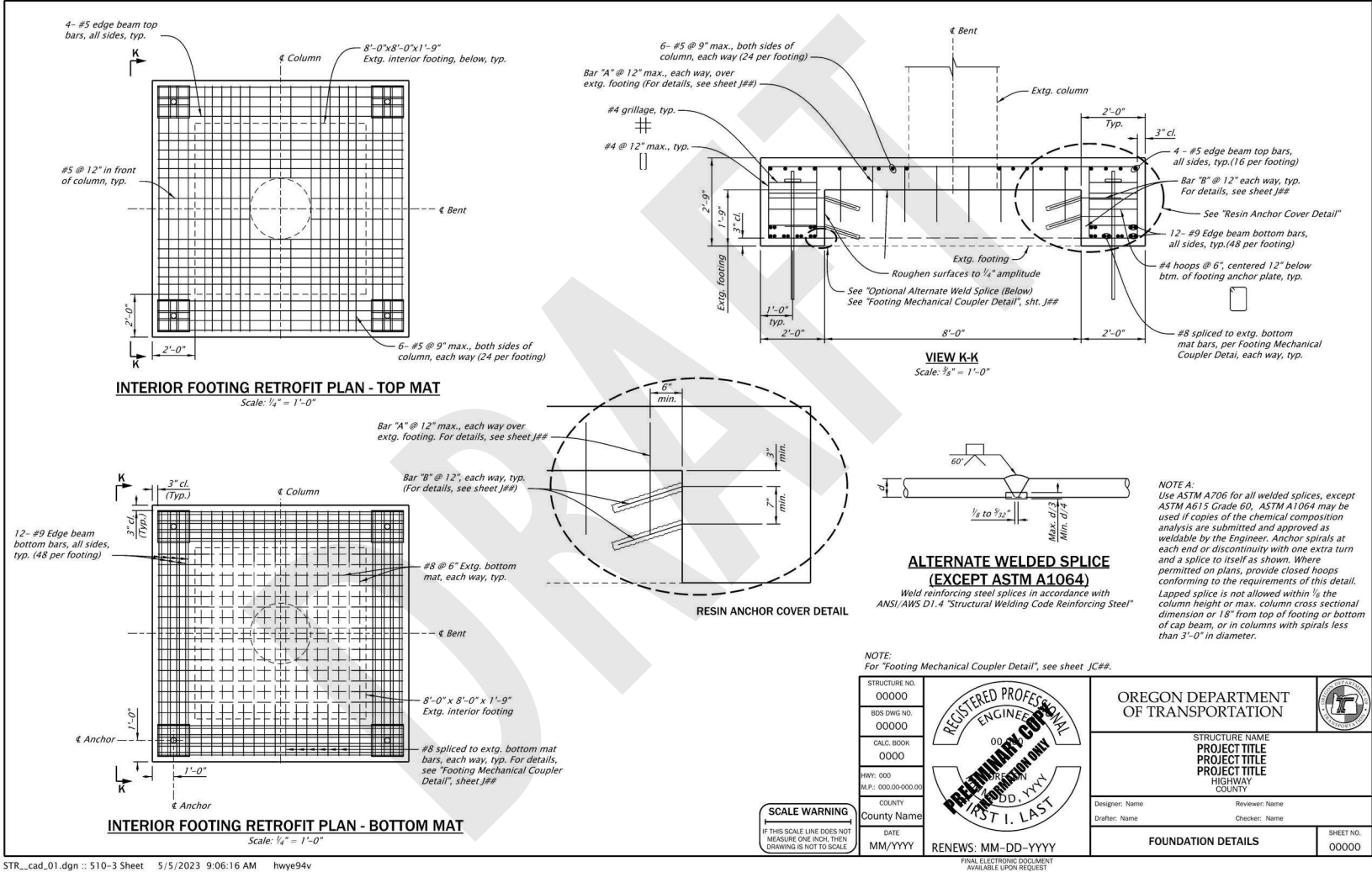


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100 Figure 510-2 Foundation Plan with Footings



102 Figure 510-3 Footing Details



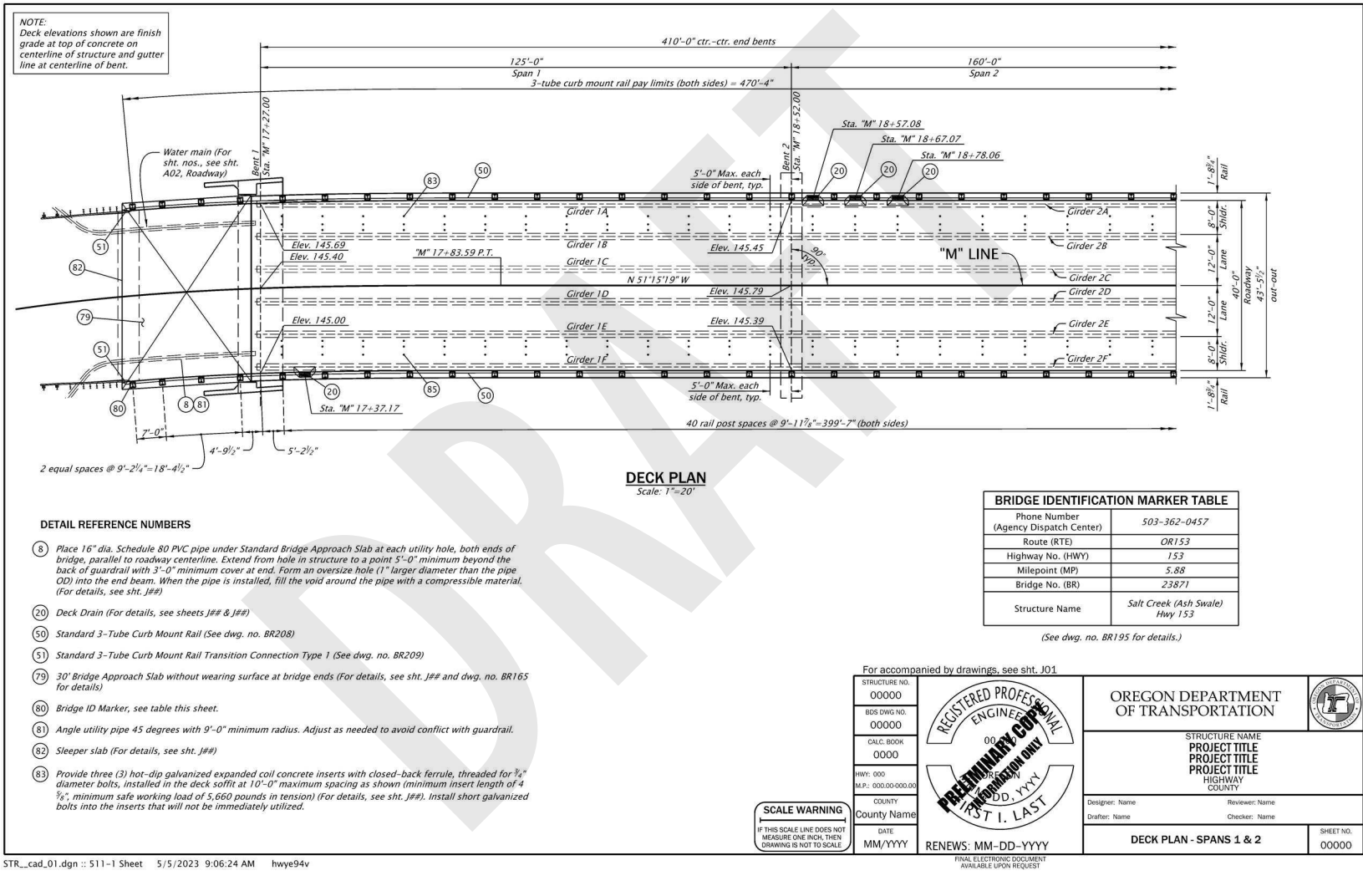
104

## Section 511 Superstructure

105

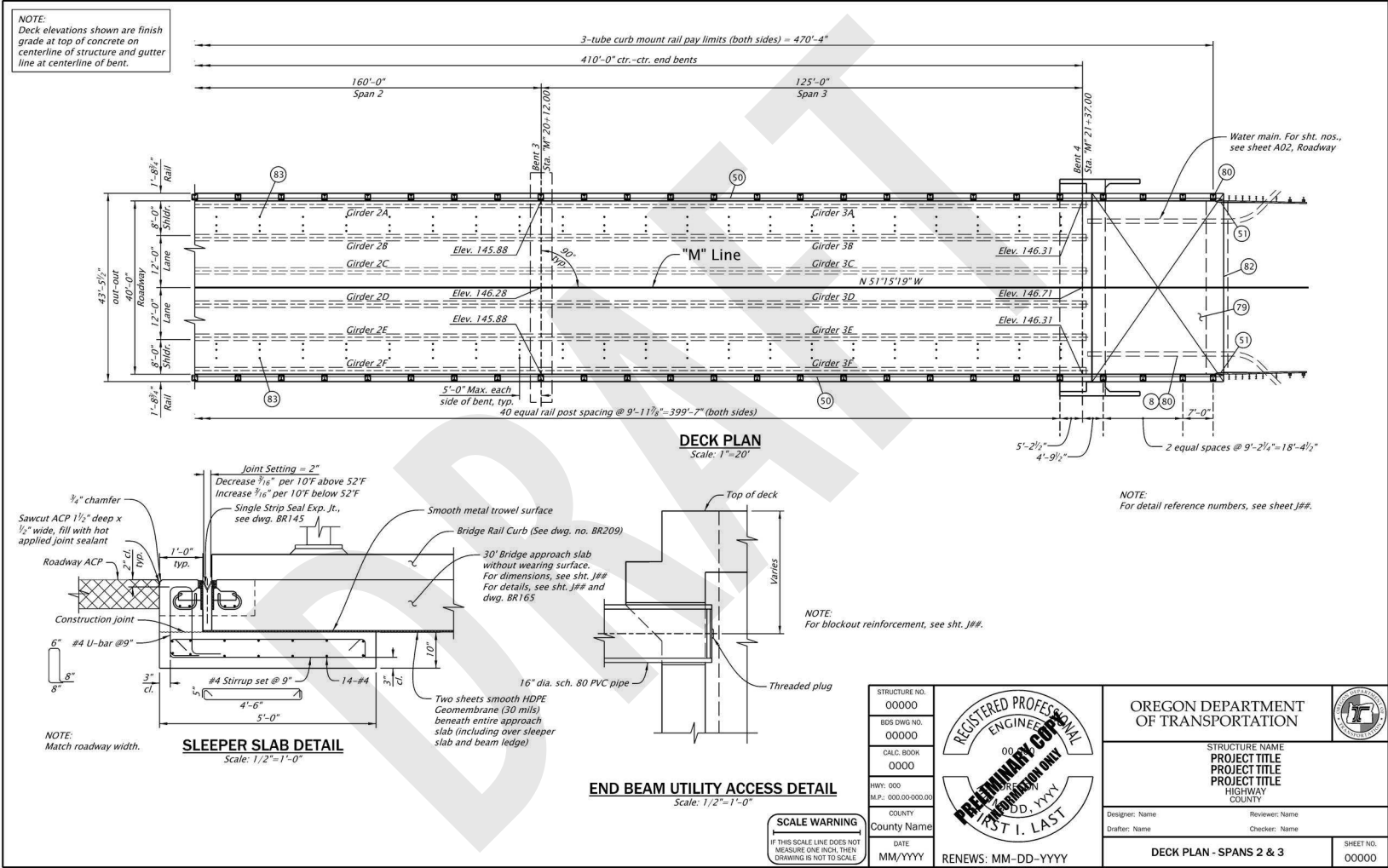
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106 Figure 511-1 Deck Plan - Spans 1 & 2

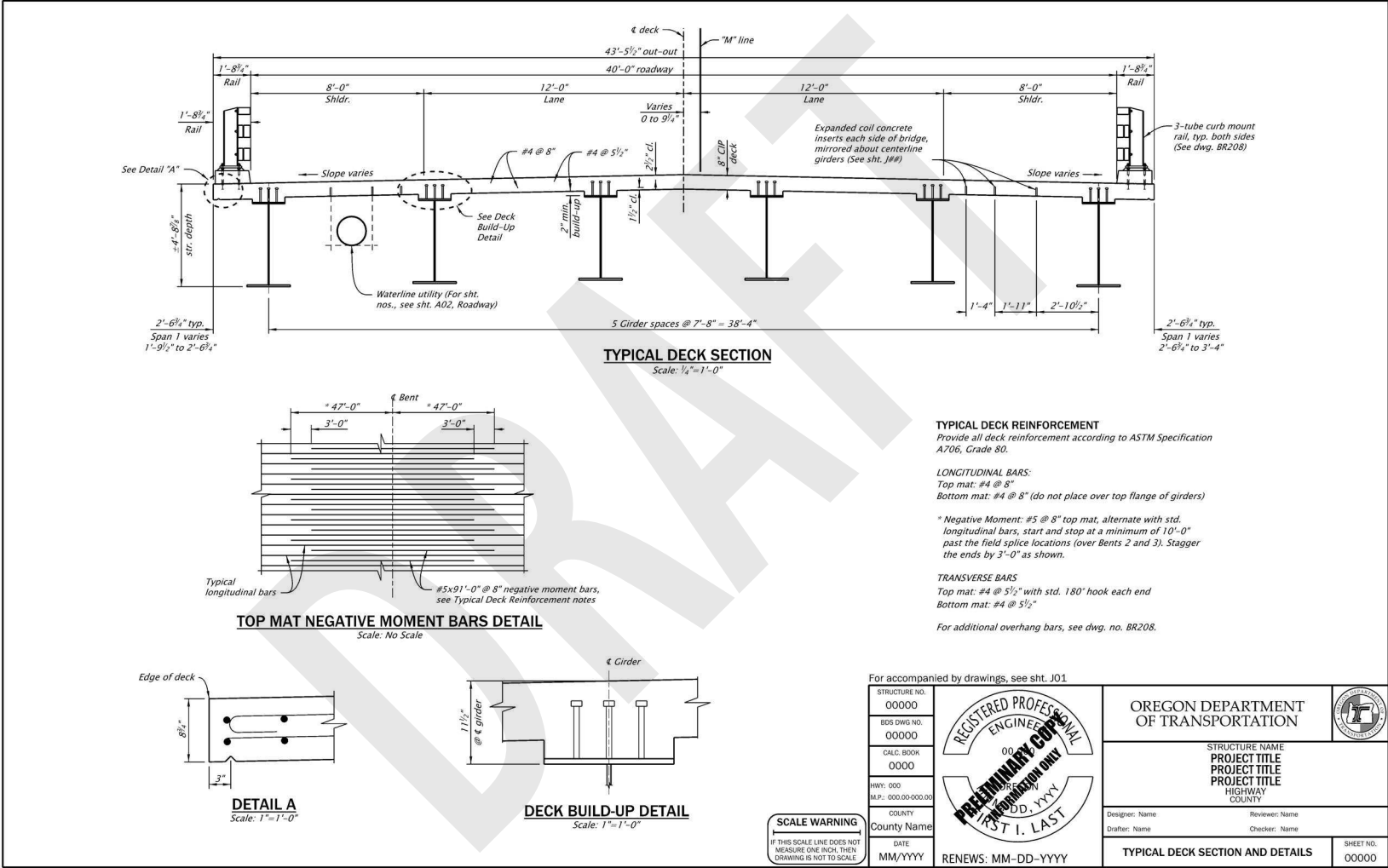




108 Figure 511-2 Deck Plan - Spans 2 & 3

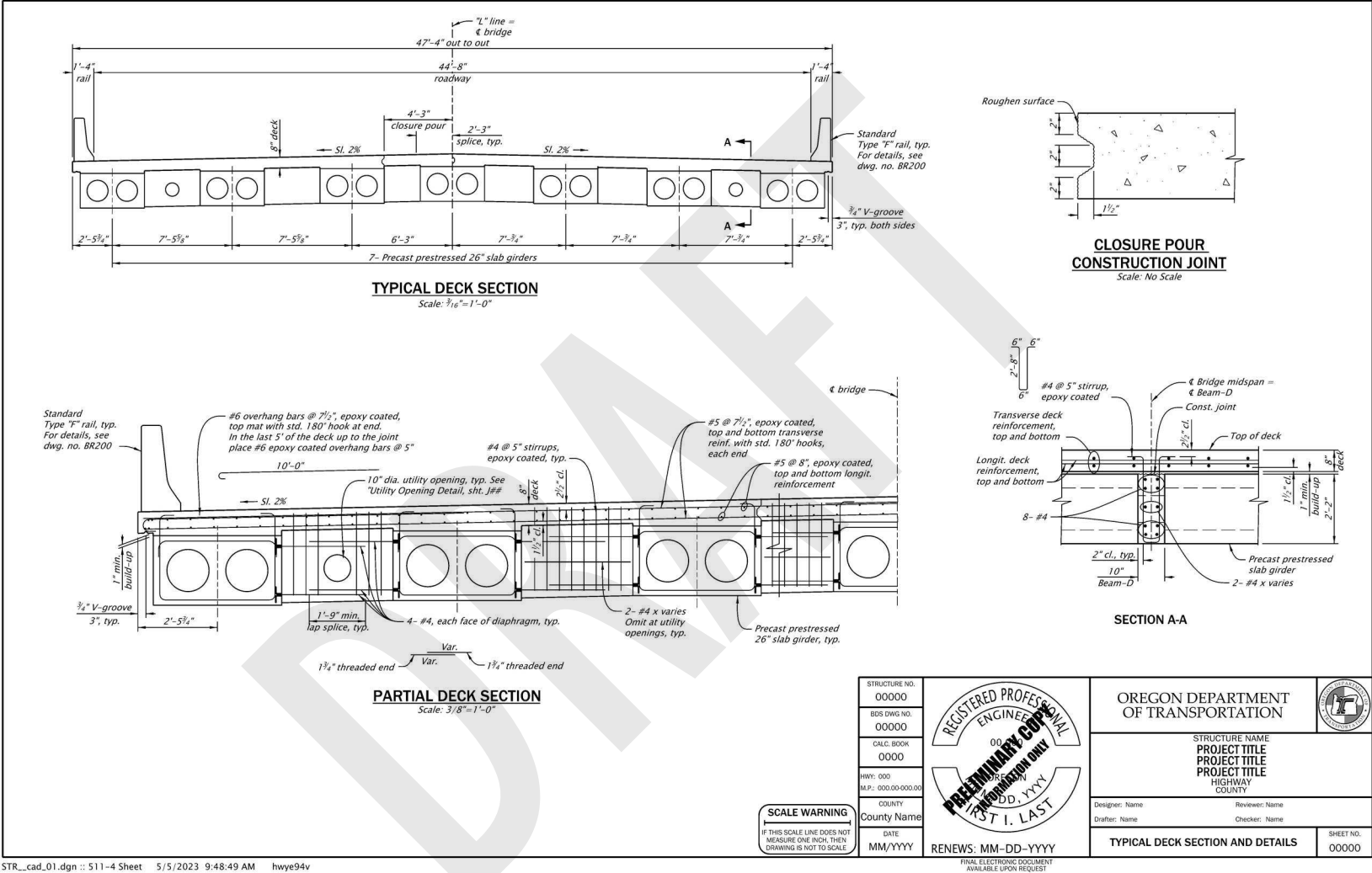


110 Figure 511-3 Typical Steel Girder Deck Section and Details



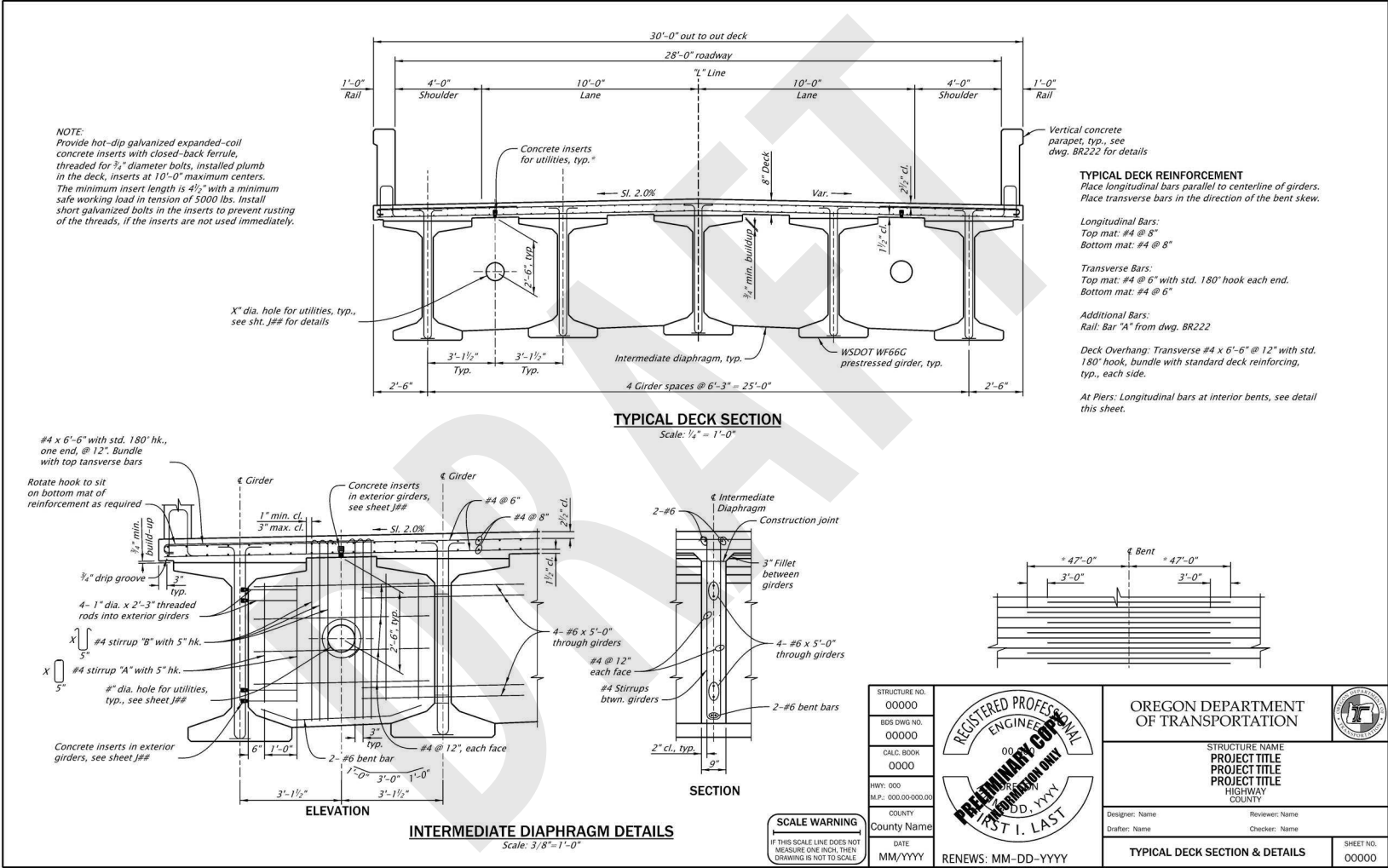
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112 Figure 511-4 Typical Slab Deck Section





114 Figure 511-5 Typical Concrete Girder Deck Section



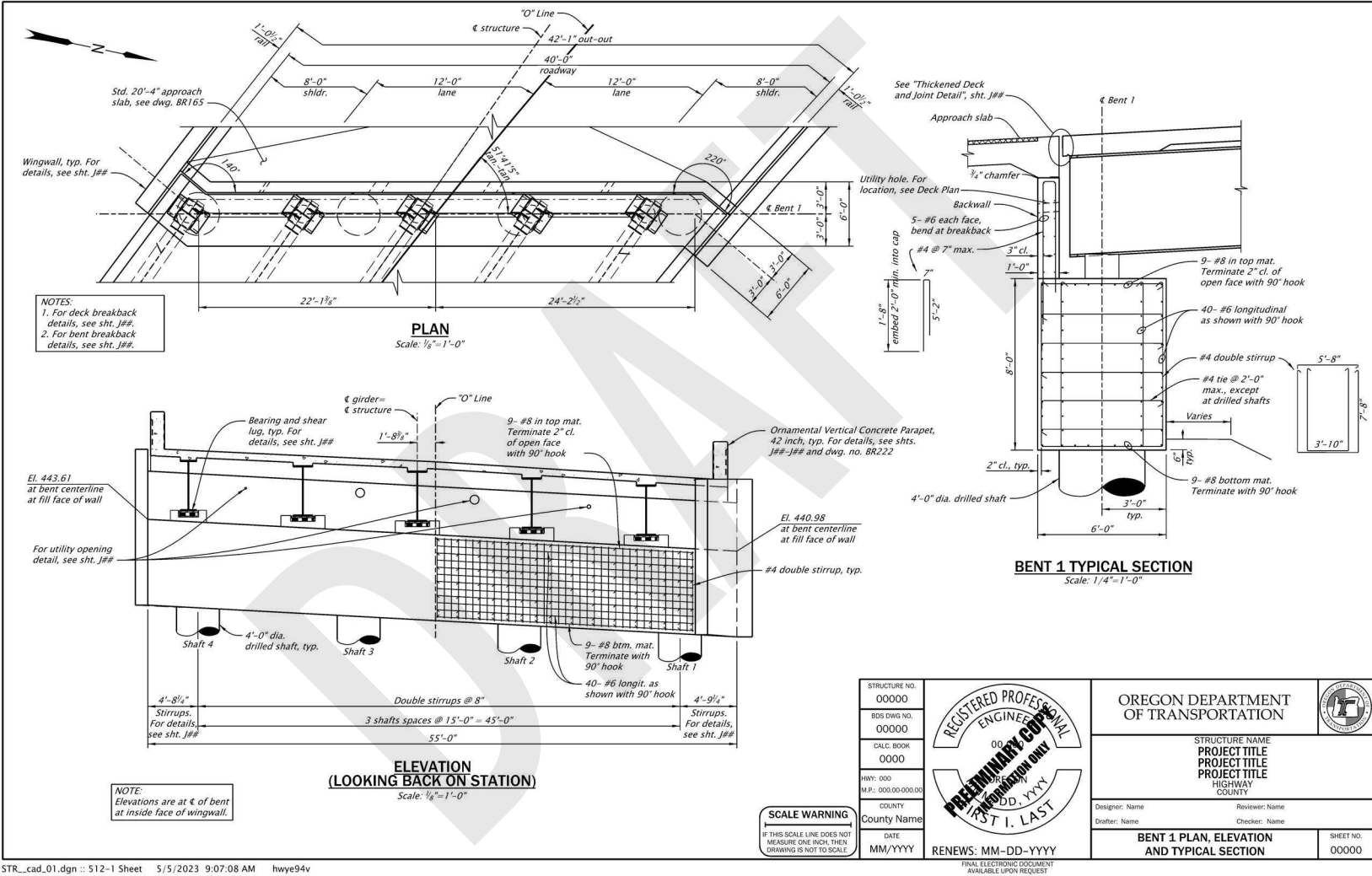
STR\_cad\_01.dgn :: 511-5 Sheet 5/5/2023 9:06:59 AM hwy94v

116 **Section 512 Substructure**

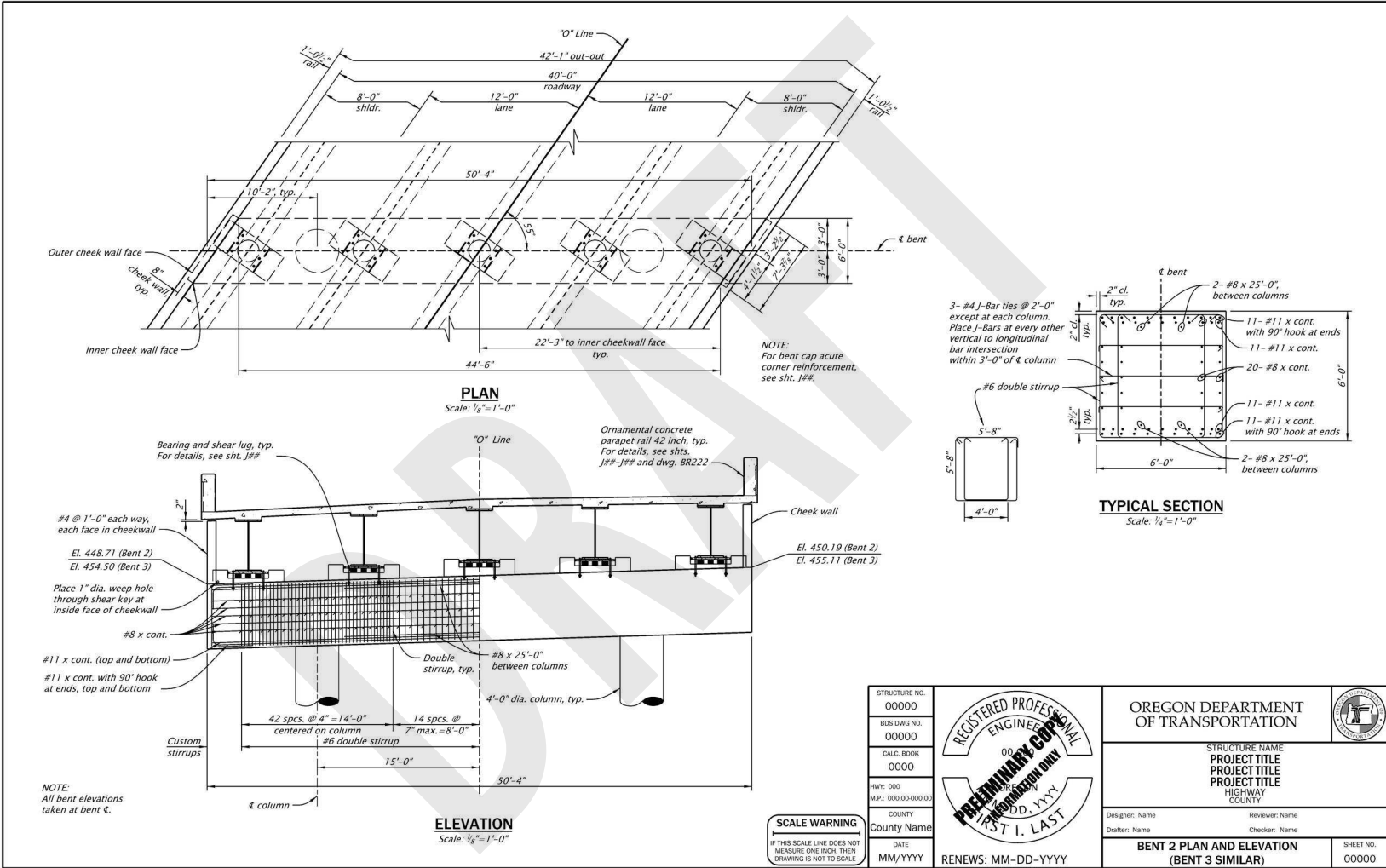
117

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118 Figure 512-1 End Bent Plan & Elevation



120 Figure 512-2 Interior Bent Plan & Elevation



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122 **512.1 Bent Section and Details**

123 **Section 513 Miscellaneous and Common Details**

124 **513.1 Wingwall details (if common to multiple bents)**

125 **513.2 Bearing and shear lug details**

126 **513.3 Excavation and backfill details**

127 **513.4 Concrete placement sequence**

128 **513.5 Drainage details**

129 **513.6 Bridge Approach slab details**

130 **513.7 Rail and transition details**

131 **513.8 Protective screening details**

132 **513.9 Illumination details**

133 **513.10 Sound wall details**

134 **513.11 Phase 1 Seismic example drawings?**

135 **513.12 Temporary work bridge details**

136

## Section 514 Addendums

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# 1 Part 600 Bridge Data System

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## Section 601 Structure and Drawing Numbers

Structure and drawing numbers are obtained using the Bridge Data System (BDS). BDS numbers are requested using the [Structure and Drawing Number Request Form](#). After completing the form as fully as possible, email it to [Bridge Section](#) to request assistance. If BDS numbers are frequently needed, instructions for acquiring access to BDS and detailed instructions for using it are available in the [Bridge Data System User Guide](#).

At the DAP milestone, acquire a structure number from the BDS. If there is a risk of the structure being removed from the project, wait until a decision about the structure is made or the Preliminary Plans milestone to obtain a structure number.

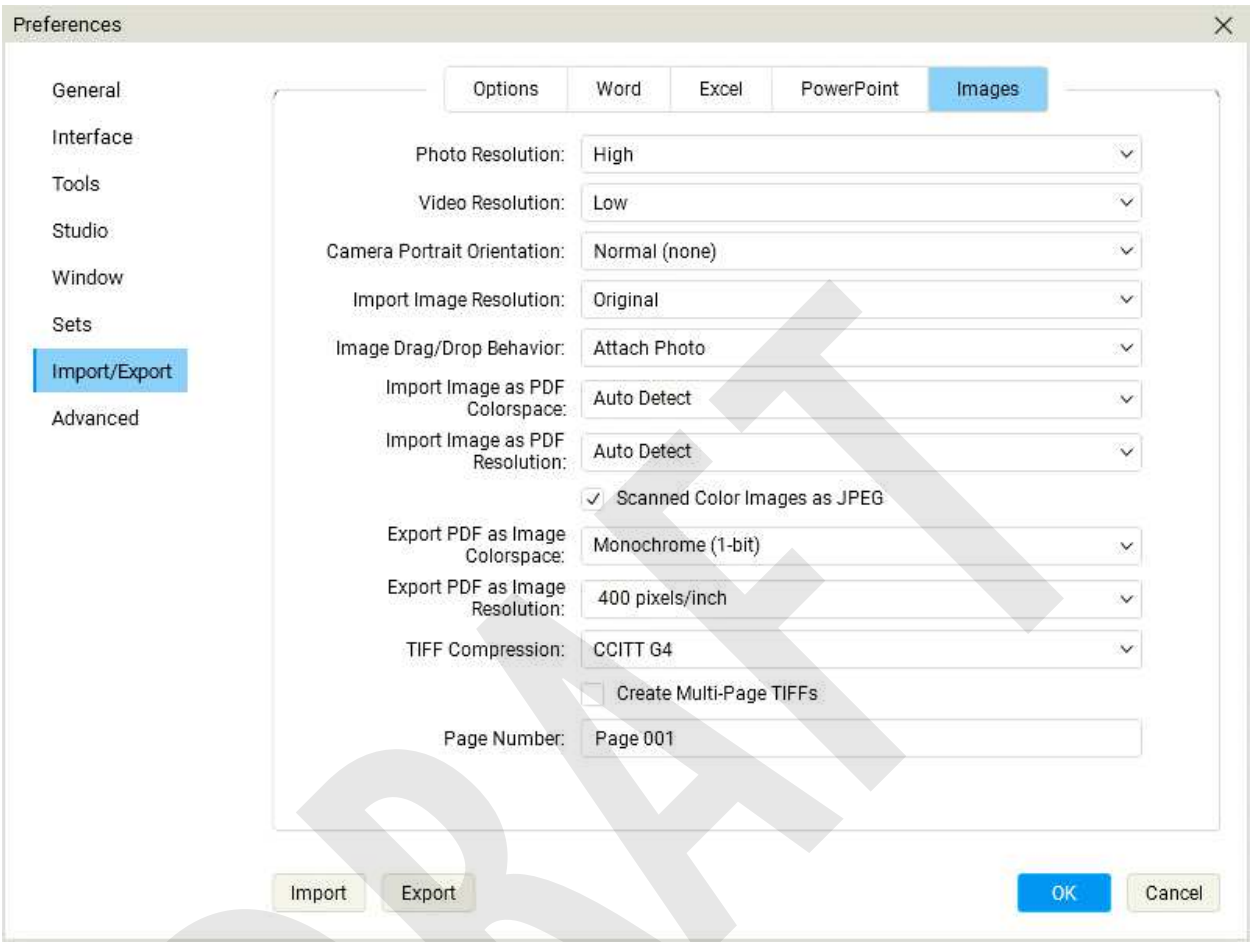
BDS drawing numbers are acquired at a reasonable point before the Final plans milestone when there are fewer additions or removals of plan sheets. Enter the project key number and title in the *Description* area. The sheet number is entered in the *SheetNo.-Title* column for each sheet (For example: J01 - Plan and Elevation).

## Section 602 Images for BDS

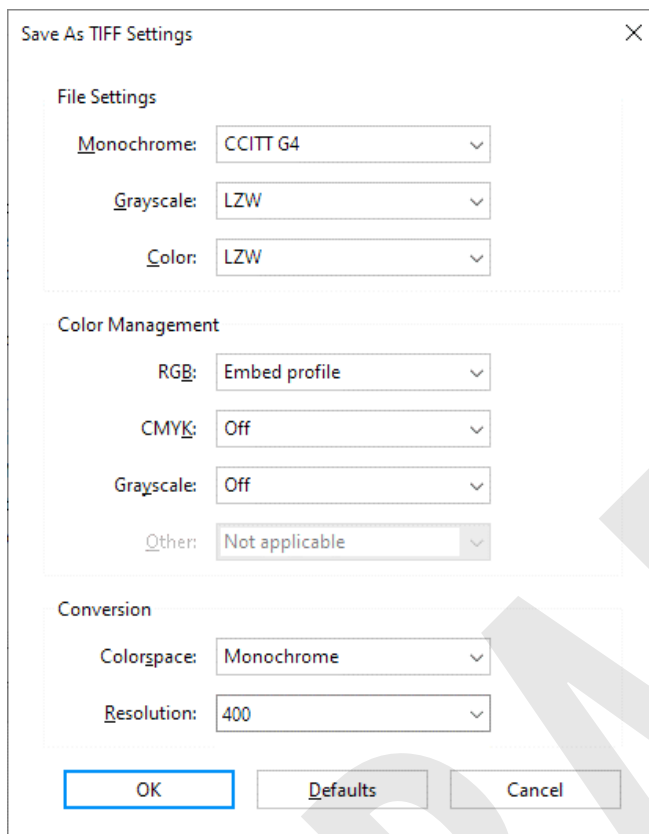
1. At project completion (bid opening for contract projects, when all addenda have been completed), the digitally signed structure PDF plans are converted to TIF files for upload to BDS.
2. For contract plans, locate the “flattened” combined set created by the Project Controls Office and extract the structure plans. For other projects, use the digitally signed PDFs.
3. In Bluebeam or Adobe, change the TIF image settings (See figures 602-1 and 602-2) and export the structure sheets to one TIF file per sheet.
4. When as-constructed changes are complete, new images are uploaded and *replace* the construction plan image.



26 Figure 600-1 Bluebeam settings for exporting to a TIF image



28 Figure 600-2 Adobe Settings for exporting to a TIF image



1. Rename each TIF file to the BDS drawing number. (For example: 123456.tif)
2. Upload the images into BDS.
  - a. If you have BDS access that allows you to upload images, then follow the directions in the [Bridge Data System User Guide](#).
  - b. The images may be too large to be sent by email. If you don't have BDS access or access that does not allow you to upload images, then send an email to [ODOT Bridge Engineering Section](#) with the subject line of "Upload Design Images to BDS" or "Upload As Constructed Images to BDS", as applicable, to arrange the method to provide the images.

## Part 700 As Constructed Plans

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## Section 701 General Information

- See Technical Bulletin RD22-01(B), As Constructed Plans Process and Requirements.
- MicroStation files will reside in ODOT ProjectWise project folders.
- All changes will be reviewed and have the Engineer of Record initials.
- Design office completes As Constructed edits in a new version of the original CAD files in the plan sheets and base files locations in ProjectWise. Include a revision mark shown next to the change.
- All as constructed revisions on one sheet will have the same revision number, consecutive with previous revisions on that sheet. See Figure 701-1. If there are no as constructed revisions, add the date and "As Constructed" with no triangle or revision number. See Figure 701-2. Add the "As Constructed" status stamp and the "Resident Engineer: *<insert name>*" text to all sheets. See Figure 701-3.
- When complete, a .TIF image (400 dpi) is created and uploaded to BDS. See Part 600 of the Bridge Data System User Guide. For those without BDS access, send the .TIF file to ODOT Bridge Engineering.
- If a 3D model was developed, notify Bridge CAD Standards so that a link may be added to the *OBM 3D Models* ProjectWise Set (Disciplines>Bridge>3\_Models).
- Once BDS has been updated, send an email to the Region Bridge inspector stating that the files have been updated for given structure.

20 Figure 701-1 Revision block with As Constructed changes

No.	DATE	REVISIONS	BY
①	09-09-09	Change	M.M.M.
②	05-20-10	As constructed	M.M.M.



21

22 Figure 701-2 Revision block with no As Constructed changes

No.	DATE	REVISIONS	BY
①	09-09-09	Change	M.M.M.
	05-20-10	As constructed	M.M.M.

23

24 Figure 701-3 Title block with As Constructed stamp and Resident Engineer name

CTURE NO. 0000 DWG NO. 0000 C. BOOK 0000 JO 00.00-000.00 QUNTY ty Name DATE 1/YYYY		RESIDENT ENGINEER: NAME  OREGON DEPARTMENT OF TRANSPORTATION 	
		STRUCTURE NAME PROJECT TITLE PROJECT TITLE PROJECT TITLE HIGHWAY COUNTY	
		Designer: Name Drafter: Name	Reviewer: Name Checker: Name
RENEWS: MM-DD-YYYY FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST		PLAN AND ELEVATION SHEET 0001	

25

ODOT provides a safe and reliable multimodal transportation system that connects people and helps Oregon's communities and economy thrive.

[www.oregon.gov/ODOT](http://www.oregon.gov/ODOT)

