SECTION 2: DRAFTING PRACTICES

2.1 COMPUTER AIDED DRAFTING (CAD)

2.1.1 Directory Setup

Every XP Workstation has been set up with a similar directory diagram. This will enable any user to find information on another workstation efficiently. Project files will be stored on the server under F:\ODOT_DATA\Projects\key #. Every Workstation has a c:\share" directory. This will allow Drafter to share details freely. (See Appendix Figure A2.3.1A for the Directory Diagram)

Use Serval software when copying or moving a file from another workstation, rename the file to avoid multiple copies of one file.

Bridge Standard Drawings files can be found in a pdf format at **http://www.odot.state.or.us/tsspecs/std-dwg-02.htm** and in dgn format on **'Salem - Rev. Bldg 5th Floor - \\scdata\brdgshar\bridge\standards\drawings**

When a standard drawing is placed on an individual workstation, change the file extension to .ref.

2.1.2 Cad Files

Drawings Start to Finish

1. Drawings are created. All bridge drawings, National Inventory (NBI) length culverts and Foundation Data sheets that accompany these structures will be "D" size. Non-bridge , non-NBI structures may use "B" size drawings. (Note: "D" size drawing borders will be a Bridge Section item and "B" size drawing borders will be a Geo/Hydro Section item)
2. Drawings are reviewed and corrected.
3. Drawings are printed and signed.
4. Mylars are scanned to make half size (11" x 17") paper prints of the signed mylars. At the same time the tiff files are saved for use in the Bridge Data System (BDS). Reprographic saves tiff file on server at: \\scdata\brdgshar\bridge\reprographics with a name reflecting the drawing number.
5. The half sized paper prints are then handed off to the Specification Writer. The full size mylars are stored away at the design office (Region Bridge Office, Preservation Team Office, Consultant office, etc.).
6. At the completion of construction of a project, As-constructed comments are placed on a paper copy of the plans and then sent to the design office for these comments to be placed on the signed mylars.
7. Once the as-constructed comments are placed on the mylars, the original set of as-constructed mark-ups is sent back to the Project Managers office.
8. The design office will make copies of the original mylars which now have all the as-constructed comments on them. Check Bridge Design and Drafting Manual where these copies will need to be sent.

2.1.2 Cad Files --- (continued)

9. The original mylars will now be sent to the ODOT – Bridge Section Headquarters to be filed and scanned.
10. The scanned image of the original plus as-constructed comments will replace the current stored design image in the BDS. Once scanned, the as-constructed drawings will be filed and sent to the drawing archive by Bridge Section.
11. To review and print these drawings go to the BDS and search for them.
12. All electronic drawing files shall be archived for future use. See Bridge Design and Drafting Manual – Section 2 for archiving procedure.

All structures have different drawings such as Layout and Index drawings, Deck Plans, Bents, but 95% of all structures have similar drawing types. They may have multiples of each of these drawings, so use the coinciding span number or Bent number in the view name, such as Span 2 or Bent 1.

Drafter Initials, Bridge Number, File I.D. , extension (.dgn)

File Identification
Only bridge number = Layout & Title Drawings
S = Superstructure Drawings
B = Substructure Drawings

Layout & Title Drawings
Layout and Index sheet
Plan and Elevation
General Notes
Foundation Data Sheet
Stage Construction
Miscellaneous Details
Work Bridge Details

Superstructure Drawings
Deck Plan
Deck Section
Framing Layout
Longitudinal Beam
Camber Diagram
Post-tensioning sheets
Rail Details

Substructure Drawings
Footing Plan
Plan and Elevation–Bent 1
Bent Details – Bent 1
Bearing Details – Bent 1
Wingwall - A Details
Shearlug

2.1.2.1 Microstation Models

All Title and Layout files (see Section 2.1.2) will have Existing Bridge Model and Proposed Bridge Model. See Figure 2.1.2.1A.

Existing Bridge model will have any existing information necessary for the project.

Proposed Bridge model will have alignment information obtained from Roadway Designer with the new bridge shown in the coordinate correct location. This model will be shared with Geo/Hydro Section for their use.

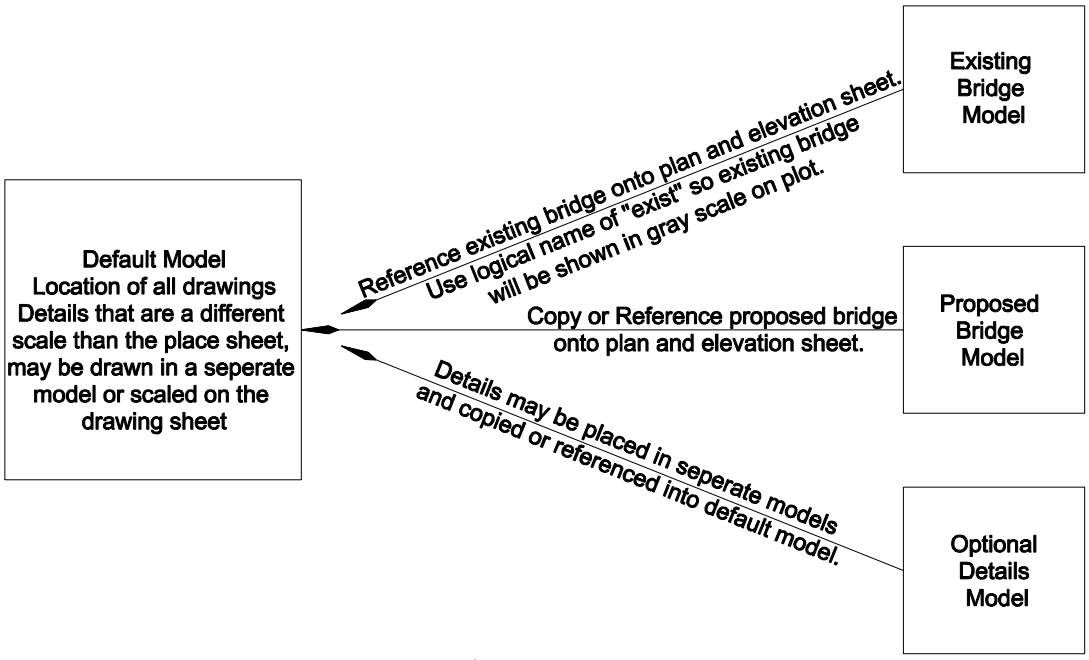


Figure 2.1.2.1A

2.1.3 Cell Libraries

All Microstation cell libraries reside on the server plus a personal cell library, for location see below.

Bridge Section Standard Cell Library

Location on server = ODOT_SPACE\Standards\Cell\Bridge.cel

Personal Cell Library

Location on server = ODOT_DATA\ENG_APP\Cell\Personal Cell Library Name.cel

Registration Seal Cell Library

This Library shall be maintained by the Senior Bridge Drafter in each Region for their Professional Engineers. Place the file in:

Location on server = ODOT_DATA\ENG_APP\Cell\Registration Seals Library Name.cel

For a copy of the cell library, see appendix A2.1.3

2.1.4 Menus

There are several types of menus that will be discussed below. All menus are located in the F:\ODOT_DATA\ENG_APP\home

- Side Bar Menus - Side bar menus are not recommended for use in Version 8.
- System Menus – A palate Menu as seen when you enter MicroStation can be created going through the Modify User Interface under utilities. See Figure 2.1.4A and 2.1.4BB for a custom made system menu.
- Function Key Menus - To set a function key menu you must be in a drawing file and go to user - function keys and edit and delete as needed, but remember to save it when finished. Each individual may have their own version of a function key menu.
- ODOT Plans Menu – Open a Microstation file. Go to ODOT (located a crossed to top) Go to menu and it will open.

Figure 2.1.4A

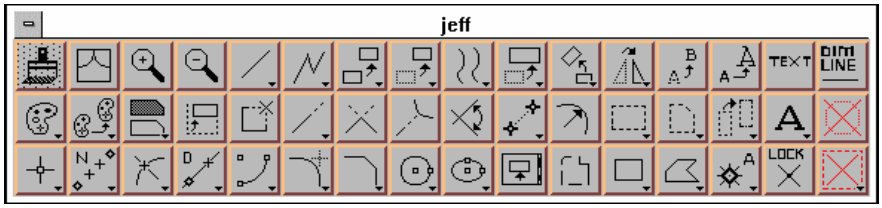


Figure 2.1.4B

2.1.5 Seed Files

Seed files are the beginning of every file, when creating a new file the system copies your seed file to create a new file. . ODOT seed file are located:

ODOT_SPACE\Standards\Seed\Seed2d.dgn
Seed3d.dgn
SeedRW2d.dgn

2.1.6 Scales

When selecting a scale, keep in mind that the drawing will be reduced to half size. For any given structure, all plans should, whenever possible, be drawn at the appropriate scale for the same details. Sections and views may be enlarged to show more detail, but the number of different scales used should be kept to a minimum. When scaling CAD details, use Figure 2.1.6A. (An enlarged version is available from Drafters.)

The scale listed under each detail should read **Scale xxx = xxx** where xxx is the appropriate scale factor.

All drawings are drawn full size to a scale of 1:1. Only when they are plotted do they become the specified scale.

Common scales for bridge drawings:

- Plan & Elevation - Use an english scale and make the plan as large as possible. (Remember to save room for location map in the upper right corner and General Notes, if possible).
- Footing Plan - As large as possible
- Deck Plan - Use either a 1/8" = 1'-0" or 1" = 10'-0".
- Deck Section - Use either a 3/8" = 1'-0" or larger.
- Bents - The plan and elevation of Bents are drawn to 1/4" = 1'-0" or 3/16" = 1'-0".

Of course, these are suggested guidelines and remember, there are always situations that don't quite fit.

Following are the scale factors for English scales that are used for bridge drawings.

Scale	Scale Factor
3" – 1'-0"	4
1 ½" = 1'-0"	8
1" = 1'-0"	12
¾" = 1'-0"	16
½" = 1'-0"	24
3/8" = 1'-0"	32
¼" = 1'-0"	48
3/16" = 1'-0"	64
1/8" = 1'-0"	96
3/32" = 1'-0"	128
1" = 60'-0"	720
1" = 50'-0"	600
1" = 40'-0"	480
1" = 30'-0"	360
1" = 20'-0"	240
1" = 15'-0"	180
1" = 10'-0"	120

PLOT SCALE 1" = n'	SCALE FACTOR (up)	SCALE FACTOR (down)	MICRO STA. PLOTING FULL SIZE	MICRO STA. PLOTING 1/2" SIZE
60	720	.00139	60:1	120:1
50	600	.00167	50:1	100:1
40	480	.0021	40:1	80:1
30	360	.0028	30:1	60:1
20	240	.0042	20:1	40:1
15	180	.0056	15:1	30:1
10	120	.00833	10:1	20:1
3/32"	128	.0078	10.667:1	21.333:1
1/8"	96	.0104	8:1	16:1
3/16"	64	.0156	5.333:1	10.667:1
1/4"	48	.0208	4:1	8:1
3/8"	32	.0313	2.667:1	5.333:1
1/2"	24	.04166	2:1	4
3/4"	16	.0625	1.333:1	2.667:1
1"	12	.0833	1:1	2:1
1 1/2"	8	.125	0.667:1	1.333:1
3"	4	.250	0.333:1	0.667:1

Scale / Factor	BORDER SIZE	SCALE FOR DETAIL																		
		10	15	20	30	40	50	60	3/32"	1/8"	3/16"	1/4"	3/8"	1/2"	3/4"	1"	1 1/2"	3"
3"	4	0.0333	0.0222	0.0167	0.0111	0.0083	0.0067	0.0056	0.0313	0.0417	0.0625	0.0833	0.1250	0.1667	0.2500	0.3333	0.5000	1.00
1 1/2"	8	0.0667	0.0444	0.0333	0.0222	0.0167	0.0133	0.0111	0.0625	0.0833	0.1250	0.1667	0.2500	0.3333	0.5000	0.6667	1.00	2.00
1"	12	0.1000	0.0667	0.0500	0.0333	0.0250	0.0200	0.0167	0.0938	0.1250	0.1875	0.2500	0.3750	0.5000	0.7500	1.00	1.50	3.00
3/4"	16	0.1333	0.0889	0.0667	0.0400	0.0300	0.0267	0.0222	0.1250	0.1667	0.2500	0.3333	0.5000	0.6667	1.00	1.3333	2.00	4.00
1/2"	24	0.2000	0.1333	0.1000	0.0667	0.0500	0.0400	0.0300	0.1875	0.2500	0.3750	0.5000	0.7500	1.00	1.50	2.00	3.00	6.00
3/8"	32	0.2667	0.1778	0.1333	0.0889	0.0667	0.0533	0.0444	0.2500	0.3333	0.5000	0.6667	1.00	1.3333	2.00	2.6667	4.00	8.00
1/4"	48	0.4000	0.2667	0.2000	0.1333	0.1000	0.0800	0.0667	0.3750	0.5000	0.7500	1.00	1.50	2.00	3.00	4.00	6.00	12.00
3/16"	64	0.5333	0.3556	0.2667	0.1778	0.1333	0.1067	0.0889	0.5000	0.6667	1.00	1.3333	2.00	2.6667	4.00	5.3333	8.00	16.00
1/8"	96	0.8000	0.5333	0.4000	0.2667	0.2000	0.1600	0.1333	0.7500	1.00	1.50	2.00	3.00	4.00	6.00	8.00	12.00	24.00
3/32"	128	1.0667	0.7111	0.5333	0.3556	0.2667	0.2133	0.1778	1.00	1.3333	2.00	2.6667	4.00	5.3333	8.00	10.6667	16.00	32.00
60	720	6.00	4.00	3.00	2.00	1.50	1.20	1.00	5.6250	7.50	11.25	15.00	22.50	30.00	45.00	60.00	90.00	180.00
50	600	5.00	3.3333	2.5000	1.6667	1.25	1.000	0.8333	4.6875	6.2500	9.3750	12.5000	18.750	25.00	37.5000	50.00	75.00	150.00
40	480	4.00	2.6667	2.00	1.3333	1.00	0.8000	0.6667	3.7500	5.0000	7.5000	10.00	15.00	20.00	30.00	40.00	60.00	120.00
30	360	3.00	2.00	1.5000	1.00	0.7500	0.6000	0.5000	2.8125	3.7500	5.6250	7.5000	11.2500	15.00	22.5000	30.00	45.00	90.00
20	240	2.00	1.3333	1.00	0.6667	0.5000	0.4000	0.3333	1.8750	2.5000	3.7500	5.0000	7.5000	10.00	15.00	20.00	30.00	60.00
15	180	1.5	1.00	0.7500	0.5000	0.3750	0.3600	0.2500	1.4063	1.8750	2.8125	3.75	5.6250	7.50	11.25	15.00	22.50	45.00
10	120	1.00	0.6667	0.5000	0.3333	0.2500	0.2000	0.1600	0.9375	1.2500	1.8750	2.5000	3.7500	5.00	7.5000	10.00	15.00	30.00

Figure 2.1.6A

REV 04/05

2.2 DETAILING

2.2.1 Text

Since all drafting is now done with the use of computers, use the following:

- General text – 5/32" font 24, wt=2
- Titles – 7/32" font 2, wt=3

Use ODOT Plans menu for setting text sizes. For abbreviations to use see Appendix Section A2.1.1.

Orient lettering to be read from the bottom or right edge of the sheet.

2.2.2 Line Work And Levels

All line work must be of sufficient size, weight and clarity so that it can be easily read from a print that has been reduced to one-half (1/2) the size of the original drawing. Similar lines denoting a structural outline, a centerline, etc., shall have the same line weight and style.

Use line weight with appropriate gradations of width to give line contrast as shown in Figure 2.2.2A. See Appendix Section 0.000 for Levels and designated line weights. Care shall be taken that the thin lines are dense enough to show clearly when reproduced See Appendix Section A2.2.2 for Standard Symbols.

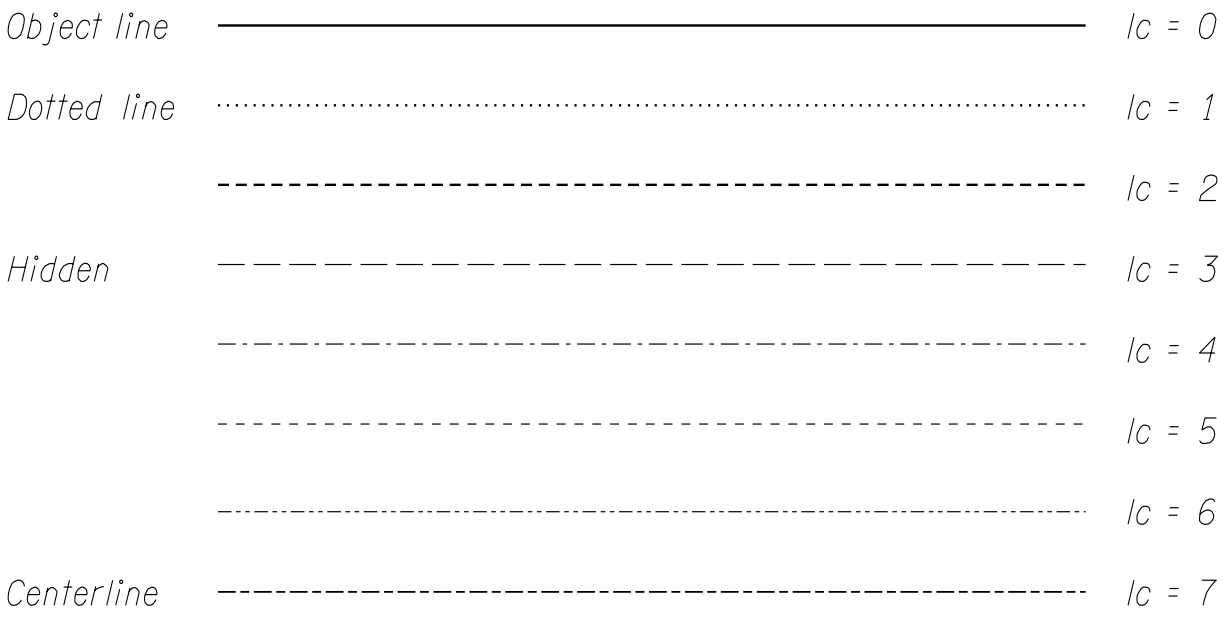


Figure 2.2.2A

2.2.3 Dimensioning

Avoid duplication and unnecessary dimensions. Place all dimension figures above the dimension line, so that they may be read from the bottom or the right edge of the sheet, as shown in Figure 2.2.3A.

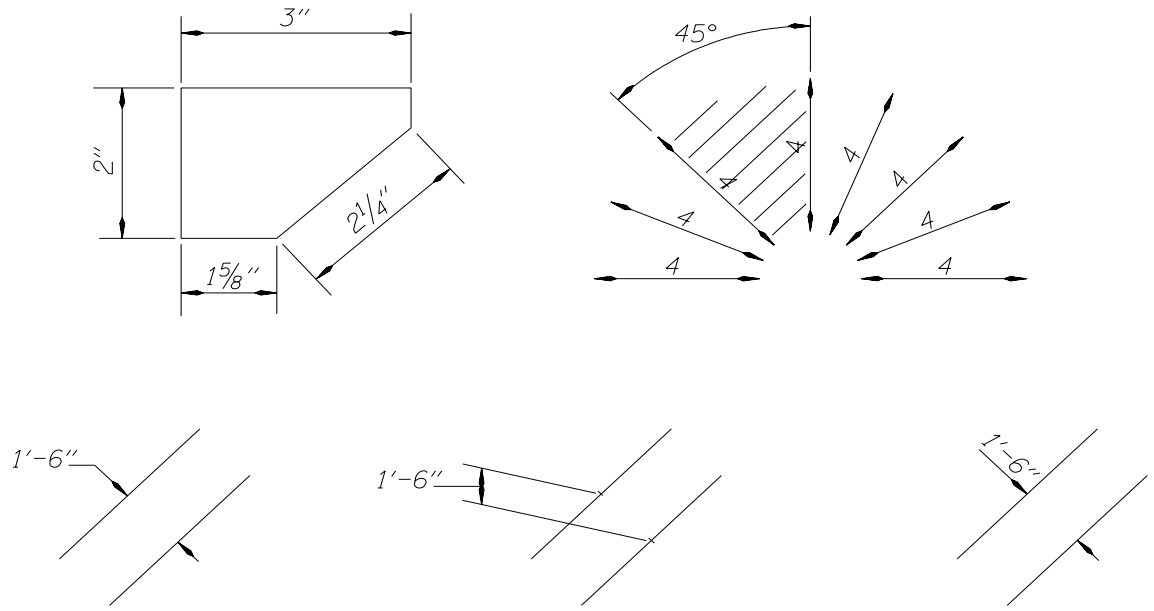


Figure 2.2.3A

In general, consider the precision of detail dimensions and the normal construction tolerances to which it is being constructed. General plan and detail dimensioning precision should not be more than the following:

- Structural Steel to 1/16”
- Welds to 1/16”
- Concrete to 1/8”
- Camber Diagrams to 1/8”
- If a series of dimensions (i.e. beam or rail post spacing) do not add up to the exact overall dimension, use a plus or minus (±) following the series dimension. (i.e. 25 spaces at 9’-3 1/8”± = 231’-7”)

2.2.3 Dimensioning – (continued)

Dimensions 12" or more are to be dimensioned in feet and inches, unless the item dimensioned is conventionally designated in inches (for example, 16" dia. pipe or #4 @ 18").

In dimensions more than 1 ft, fractions less than 1" are to be proceeded by 0 (for example, 3'-0 1/8").

Intersection angles should be dimensioned as the acute angles between centerlines of roadways or between centerline of roadway and centerline of bent. Where the intersection is on a curve, measure the angle from the local tangent to the curve at the point of intersection. For intersecting curves, give the angle and add the words "tan - tan".

Placement of dimensions outside the view, preferably to the right or below, is desirable. However, in the interest of clarity and simplicity, it may be necessary to place them otherwise. Examples of dimensioning placement are shown in Figure 2.2.3B.

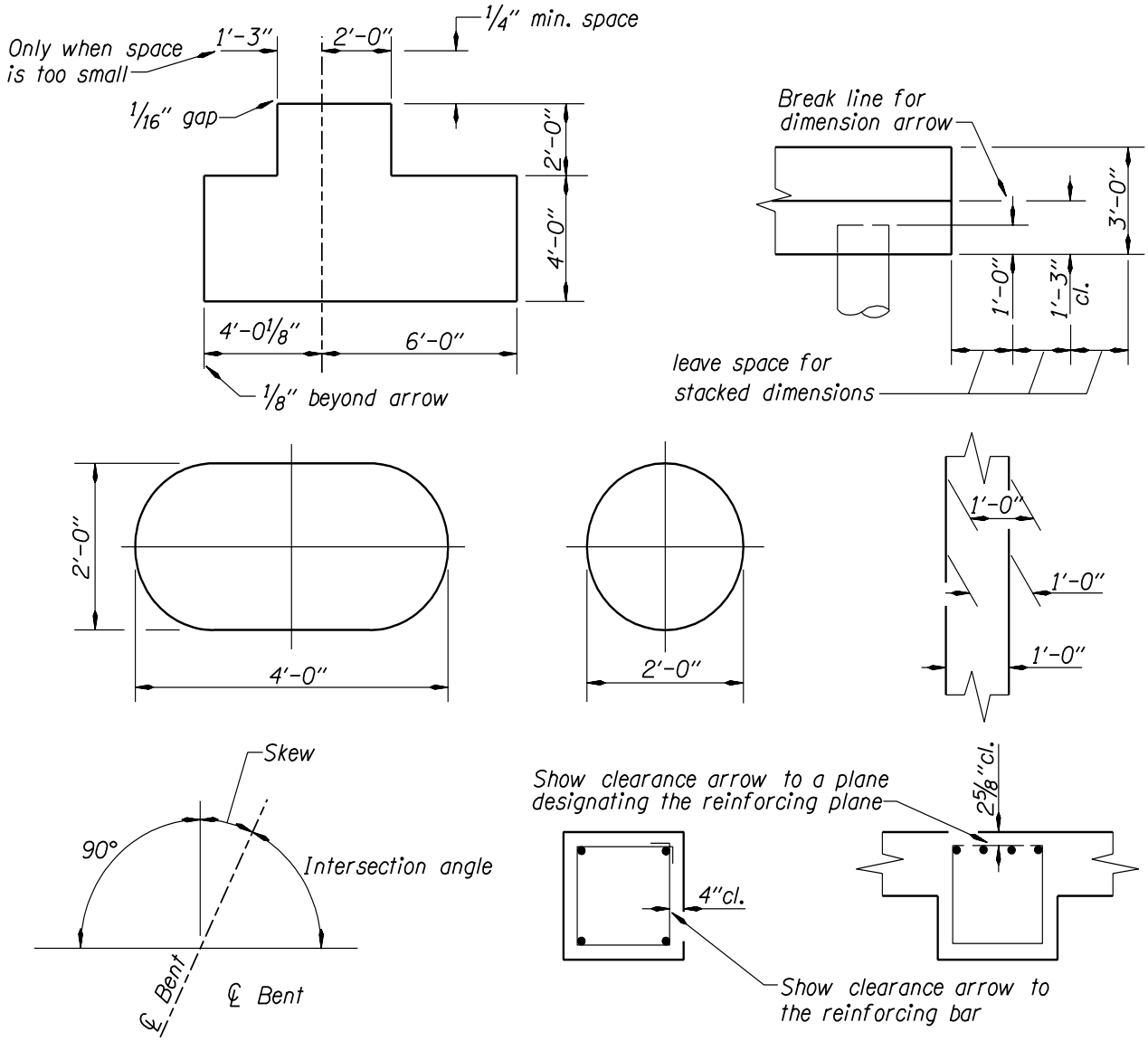


Figure 2.2.3B

2.2.4 Concrete

A typical crossbeam section is shown below.

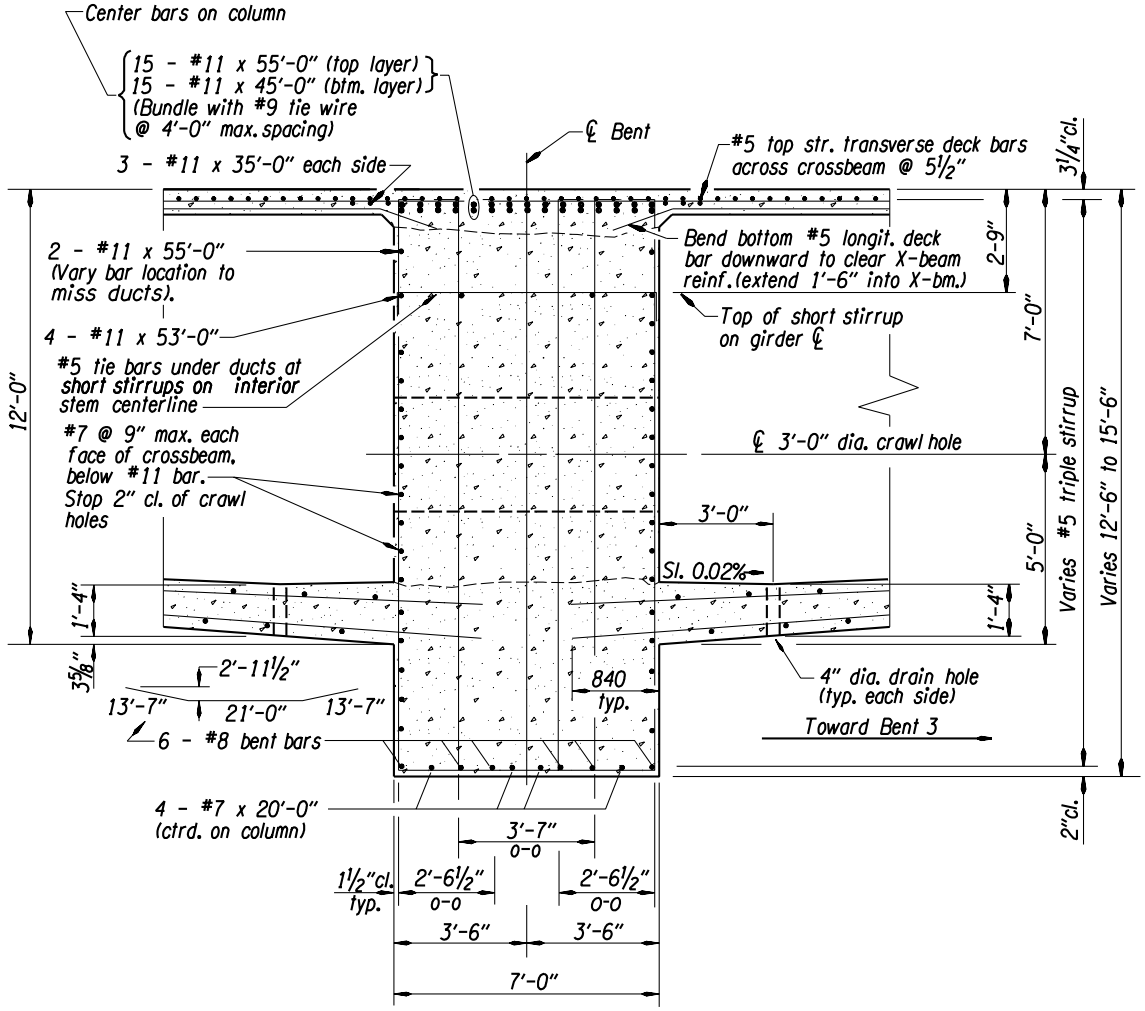


Figure 2.2.4A

2.2.5 Structural Steel

Generally dimension marks are not used, except for length dimensions, for detailing structural steel shapes, plates and welds. See Figure 2.2.5A for an example. Steel callout examples include:

Plates
PL 1/2 x 12 x 6'-3"
PL 3/4 x 12 x 12

Angles
L 6 x 6 x 1/2 x 16'-6"
2Ls 3 x 3 x 3/8 x 12"

Wide-Flange Sections
W 8 x 24 x 10'-0"

Structural Tubing

TS 4 x 4 x 0.375 x 8'-6"
TS 3 OD x 0.250 x 6'-3"

Fillet Welds

See example of fillet welds in Figure 2.3.4A.

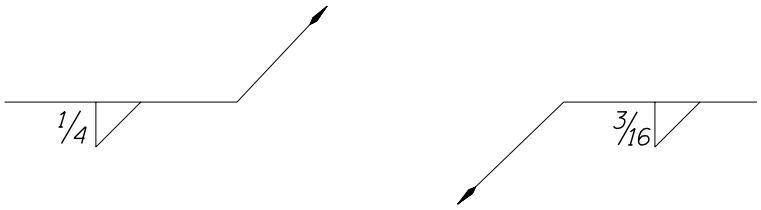
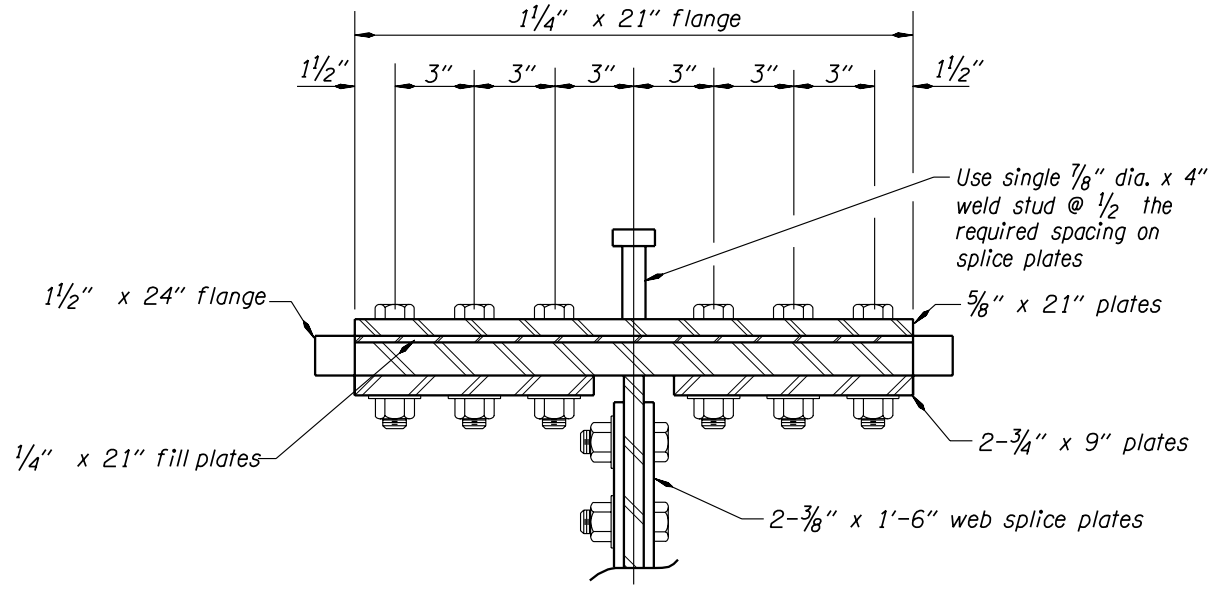
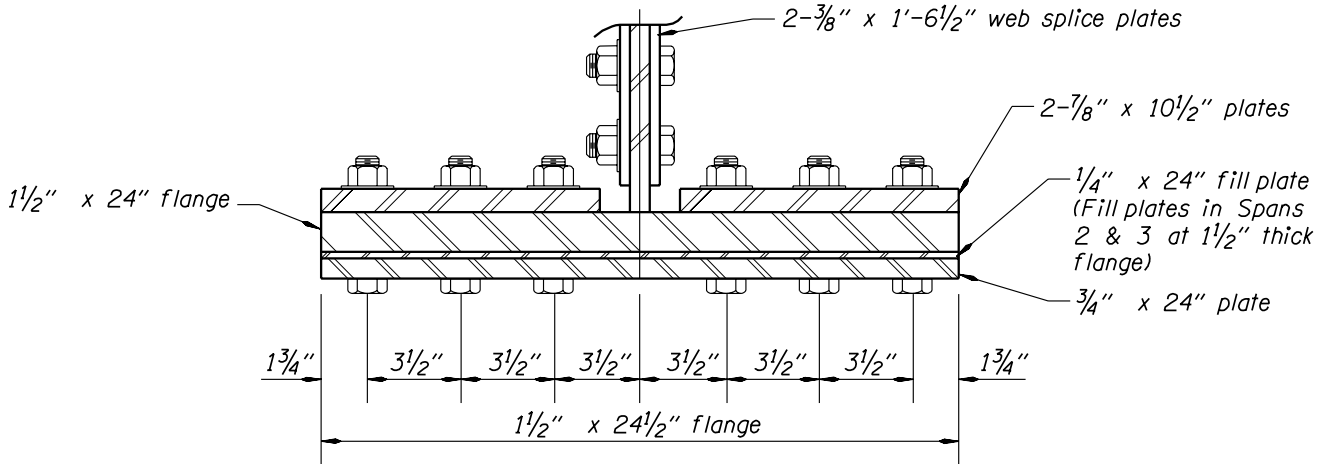


Figure 2.3.4A

2.2.5 Structural Steel – (Continued)



TOP FLANGE - FIELD SPLICE DETAILS



BOTTOM FLANGE - FIELD SPLICE DETAILS

Figure 2.2.5B

2.2.6 Reinforcing Steel

Simplify labeling reinforcing steel as much as possible. Eliminate needless words like "no.", "bars", "ctrs", etc. See example in Figure 2.2.6A.

Figure 2.2.6A

2.2.7 Bar Length Labeling

To avoid excessive bar lengths (greater than stock lengths indicated in Section 1.2.11.2) and to avoid splices in the wrong places, label the main reinforcing steel lengths. Sketches may be necessary to show correct bar and splice location. See labeling methods in Figure 2.2.7A.

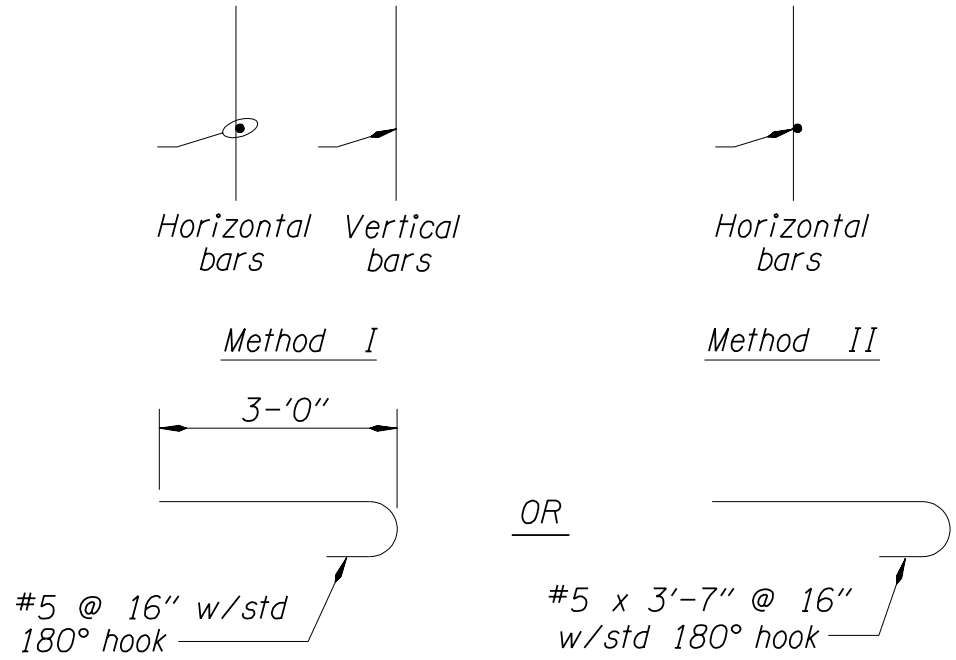
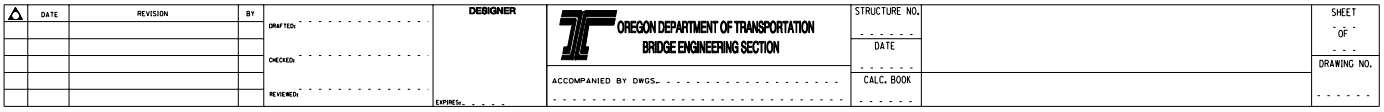


Figure 2.2.7A

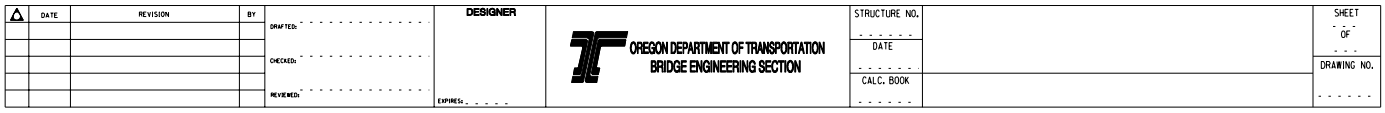
2.3 DRAWING BORDERS

Plot final drawings on mylar ("D" Size). There are three styles of borders as shown in Figure 2.3A. See Appendix Section A2.3 for enlarged examples.

When one of the three borders is selected and placed in a graphics file, a file identification tag is placed vertically at the bottom right corner of the border just inside the cut line. See drawing identification tag in Section 2.3.1.

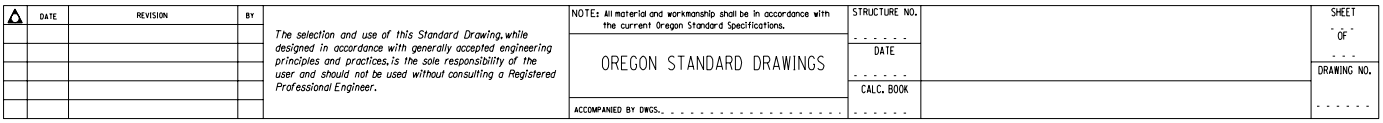


TITLE SHEET



DETAIL SHEET

FOUNDATION DATA SHEET



OREGON STANDARD SHEET

Figure 2.3A

While in a graphics file, place all drawings in an appropriate Plotypus layout location. See Plotypus plotting manual for layout grid.

2.3.1 Drawing Identification Tag

The drawing ID tag runs across the bottom of the drawing starting at the bottom left corner.

example: Station ID: ##FILE NAME LOCATION WHILE PLOTTING## Date, Time, User Identification

File name location while plotting: This will plot the current file location during plotting.

Plotting Tag runs across the bottom starting at the lower right corner of the drawing. This will indicate the border scale and the view name (Scale – view name) for the drawing. Placing a descriptive name here will help find specific drawings within the graphics file, some examples are:

DRAWING DESCRIPTION	**View Name (vi=)**
Layout and Index sheet	Layout
Plan and Elevation	Plan
General Notes	Notes
Foundation Data Sheet	Foundation
Stage Construction Details	Stage
Footing Plan	Footing
Deck Plan – Span 1	DeckPlan
Deck Section	DeckSection
Framing Layout	Frame
Longitudinal Beam	Beam
Camber Diagram	Camber
Post-tensioning sheets	Post-tensioning
Plan and Elevation – Bent 1	Bent1
Bent Details – Bent 1	BentDetails1
Bearing Details – Bent 1	Bearing 1
Shear Lugs	Lugs
Wingwall - A Details	Wingwall
Rail Details	Rail
Miscellaneous	Misc

Date: The date when the plot was made.

2.4 TITLE BLOCK INFORMATION

2.4.1 Request for Drawing Numbers

Request drawing numbers through project lead drafter and they will access Bridge Data System (BDS) for drawing numbers. If project does not merit a lead drafter, then each drafter has access to obtain drawing numbers through the BDS system. On structures that have “D” size Foundation Data Sheets, the Bridge Drafter will get drawing numbers for the Foundation Data Sheets. This will ensure that the drawing numbers are consecutive for the structure.

Bridge name should reflect the information on the structure data sheet located in the Bridge Data System (The correct bridge name can be found in the Bridge Log for existing bridges)

The Drafter should work with the Designer to make sure all areas are covered before requesting drawing numbers.

2.4.2 Title Sheet

List the Title block information as follows: structure name, section name, highway name and milepost, and the county name. See Appendix Section A2.4.6 for example.

The County Bridge No. is placed immediately above the BRIDGE NO. to provide maintenance cross referencing. If the County Bridge No. is not already cross- referenced in the job record or our files, it may be obtained from the Bridge Operations Managing Engineer.

Identify structures on the State Highway System (Interstate, Primary and Secondary highways) in the title block of the title sheet by milepoint (MP) location. Show the milepoint in parenthesis immediately after the highway name to the hundredth of a mile.

For "Accompanied by", list the rest of the drawings for this structure (i.e., 37833 through 37846) followed by any Bridge standard drawings which show details common to this structure and other structures which are a part of the same contract and roadway standard drawings to which reference has been made anywhere in the plans for this structure.

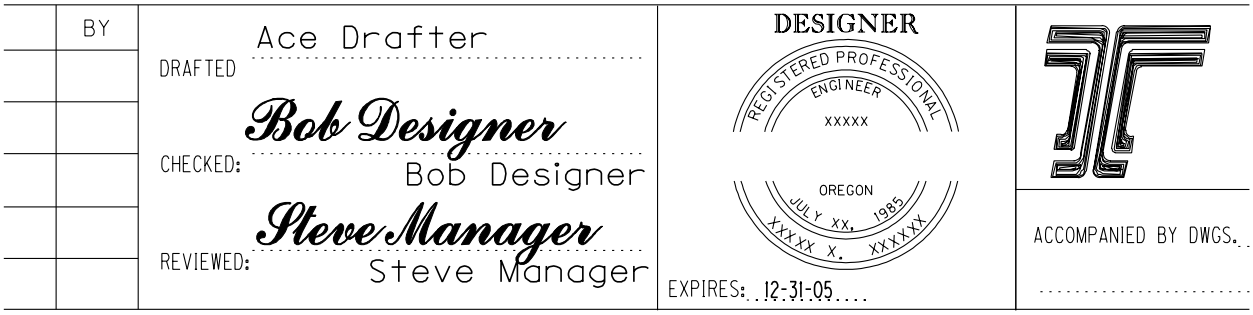


Figure 2.4.2A

2.4.2 Title Sheet – (continued)

Provide a list of drawing numbers for the existing structure just above title inside the border.

Put "Information Only" notation above the title block at the right side of existing drawings.

For "No. of ", the title sheet will be No. 1. The number of sheets will be the title sheet and all of the detail sheets for the structure. Do not include “Accompanied by” standard drawings in the total.

Within the title block, place the Bridge Engineer's and the Managing Engineer's or Design Engineer's registration seal, whoever is the most appropriate. Each registration seal must have an expiration date (which will be added by the Engineer when signature is placed) placed under it within the title block.

Drafters may print or sign their first and last names.

Checkers and Reviewers sign their names (using full signature) above the dotted line and print their name below (see Figure 2.4.2A and Figure 2.4.2B for the Title Block).

For any project not designed in-house the Bridge Engineer will sign the plans "Reviewed" rather than stamp the plans (see Figure 2.4.2A and Figure 2.4.2B)

2.4.3 Detail Sheet

On Detail Sheets, Designers include their registration seal and expiration date if registered. If the Designer is not a Registered Engineer, then the Design Supervisor will place their registration seal. See Appendix Section A2.1.6 for example.

Drafters and Checkers place their names as indicated for the title sheet (see Figure 2.4.2A and Figure 2.4.2B for the Detail Sheet title block).

Normally Standard Drawing project specific fill-in sheets should be detail sheets. Change the border from a Standard Drawing border to a Detail Sheet border.

2.4 Title Block Information – (continued)

EXAMPLE TITLE BLOCKS

1. Revisions
2. Drafter
   Checker
   Reviewer
   (Reviewer signs here if Designer is registered)
3. Registration Seal - Designer (if registered or Reviewer)
4. Standards Disclaimer
5. Accompanied by drawings
6. Structure Number
7. Date
8. Calculation book
9. Bridge Name
   Section Name
   Highway Name and Milepost
   County Name
10. Drawing Description
11. Standards Drawing Number (Filing purposes only)
12. Sheet xx of xx
13. Bridge Section drawing number
14. Bridge Name
15. Oregon Standard Drawing
16. County Bridge Number or Existing Bridge Number
17. For Information Only drawings
18. Welds Reviewed by (top left corner)
19. File location information
20. Scale, Viewname and Plotting tag

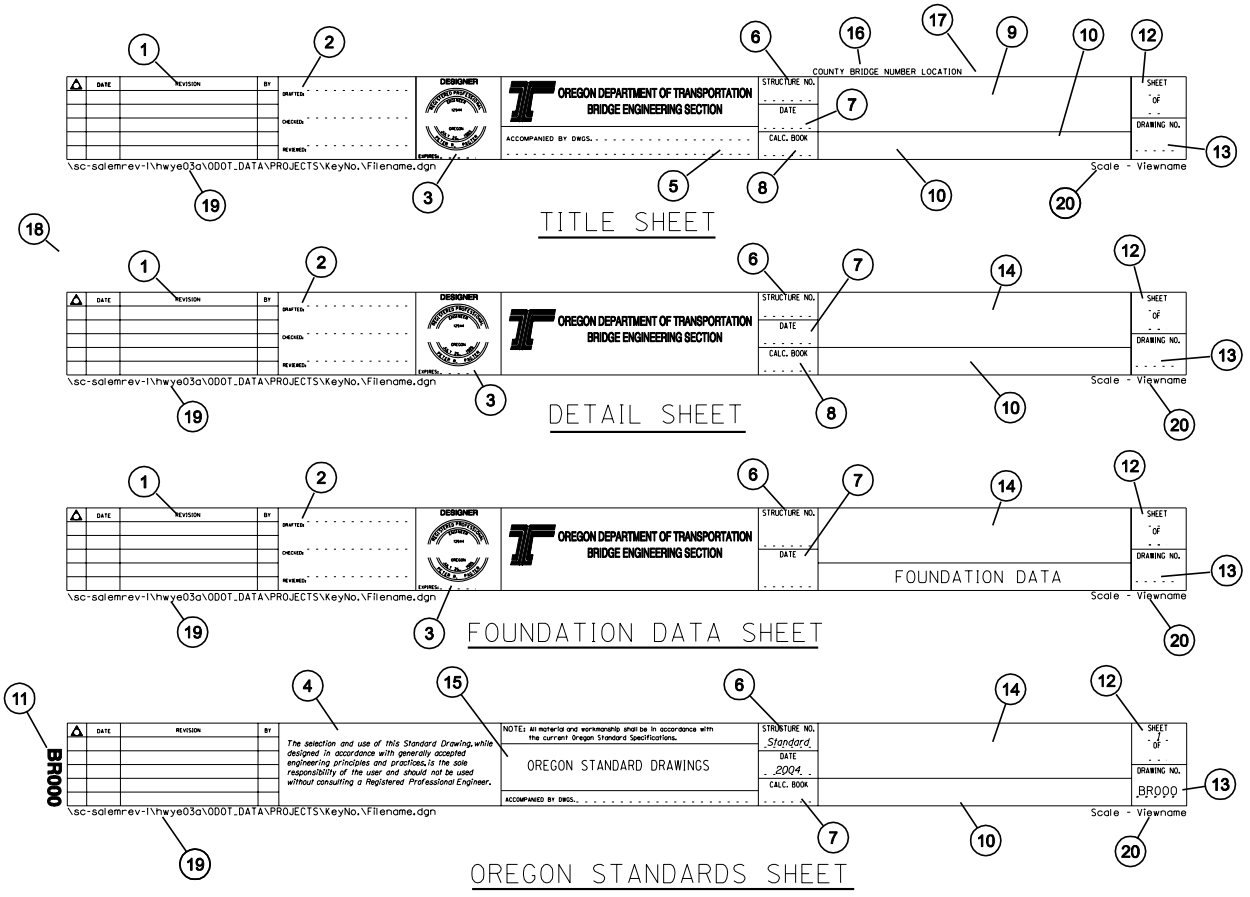


Figure 2.4.2B

2.5 LEAD DRAFTERS DUTIES ON LARGE PROJECTS

Large projects, with multiple or complex structures involving several designers and drafters, can often be completed more efficiently with one Designer and Drafter helping the Design Team Supervisor manage and organize the efforts of the design team. These Lead Drafters also benefit by gaining experience in project management and coordinating the efforts of other Designers and Drafters.

The following guidelines should be reviewed and agreed to by the designer and drafter.

- Get involved early to be knowledgeable about the overall project and deadline requirements.
- Make early estimates of time and number of sheets required.
- Be available to do TS&L sketches and drawings as needed.
- Coordinate and communicate with other Drafters.
- Monitor drafting progress and request help as needed to meet project deadlines.
- Review drafting for completeness and consistency.
- Maintain a current drawing file of all structures on the project.
- Attend project team meetings along with other Drafters involved.
- Stay informed of project status regarding schedules and deadlines.

2.6 TYPE, SIZE AND LOCATION PLAN & ELEVATION

The Type, Size and Location (TS&L) Plan and Elevation sheet is also used for the Final Plan and Elevation sheet. This information is placed on a title sheet.

2.6.1 Plan

This is a plan view showing horizontal alignment and all major dimensions of the structure: total length, span lengths, rail pay limits, and numbers with type of construction (e.g., RCBG), bent numbers and stations (normally increasing from left to right), roadway width and out-to-out transverse dimensions. Show retaining walls, wing walls, abutments, existing utilities, right-of-way lines, catch basins, drains and where they drain to, and access manholes for utilities on box girders.

Reference all dimensioning to the line described by the alignment data (e.g., "L" line or "C" line, etc.). Do not use a separate, "structure center line".

Show North arrows on the Plan and Elevation Sheet, Foundation Data Sheet, and Footing Plan sheet. (**AC = NPOINT)**

To avoid confusion on multi-span structures, call all supports whether they are technically abutments, bents or piers, "bents" and number them consecutively.

2.6.1 Plan – (continued)

Show existing bridges or other structures which will be in place during the construction of a structure and, if necessary, locate by dimensions. Note existing structures and utilities to be moved or relocated , and who is responsible for the work. Show temporary structures which are to be removed or used in the performance of the contract.

This sheet typically contains the following: (if possible, place Type, Size and Location information on one drawing. Place Staging and Typical Section on the second drawing, when two drawings are needed)

- Location map (upper right corner)
- Plan (location of existing bridge if applicable) and Elevation
- Typical Section
- Proposed Loading (HL-93)
- Gradeline Diagram
- Vertical Elevation Diagram (including Datum information)
- Staging Details
- Hydraulic Data (if applicable)
- The TS&L Plan and Elevation sheet is normally drawn to a 1"=10' and 1"=20' scale.

2.6.2 Location Map

A small-scale location map is required to enable prospective bidders to locate the project. The map should be about 6" square (on final mylar) and placed in the upper right-hand corner of the sheet, but it can be placed elsewhere on this sheet if necessary. In cities, show the name of the city and the names of important streets. In rural areas, show the section, township and range and the direction and distance to the nearest town. For railroad projects, show the section to the nearest 1/16 section. Show a north arrow on the location map (See Figure 2.6.2A). Identify the project location with a bold arrow as shown in Figures 2.6.2B.

State, County and City maps may be found on the server \\S0442C\maps

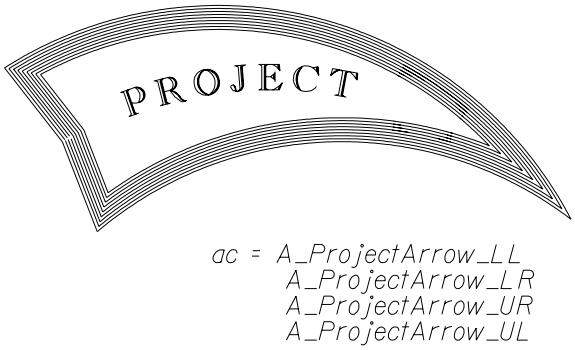


Figure 2.6.2B

2.6.2 Location Map – (continued)

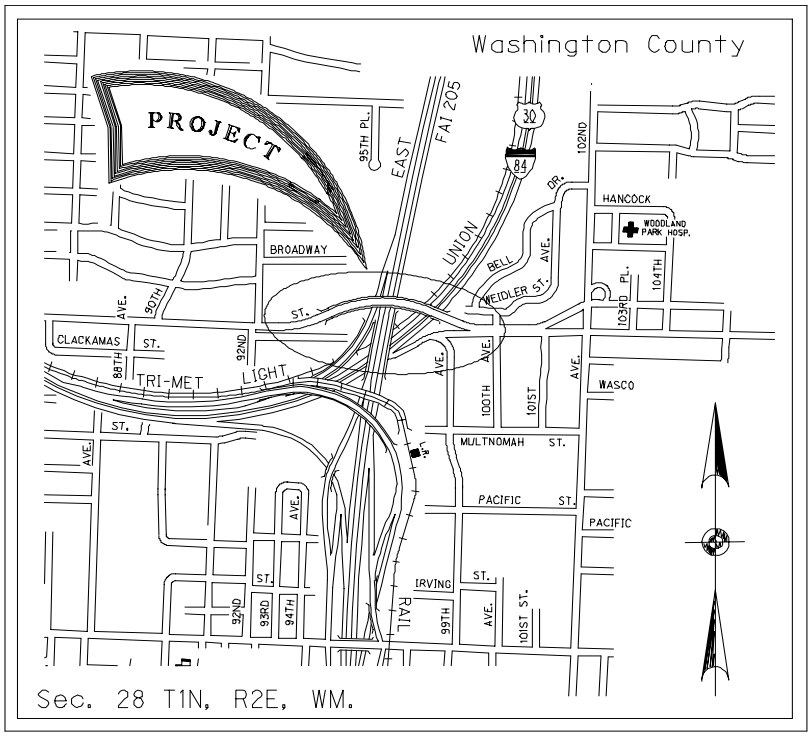


Figure 2.6.2A

2.6.3 Clearance Diagrams

Show vertical clearances at the critical points over railroads, streets, roads and/or highways. Where construction is to be over traffic and a railroad, show a construction clearance diagram indicating both horizontal and vertical minimum clearances.

Indicate the support condition at each end of each span, "fixed", "expansion", "pinned". Show existing and future ground lines at centerline, left and right. Show fill areas hatched and label as fill.

2.7 FINAL PLANS

2.7.1 Layout for Large Projects

An Index Sheet is usually provided where 30 or more sheets are required for a single structure or where several structures are to be built under the same contract. On this sheet, the structure drawings are listed with their drawing numbers and bridge numbers (if more than one structure) followed by the standard drawings needed for the project. Use a "title sheet border" for the General Layout and Index sheet.

The Index Sheet should give an overall layout of the entire project with each structure and the accompanied drawings being listed. The sheet number shall be 1 of 1.

Begin the sheet numbers for each structure with No. 1 for the Title Sheet of that structure. List the total number of sheets for each structure shall on the plans for that structure and include all of the standard drawings used for that structure.

When construction requires excavation adjacent to a railroad, show a Railroad Shoring Requirement Diagram. Limits of excavation and shoring requirements are referenced in Section 1.5.8.2.

Details which are repeated several times or which require a note which is larger than can readily be placed close to the item detailed can be called out by a number in a circle. A corresponding number and circle along with the note can then be placed elsewhere on the sheet. Typical Detail references are shown in the Appendix Section A2.7.1.

2.7.2 Final Plans, General

A set of drawings for a structure should contain all the information necessary for the layout and construction of that structure. Clear and complete plans form the basis for fair bidding. Details not properly covered can lead to high bid prices or extra work orders and price agreements during construction.

The use of notes, such as "Bent 3 similar", may be a good practice to save detailing, but use only if it is strictly true or if any differences are clearly noted.

Before detailing is begun, there needs to be good communication between the Designer and the Drafter to determine the number of sheets which will be required and what views and details are to be shown on each sheet. Lay out sheets to ensure sufficient room for unanticipated details, which may be required later. Take care at this time to ensure the information is presented in a clear and logical manner.

Do not make pencil changes to mylars. The only time for pencil changes is when doing “As Constructed” drawings. This will ensure that the electronic data is current.

2.7.2 Final Plans, General – (continued)

Detailing practices will be discussed under the following headings:

- Plan and Elevation
- Foundation Data Sheet
- Stage Construction Details (when needed)
- Footing Plan
- Deck Plan
- Superstructure Details
- Bent Details
- Miscellaneous Details
- Standard Drawings
- Plans For Information Only
- Revisions

2.7.3 Plan and Elevation

The Plan and Elevation sheet for the ordinary bridge is also the title sheet. It typically contains:

- Location Map
- Plan
- Elevation
- General Notes (see Appendix A2.7.3)
- Gradeline Diagram
- Hydraulic Data (if applicable)
- Loading Diagram (if applicable)
- Title Block
- Miscellaneous Additional Information

The plan and elevation and footing plan are normally drawn to the same scale and as large as possible.

2.7.3.1 Plan

This is a complete plan view showing horizontal alignment and all major dimensions of the structure: total length, span lengths, rail pay limits, traffic flow direction and numbers with type of construction (e.g., RCBG), bent numbers and stations (increasing from left to right), roadway, lane, shoulder, rail and median widths and out-to-out transverse dimensions. Show retaining walls, wing walls, existing utilities, right-of-way lines, abutments, catch basins, drains.

Reference all dimensioning to the line described by the alignment data (e.g., "L" line or "C" line, etc.). Do not use a separate "structure center line".

Show a North arrow on the Plan and Elevation sheet, Foundation Data Sheet and Footing Plan sheet. (ac=npoint)

To avoid confusion on multi-span structures, call all supports, whether they are technically abutments, bents or piers, "bents" and number them consecutively.

2.7.3.1 Plan – (continued)

Show existing bridges or other structures which will be in place during the construction of a structure and, if necessary, locate by dimensions. Note existing structures and utilities to be moved or relocated, and indicate who is responsible for the work. Show temporary structures which are to be removed or used in the performance of the contract.

Show the location and type of detour structures as well as any information necessary to determine the responsibility for the construction and removal of these detours.

Space limitations on the title sheet may require that the footing plan and/or the grade line diagrams, General Notes, and other miscellaneous information be located on the second or third sheet of the set. Placement closer to the front of the set is more desirable. Do not place on Foundation Data Sheet.

Show existing utilities, whether relocation is necessary, and the responsible entity for relocation.

2.7.3.2 Elevation

This is an overall elevation view showing the general appearance, grade and type of structure to be built. Number spans and bents to agree with the plan view. Indicate the support condition at each end of each span, "fixed", "expansion", "pinned". Show existing and future ground lines at centerline, left and right. Show fill areas hatched and label as fill. Reference bridge rails, pedestrian rails, special rail end treatment and slope paving, using drawing numbers. Indicate the type of footings, bottom of footing elevations and type and size of piling, if any. For spread footings, state the maximum required soil bearing capacity for each footing.

Elevations based on the City of Portland Datum is 1.375 feet above the National Geodetic Vertical Datum (MSL = 0.0) and the Oregon Department of Transportation Datum.

Show an elevation bracketed to the left of the structure such as shown in Figure 2.7.3.2A.

The Datum used to establish the elevations shown on the drawing should be indicated. Normally, this will be the National Geodetic Vertical Datum (MSL = 0.0) or the Oregon Department of Transportation Datum.

If a different datum is used, indicate the relationship between the datum as shown in Figure 2.7.3.2B.

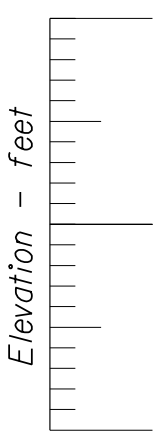


Figure 2.7.3.2A

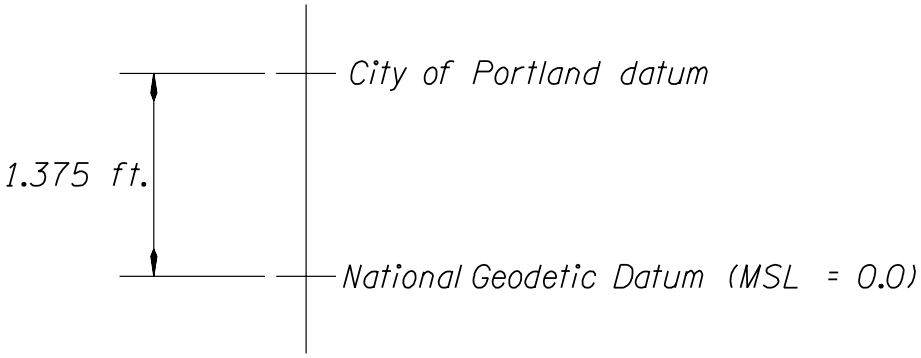


Figure 2.7.3.2B

2.7.3.3 Hydraulic Data

At stream crossings, show normal low water elevation and high water elevation with date of flood. Show low water channel width and channel change on both elevation and plan view. Show footing seals, riprap and navigation lights wherever applicable. Show Hydraulic data as shown in Figure 2.7.3.3A for all water crossings. Cell name for this chart is "**ac=D_HydraulicData**"

HYDRAULIC DATA				
ITEMS	(UNITS)	DESIGN FLOOD	BASE FLOOD	ROADWAY OVERTOPPING FLOOD
DISCHARGE	(CFS)			
RECURRENCE INTERVAL	(yrs.)			
H.W. ELEV. AT UPSTREAM FACE OF BRIDGE ALONG EMBANKMENT	(Ft.)			
BACKWATER	(Ft.)			

Figure 2.7.3.3A

2.7.3.4 General Notes

General notes are normally located immediately below the location map. See Appendix Section A2.7.3 for General Notes.

2.7.3.5 Gradeline and Superelevation Diagrams

Show gradeline diagrams for the roadway carried by the structure and for all roads and/or railroads under the structure. Show the location of the structure by a dark heavy line on the structure gradeline diagram. Also show the roadway cross-slope or superelevation information. Confirm the geometric controls match the Roadway Plans.

2.7.3.6 Military Loading

When a structure is designed for military loading, place the military loading diagram shown in Figure 2.7.3.6A on the title sheet. A cell is available for placing this diagram (**ac=D_L_Military**).

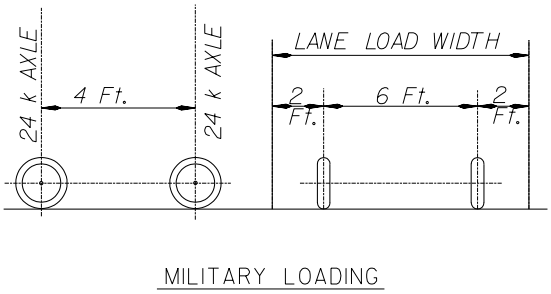


Figure 2.7.3.6A

2.7.3.7 Utilities and Right-of-Way

Show utilities located within the limits of the construction of the structure. Water lines, sewer lines, gas lines, power lines, telephone and telegraph lines are commonly encountered and should be indicated both in their existing and proposed locations. Show Railroad tracks, existing streets and highways and private roads. Show right-of-way lines in the work area, along with any temporary or permanent easements. In all cases where the location of utilities is critical, locate by dimension and/or station. In all cases where utilities are to be moved or salvaged, note who is responsible for the work. Show underground utilities on the footing plan.

2.7.3.8 Railroad Clearance Diagram

For railroad overcrossing structures, a railroad clearance diagram is required. When the intersection angle is 90 degrees, it can often be shown on the Elevation View. Otherwise, a separate clearance diagram normal to the centerline of the tracks will be required. Where there will be construction over or adjacent to railroad tracks, show a construction clearance diagram (possibly on the same view as the final clearance diagram). Construction clearance diagrams are also required for railroad shoofly tracks if the clearances provided are less than those required for permanent construction. Construction clearance requirements are shown in Section 1.4.8.2 .

If required, show collision posts or crash walls, on the plans and specify in the Special Provisions. Requirements are referred to in Section 1.4.8.2.

2.7.3.8 Railroad Clearance Diagram – (continued)

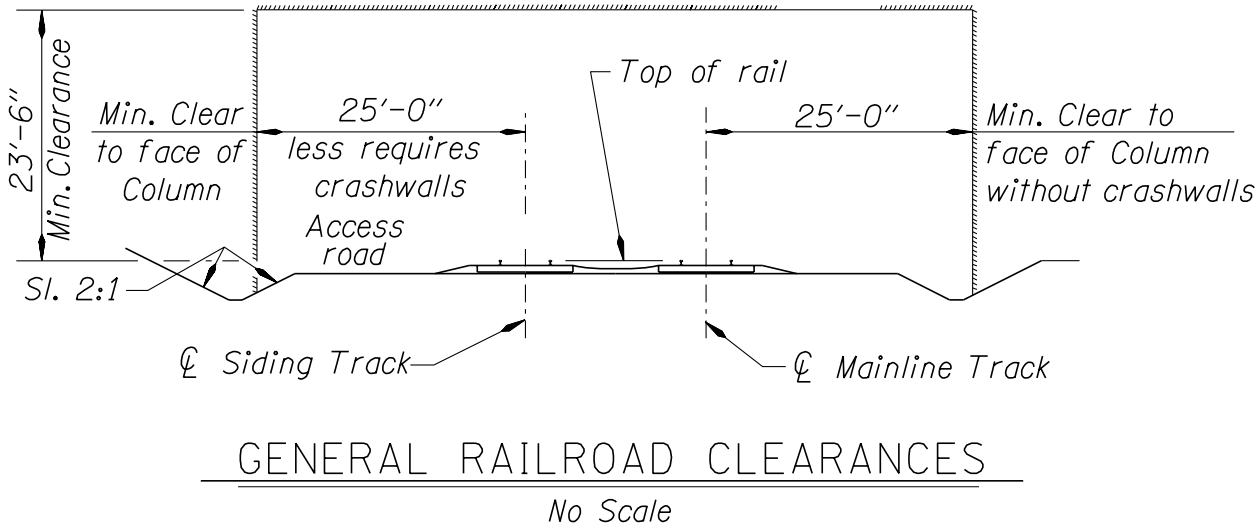


Figure 2.7.3.8A

2.7.3.9 Construction Clearance Diagram

When construction requires excavation adjacent to a railroad, show a Railroad Shoring Requirement Diagram. Limits of excavation and shoring requirements are referenced in Section 1.5.8.2 .

2.7.4 Foundation Data Sheet

A Foundation Data Sheet will normally be part of each set of construction plans. This sheet should usually follow the Plan and Elevation sheet.

2.7.5 Footing Plan

The purpose of the footing plan is to enable the footings to be laid out readily in the field. Provide the intersection station, the angle between each bent centerline, the alignment centerline and the distance from the intersection to each footing or pile.

For spread footings, show "Minimum Required Bearing Capacity is __ psf." The value should be the average allowable bearing capacity as stated in the Foundation Report.

Show all underground utilities as well as existing footings on the footing plan.

The Footing Plan is a good location to show in water work zones that occur on all water crossings.

2.7.6 Deck Plan

If the plan view of the Plan and Elevation sheet is drawn to a scale of 1”=10’ or larger, a separate deck plan may not be necessary. When a deck plan is required, draw it to a scale of 1/8” = 1’-0”. Generally, draw a full deck plan. However, if a structure is symmetrical or has repetitious elements, it may be sufficient to draw only half or less of the total superstructure. In this case, the designer and drafter should study together how this can best be done so as to avoid confusion.

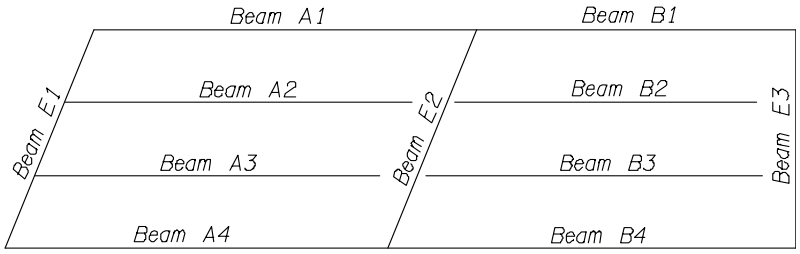


Figure 2.7.5A

Details normally shown on the deck plan include:

- Details which are repeated several times or which require a note larger than can readily be placed close to the item detailed can be called out by a number in a circle. A corresponding number and circle along with the note can then be placed elsewhere on the sheet. Typical Detail references are shown in the Appendix Section A2.7.1.

- The designated alignment line ("L" Line, "C" Line, etc.) to which all dimensions are tied. Show the bearing of this line if it is on tangent.

- Out-out widths of the structure.

- Bent centerline stations, numbers, and angles of intersection with the local tangent. Dimension the intersection angle as the acute angle between centerlines of roadways or between centerline of roadway and centerline of bent. Where the intersection is on a curve, measure the angle from the local tangent to the curve at the point of intersection. The skew angle, which determines placement of deck steel, should not be dimensioned.

- Span numbers and lengths.

- Deck elevations with a note, "elevations shown are finish grade top of concrete at centerline of bent" (if ACWS is to be placed elevations may be shown 2” below finish grade, if so noted).

- Drains, catch basins and drain pipes.

- Rail post spacing, rail splices and locations of preformed expansion joint filler in concrete curbs or parapets and rail pay limits.

- Light posts and electrical conduit and fixtures.

2.7.6 Deck Plan – (continued)

Details normally shown on the deck plan include: - (continued)

- Deck steel placement if not parallel to bents.
- The location of utility lines carried in the structure, pipe hangers, concrete deck inserts, and the name of the owner, who will furnish the materials, and who will do the work.
- Access manholes, crawl holes and drain holes in diaphragms. Drain holes and access holes in the bottom slabs of box girders. Vent holes in top of stems.
- The centerlines of all longitudinal beams, cross beams and diaphragms. The distances between the centerlines of longitudinal beams along the centerline of the bent are normally shown here. If this proves too involved to do on the deck plan, it can be done on a plan view of the bent, in which case it would appear with the bent details.
- Beams usually identified by a single letter for the beams of one span with subscripts when the beams are not identical. See Figure 2.7.5A
- Lateral bracing for steel structures indicated by a single line. Its size may be called out here.
- The width of the stems of poured-in-place concrete girders. This may be done by a "cut away" view showing the typical dimensions of each type of beam used.
- Protective screening
- Earthquake restraint
- Expansion joints
- End panels

2.7.7 Superstructure Details

2.7.7.1 General

The superstructure is that portion of the structure that extends from the bottom of the longitudinal beams upward. Here are a few basic types of superstructure construction:

- Cast-in-Place Concrete
- Slab
- Rigid Frame
- Reinforced concrete deck girder
- Reinforced concrete box girder (RCBG)
- Post-tensioned concrete box girder (RCBG/PT)
- Precast prestressed concrete
- Girder
- Box beams
- Integral deck girder
- Channels (tubs)
- Segmental post-tensioned concrete - a structure combining elements of cast-in-place and precast prestressed concrete
- Steel structures
- Multi-beam, composite girder
- Through girder
- Truss
- Arch

Superstructure details for girder type structures consist primarily of longitudinal beam elevation views, superstructure sections, and diaphragm and cross beam details.

2.7.7.2 Superstructure Sections

A "Typical Deck Section" is a transverse cross-section of the superstructure showing the deck, beams and curbs or parapets, if any. Required dimensions include the out-out width of the structure, roadway width, beam spacing, the location of these with respect to the designated alignment centerline and the deck thickness, reinforcement bends and bar spacing.

2.7.7.2 Superstructure Sections – (continued)

Draw the deck section to a scale of not less than 3/8" = 1'-0". A separate deck section is required for each type of construction used. Additional sections may be required if the roadway width or number of size of beams changes. Half sections may be used for symmetrical superstructures. On wide superstructures with many identical girders at equal spaces, a portion of the width may be omitted to save space and detailing. The number, size and spacing of deck reinforcing bars should be listed adjacent to the deck section. A note should refer to rail drawing(s) for additional reinforcement at rails.

For conventionally reinforced continuous concrete structures, the location of the main longitudinal bars can be called out by letter on typical sections (or half-sections) of the superstructure at midspan and near interior supports. These bars can then be listed in a table showing the letter designation, number required, size and length, and the distance to some control point. These sections can also be used as typical deck sections (see above). Separate sections of individual girder stems are often shown to call out such details as the shape and dimensions of vertical stirrups and the location of temperature reinforcement.

2.7.7.3 Diaphragm and Cross-Beam Details

Diaphragm beams for concrete girder structures are usually shown in elevation on the typical deck section. Details required include reinforcing bars and the size and location of utility holes. Crawl holes and drain holes through the diaphragm must be shown for box girders. Show a section through the diaphragm beam showing dimensions and reinforcing bars on the same sheet.

Show cross beams and end beams for concrete structures on the bent drawings.

2.7.7.4 Longitudinal Beam Elevation Views

The elevation view of a cast-in-place concrete girder should show the total length, the lengths between centerlines of bents or bearings, the location of diaphragm beams, haunch dimensions (vertical), stirrup spacing, beam end condition and longitudinal reinforcing bar location.

For post-tensioned concrete box girders, place a diagram showing the path of the post-tensioning center of gravity above the longitudinal beam elevation.

For steel girders, standard precast prestressed concrete girders and the tensioning details of post-tensioned box girders, there are file drawings which can be completed to cover most of the required details. Use these if possible. If not, use them as patterns for the manner of presenting information.

For all structures which make use of prefabricated beams, provide a note saying, "All dimensions shown are horizontal and must be corrected for slope." This note appears on the standard steel beam and prestressed girder sheets and need not be repeated.

Plate diaphragms and cross beams for steel structures must be detailed separately.

So far as possible, beam details should be completed on each sheet for the spans shown there. Place notes referring to common details which appear on other sheets immediately above the title block.

Camber diagrams - required for all structures. Place a note by the camber diagram as to the assumptions on which it is based.

2.7.8 Bent Details

2.7.8.1 General

Show the following information, as applicable, for all bents. Where abutments are used, it is necessary to show the final ground elevation inside and outside the abutment. This may be shown on a side elevation of the abutment or on a separate sketch.

2.7.8.2 Plan View

Provide a plan view of a pier, bent or abutment, if it is necessary to tie down the arrangement of beams or to show features at the deck level which influence the details of the substructure. Show drains, special reinforcement at joints, et cetera, in this view. On some bents, a plan at the bearing level is necessary to show the arrangement of bearing devices and anchor bolts.

2.7.8.3 Elevation

Provide an elevation view showing the dimensions and reinforcement of columns, web walls, caps, crossbeams, etc. Indicate the location of utility holes. Show the vertical dimensions of the footings or pile caps, and the elevations of the bottoms of the footings or pile caps, on this view. If the footings or pile caps are sloped, show the elevations at each end.

2.7.8.4 Footing Plan

Provide a footing plan showing the size and reinforcement of footings (and seals) and the size and locations of piles, if any. Show the location of the footings with respect to the designated alignment line and the intersection angle of the footing centerline with that line. Show sectional views of columns or shafts with dimensions and reinforcement in this view or elsewhere on this sheet.

2.7.8.5 Details

Show reinforcing and dimensions of cross-beams, caps, wing walls and web walls in cross-section views. Call out all reinforcing steel by size, length and spacing. Clarify stirrup and hoop details by separate diagrams, if necessary.

The following procedures which reduce the amount of detailing may be used if they do not reduce the clarity of the plans. Draw similar bents, footings or cross-beams only once and double dimension or make a table of varying dimensions.

If possible, bent details should be complete on any sheet for the bents shown there. Place notes referring to common details which appear on other sheets immediately above the title block, and reference individual details to their location.

2.7.9 Miscellaneous Details

Include in each set of drawings such miscellaneous details as are required for the completion of the project. These would include the following:

- Concrete pour schedules.
- Bearing devices – show details of bearing devices and their material called out. List the location and number required for each type or size of bearing.
- Steel beam details - framing and bracing, splices, etc.
- Deck joint details - armored corners, paving dams, joint seals, etc.
- Electrical and lighting details.
- Signing support details.
- Pile details - tip reinforcement, encasement, etc.
- Median details - barrier rail, longitudinal joint, etc.
- Shoring plan and Falsework diagram and lighting.
- Surface finish diagram.

2.7.10 Plans "For Information Only"

When plans of an existing bridge are to be included in a set of contract drawings, the designer or drafter should obtain the full-scale tracings. Place the following tag on each drawing in a manner that can be removed:

These drawings should then be added to the contract tracings. When drawings are placed back into the file, the “For Information Only” tag should be removed.

The most commonly used practice is stating in the Special Provisions that existing plans are available from the Project Managers office.

2.7.11 Revisions

Note any Revisions to drawings under the following conditions:

- Final drawings which have been sent to prospective bidders (generally, any time after the Bridge Engineer has signed them) or are a part of a job under contract.
- "As Constructed" prints that are returned at the completion of a project.

Normally, revised final drawings and "As constructed" drawings have the changed detail lined out, not erased. Where changes are such that they cannot be made feasibly by lining out, include the change note ("redrawn") next to the description of the change.

2.7.11 Revisions – (continued)

Note Revisions by a number in a triangle next to the change and in the title block.

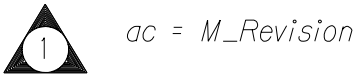


Figure 2.7.10A

Do not make Revisions on final drawings between the latest date that a letter of addendum can be sent out and the bid opening date. This generally means at least 10 days before the bid opening date. Failure to observe this could result in some bidders obtaining revised plans while others did not. After the bid opening, revisions can be made and sent out as a construction change.

Revisions to a project will have designer's initials shown, "As Constructed" changes will have the Drafters initials. See Figure 2.7.10B.

△	DATE	REVISION	BY	
1	8-21-79	Added temporary rail	RLM	DRAFTED
2	8-21-79	change longitudinal joint	RLM	CHECKED:
3	10-2-79	change post dimension	RLM	
4	11-7-80	As Constructed	JLS	REVIEWED:

Figure 2.7.10B

All "As Constructed" revisions on one sheet should have the same revision number, consecutive with previous revisions on that sheet. If there are no "As Constructed" revisions, add the date and "As Constructed" with no triangle or revision number. Show the name of the Project Manager on the title sheet.

"As Constructed" revisions are made by hand to the original signed mylar and not made to the electronic cad files.

Once the Bridge Section has received mylars, then all "As Constructed" changes to the original mylar will have to be made in the Salem office. No mylars are to leave the records area.

2.8 PLOTTING

2.8.1 Printers

The following chart shows several types of plotters and media type available:

Server	Printer Name	Media Type	Media Size (inches)
Sprntsrev3	Pr+crew #A	Paper	8.5 x 11
Sprntsrev3	Pr+crew #B	Paper	11 x 17
Oce_paper	P24	Paper	400 x 24
Oce_mylar24	P36	Mylar	400 x 35
Oce_mylar36	M36	Mylar	400 x 35

During the design phase of a project there are different requirements as far as what kind of plot is ordered. The following are suggested guidelines.

- Check Prints - Use queue's for plotters located within your crew's room for half size paper prints
- Preliminary Plans - Same as "Check Prints"
- Advanced Plans - Use half size paper prints (sent with Roadway Plans)
- Final Plans ("D" size 24" x 36") - Mylar for full size prints

2.8.2 Plotypus Plotting

Under File>Plotypus is a automated plot program for running multiple plots from multiple files. Below in Figure 2.8.2A is the layout tool for placing plot borders. See Figure 2.8.2B for the plotting menu.

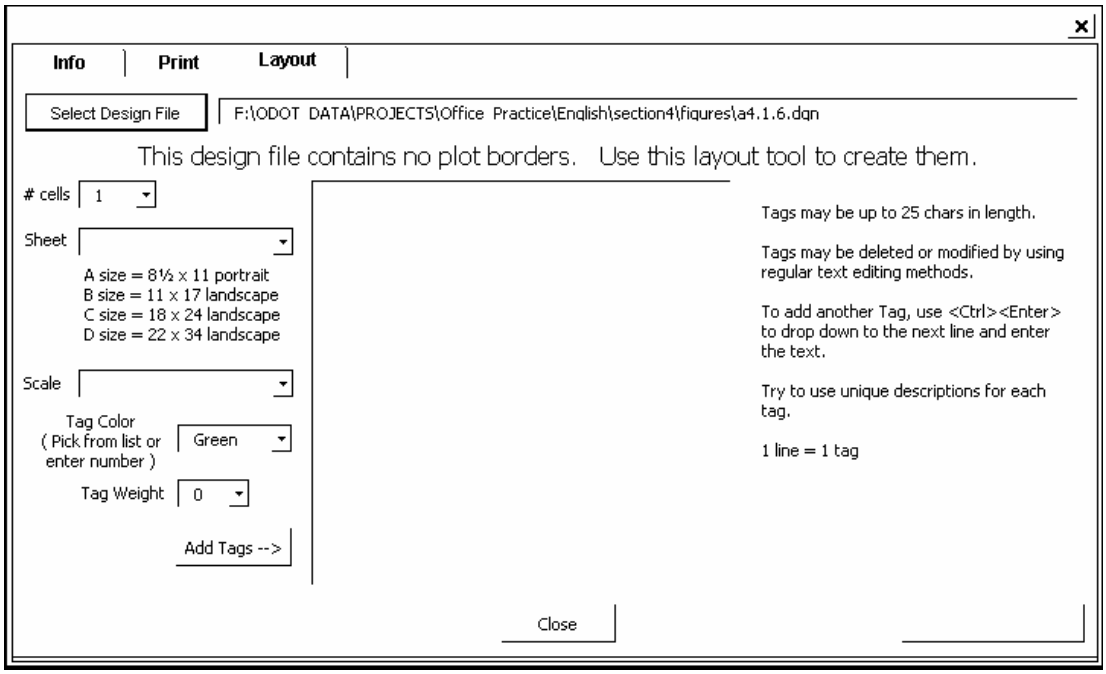


Figure 2.8.2A

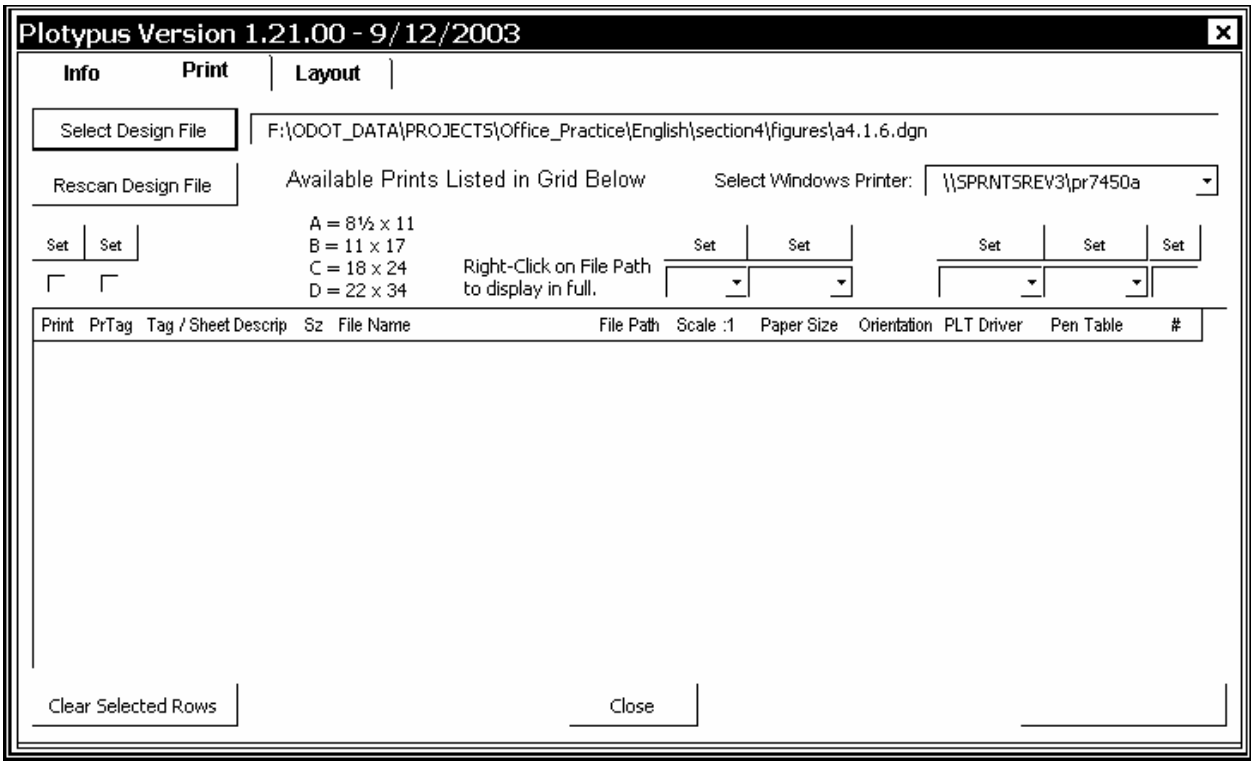


Figure 2.8.2B

2.8.3 Electronic Files for Drawing Database

When requesting half –size paper prints of your signed mylars, request from Repographics that the scanned file be placed on **'Salem - Rev. Bldg 5th Floor - \\scdata\brdgshar\bridge\reprographics_____** directory using the drawing number as the file name. Once these files have been placed in this directory, the Drafter of these drawings will load them into the Bridge Data System (BDS). The procedure is outlined in the Bridge Data System (BDS) user's guide.

2.9 TRANSFER OF ELECTRONIC FILES TO CONSULTANTS

There are several ways to send files outside of ODOT. Using CD's, electronic mail (this method is discouraged for large design files) and using the ftp site on the internet. The location of the ftp site is: **ftp on 'Salem - Rev. Bldg 5th Fl - FTP Server (S0442c).** There are both incoming and outgoing directories listed on this site, depending on whether you are sending or receiving information. The information at this site is only stored for a short period of time, and then deleted from the site.

The emailing of files is discouraged, because the size of CAD files are quite large.

2.10 ARCHIVING CAD FILES

Once a project has been printed on mylar, the files should reside on your workstation until shortly after the project has gone to bid before being archived.

The engineering archive directory is located at:
eng_arc on 'Salem-Rev. Bldg 5th Flr - VIRTUAL SCDATA2 Clustr (scdata)'

There are email forms in the above location for your archiving convenience.

The following information is required to archive a project. Information shown below in bold is required.
Please archive the following project.

KEY NUMBER=
COUNTY=
SECTION=
HIGHWAY NAME=
HIGHWAY NUMBER=
ROUTE=
MILE POINT START=
MILE POINT END=
PHASE=
COMPUTER_NAME=
FILES_PATH=
FILES_NAMES=
USERNAME=
USERPHONE=
V NUMBER=
CONTRACT NUMBER=

It is the Structural Drafters responsibility to see that CAD files are archived in the proper directory. Remember to do this in a timely manner, so that everyone can find the files they need.

When files are retrieved from Archives directory for another project, remember to rename these files. (filename.ref)

SECTION 2: APPENDIX

A2.1.1 Text

Abbreviations:

GENERAL

1. Do not use abbreviations where the meaning may be in doubt. If there is a possibility of confusion, spell the term out.

2. Place a period after all abbreviations, except as listed below.

3. Apostrophes are usually not used. Exceptions: pav't., req'd.

4. Abbreviations for plurals are usually the same as the singular. Exceptions: figs., nos., ctrs., pp.

5. Avoid abbreviations in titles if possible.

List of Abbreviations Commonly Used on Bridge Plans

A

additional	add'l.
adjust, adjacent	adj.
alternate	alt.
ahead	ah.
American Society for Testing Materials	ASTM
American Association Of State Highway and Transportation Officials	AASHTO
Anchor Bolt	A.B.
and	&
approximate	approx.
approved	appd
asphalt concrete	AC
Asphalt Concrete Wearing Surface	ACWS
assembly	assy
at	@ (used only to label spacing or pricing, otherwise spell out.)
Avenue	Ave.
average	avg.

B

back	bk.
beam	Bm.
bearing	Brg.
begin vertical curve	BVC
bent	Bt.
between	btwn.
bottom	btm.
bottom of	B.O.
bridge	Br.
building	bldg.

C

cast-in-place	CIP
center, centers	ctr., ctrs.
centerline	CL or L
center of gravity	cg
center of gravity of strands	cgs
center to center	ctr-to-ctr or c-c
centered	ctrd.
clearance, clear	cl.
compression, compressive	comp.
column	col.
concrete	conc.
concrete pavement	PCC pav't.
connection	conn.
construction	const.
continuous	cont.
corrugated metal pipe	CMP
County	Co.
Creek	Cr.
crossbeam	X-Bm.
crossing	Xing
cross section	X-Sect
cubic feet, meters	ft^3 ,m^3
cubic in, millimeters	in^3 ,mm^3
culvert	culv.

D

degrees, angular	^{o} or deg.
degrees, thermal	^{o}C, ^{o}F
diagonal(s)	diag.
diameter	dia. or ø
diaphragm	diaph.
dimension	dim.
District	Dist.
double	dbl.
drawing, drawings	dwg, dwgs
drill and tap	D & T
Drive	Dr.

E

each	ea.
each face	EF
each way	EW
easement	ease.
East	E
edge of pavement	EP
edge of shoulder	ES
electric	elect.
elevation	El.
embankment	emb.
end vertical curve	EVC
Engineer	Engr.
estimate(d)	est.
excavation	exc.
excluding	excl.
expansion	exp.
existing	extg.
exterior	ext.

F

far face	FF
far side	FS
feet, foot	ft.
figure, figures	fig., figs.
flange	flg.
footing	ftg.
forward	fwd.
Freeway	Fwy.

G

galvanized	galv.
galvanized steel pipe	GSP
gauge	ga.
Grade	Gr.
ground	grd.

H

hanger	hgr.
height (retaining wall)	ht.
hexagonal	hex.
high strength	HS
high water	HW
high water mark	HWM
Highway	Hwy.
hook	hk.
horizontal	horiz.
hour(s)	hr.
included, including	incl.
inside diameter	ID
inside face	IF
inside radius	IR
interchange	intchge.
interior	int.
intermediate	interm.

J

joint	jt.
junction	jct.

K

Kilometer	km

L

left	lt.
length of curve	LC
longitudinal	longit.
long	LG
lump sum	L.S.

M

maintenance	maint.
manhole	MH
manufactured	mfd.
manufacturing	mfg.
material	mat'l.
maximum	max.
meter	m
mile	mi.
millimeter	mm
minimum	min.
minute(s)	min.
miscellaneous	misc.

N

National Geodetic Vertical Datum	NGVD
near face	NF
near side	NS
nominal	nom.
North	N
Northbound	NB
number, numbers	No., Nos., #

O

original ground	OG
outside diameter	OD
outside radius	OR
out to out	o-o
overcrossing	O'xing

P

page, pages	p. or pp.
pavement	pav't.
pedestrian	ped.
Plans, Specifications and Estimates	PS&E
plate	PL
point	pt.
point of compound curve	PCC
point of curvature	PC
point of intersection	PI
point of reverse curve	PRC
point of tangency	PT
point on vertical curve	PVC
point from tangent to spiral	PS
point from spiral to circular curve	PSC
point from circular curve to spiral	PCS
point on spiral	POS
point on horizontal curve	POC
point on tangent	POT
polyvinyl chloride	PVC
Portland Cement Concrete	PCC
prestressed	prest.
prestressed concrete pipe	PCP

Q

quantity	qty.

R

radius	R.
railroad	RR
Range	R.
reinforced, reinforcing	reinf.
reinforced concrete	RC
reinforced concrete box beam	RCBB
reinforced concrete box culvert	RCBC
reinforced concrete deck girder	RCDG
reinforced concrete box girder	RCBG
reinforced concrete pipe	RCP
required	req'd.
retaining wall	ret. wall
revised (date)	rev.
right	rt.
right of way	R/W
River	R.
Road	Rd.
roadway	rdwy.

S

seconds (angular)	“
seconds (time)	sec
Section (map location)	Sec.
Section (of drawing)	Sect.
sheet	sht.
shoulder	shld. or sh.
sidewalk	SW or sdwk.
slope	sl.
South	S
Southbound	SB
spaces	spcs
spaced	spcd.
spacing	spcg.
splice	spl.
specification	spec.
square kilometer	km^2
square feet,meter	ft^2,m^2
square inch, milimeter	in^2 ,mm^2
standard	std.
Station	Sta.
stiffener	stiff.
stirrup	stirr.
Street	St.
structure, structural	str.
support	supp.
surface, surfacing	surf.
symmetrical	symm.

T

top & bottom	T & B
tangent	Tan. or T.
telephone	Tel.
temporary	temp.
test hole	T.H.
thick(ness)	thk.
township	T.
top of	T.O.
transportation	trans.
transverse	transv.
typical	typ.

U

ultimate	ult.
undercrossing	U'xing

V

variable, varies	var.
vertical	vert.
vertical curve	VC
volume	vol.

W

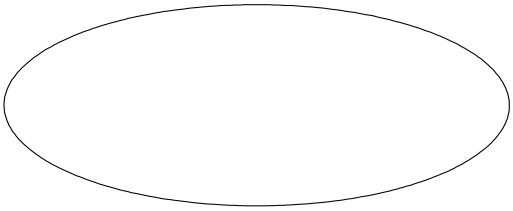
wearing surface	WS
weight	wt.
West	W
Willamette Meridian	WM
with	w/
without	w/o

A2.1.3 Cell Library: Bridge.cel

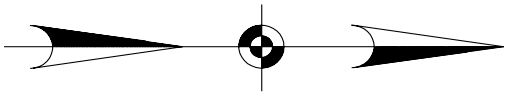
Cell Name: A_Ah
Descrip: Arrowhead - Terminator

Cell Name: A_DblAh
Descrip: Bouble Arrowhead - Terminator

Cell Name: A_Elipse
Descrip: Elipse - Terminator



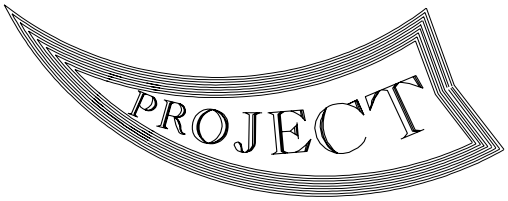
Cell Name: A_North
Descrip: North Arrow



Cell Name: A_ProjectArrow_LL
Descrip: Project Arrow Lower Left

Cell Name: A_ProjectArrow_LR
Descrip: Project Arrow Lower Right

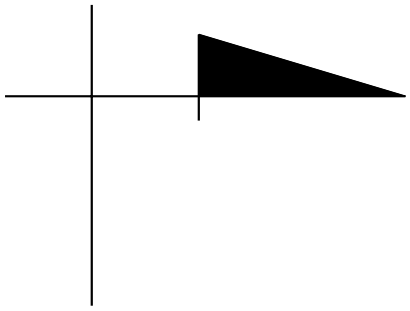
Cell Name: A_ProjectArrow_UL
Descrip: Project Arrow Upper Left



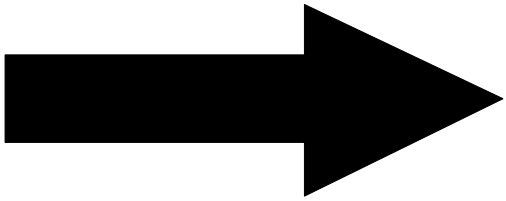
Cell Name: A_ProjectArrow_UR
Descrip: Project Arrow Upper Left

A2.1.3 Cell Library: Bridge.cel (continued)

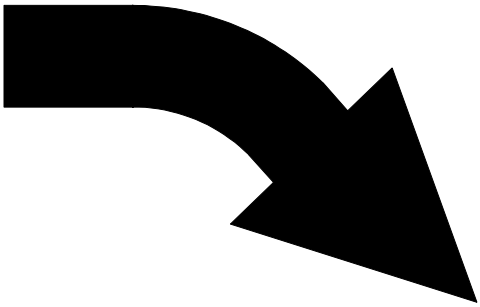
Cell Name: A_Section
Descrip: Section Arrow



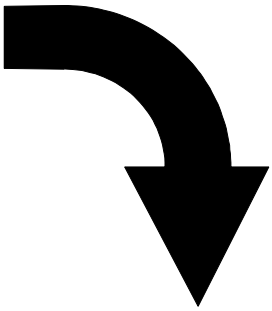
Cell Name: A_Traffic_0^
Descrip: 0^Traffic Arrow



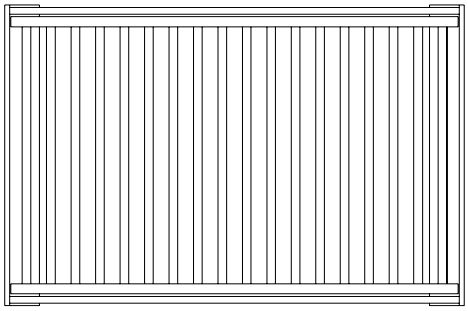
Cell Name: A_Traffic_45^
Descrip: 45^ Traffic Arrow



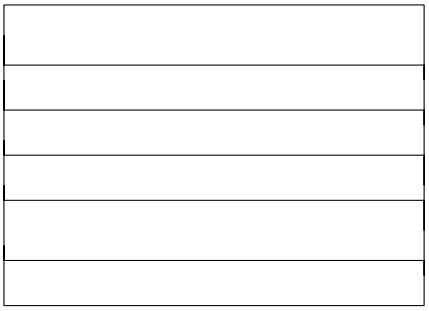
Cell Name: A_Traffic_90^
Descrip: 90^ Traffic Arrow



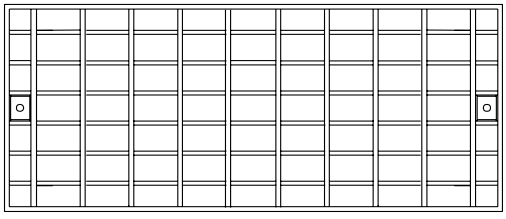
Cell Name: DR_27090
Descrip: Deck Drain, dwg. 27090



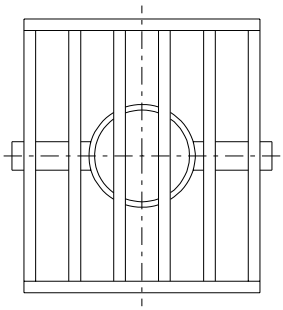
Cell Name: DR_DrainSymbol
Descrip: Drain Inlet - Symbol



Cell Name: DR_RectangDrain
Descrip: Rectangular Deck Drain - Plan

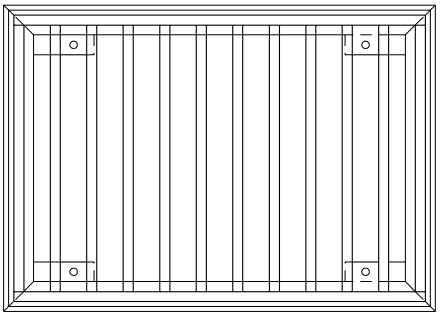


Cell Name: DR_S0083
Descrip: Deck Drain, dwg S83

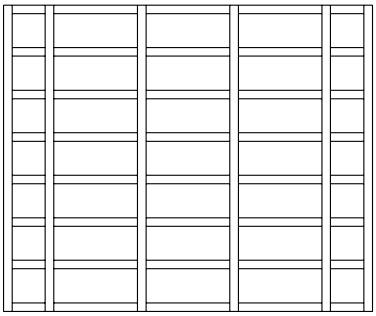


A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: DR_S226
Descrip: Drain, dwg S226

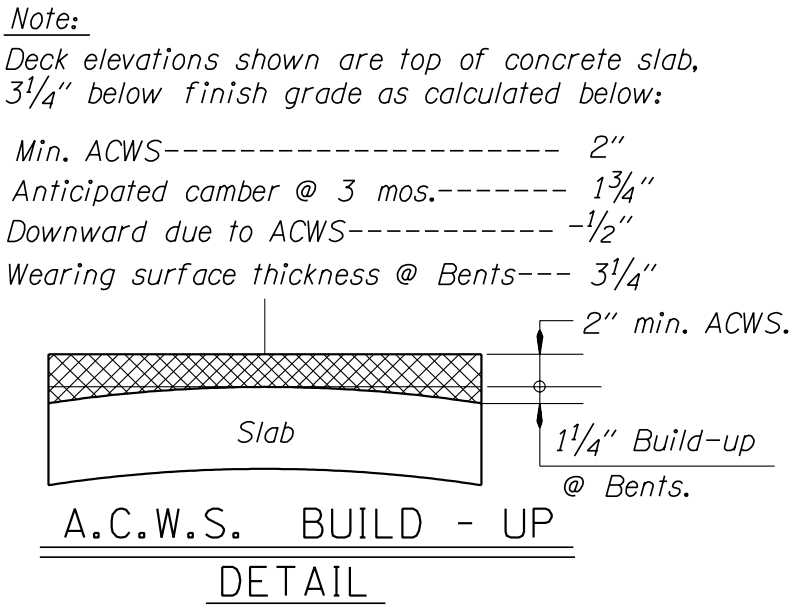


Cell Name: DR_SquareDrain
Descrip: Square Deck Drain - Plan

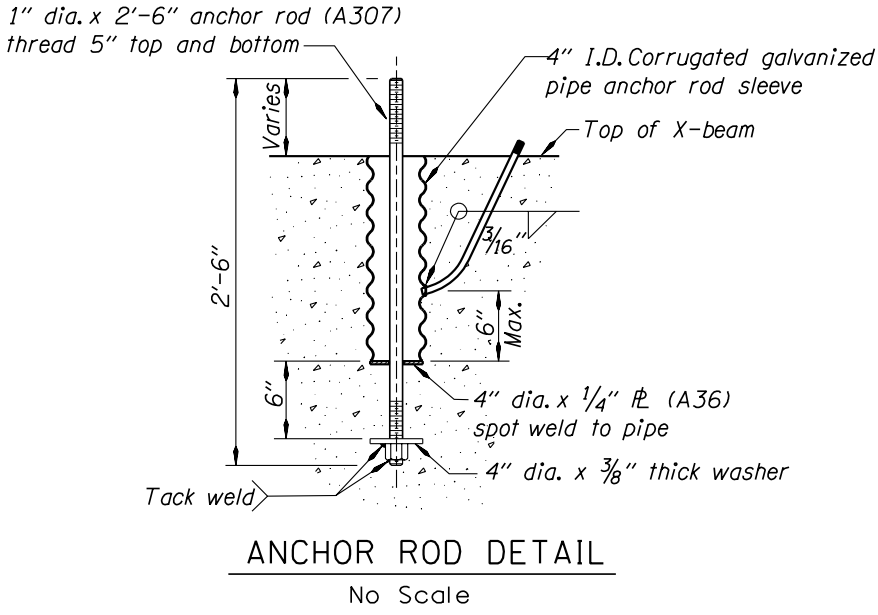


A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_ACWSBuildup
Descrip: ACWS Build-up diagram

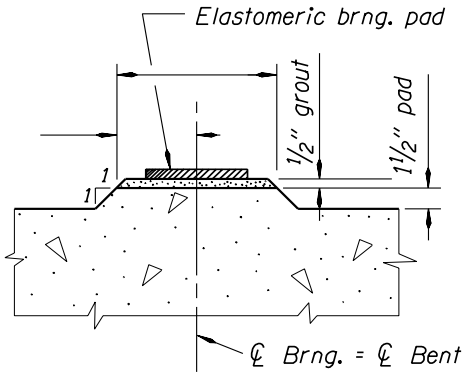


Cell Name: D_AnchorRod
Descrip: Anchor Rod



A2.1.3 Cell Library: Bridge.cel (continued)

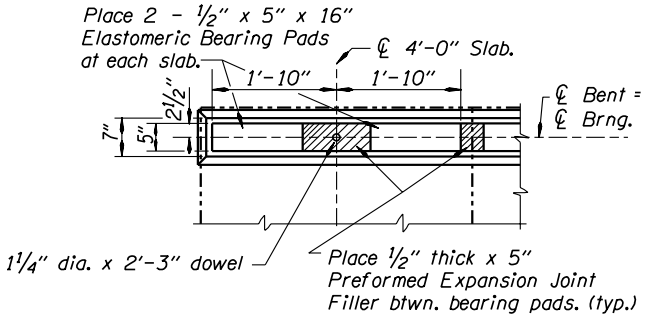
Cell Name: D_Brg_1Pad
Descrip: Single Concrete Bearing Pad



CONCRETE PAD DETAIL

Form 1½" concrete pad integrally with supporting member. Place ½" grout layer immediately before placing slabs. Place elastomeric bearing pads, preformed exp. jt. filler and prestressed slabs before ½" grout is fully set to ensure uniform bearing across full width of slab. If uniform bearing is not achieved, lift slab and repeat procedure. Remove any excess grout protruding above bottom of bearing pads immediately after placing slabs.

Cell Name: D_Brg_1PadPlan
Descrip: Single Concrete Bearing Pad - Plan

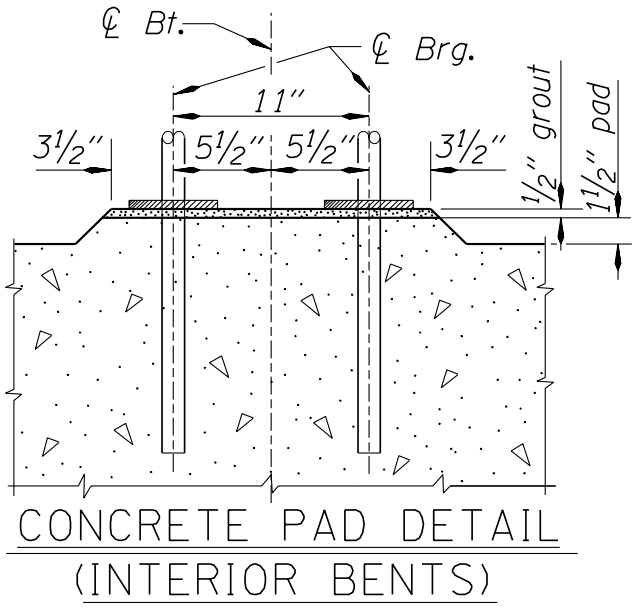


BEARING DETAIL

Place concrete pad to within ½" of top of pad. Wait a min. of 3 days to place remaining ½" layer. Place elastomeric bearing pad and prestressed slabs before top layer is fully set to insure uniform bearing across full width of slab. If uniform bearing is not achieved, lift slab and repeat procedure. Remove any excess concrete protruding above bottom of bearing pads immediately after placing slabs.

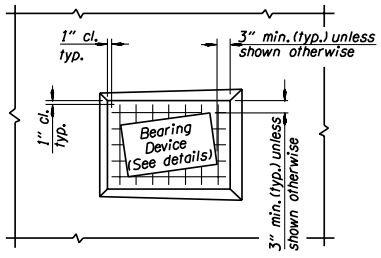
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_Brg_2Pad
Descrip: Double Concrete Bearing Pad - Section

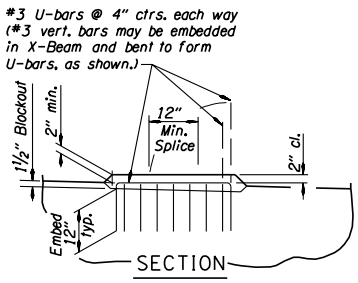


CONCRETE PAD DETAIL
(INTERIOR BENTS)

Cell Name: D_Brg_ConcretePad
Descrip: Concrete Pad for Bearing Device - Plan and Elevation



PLAN

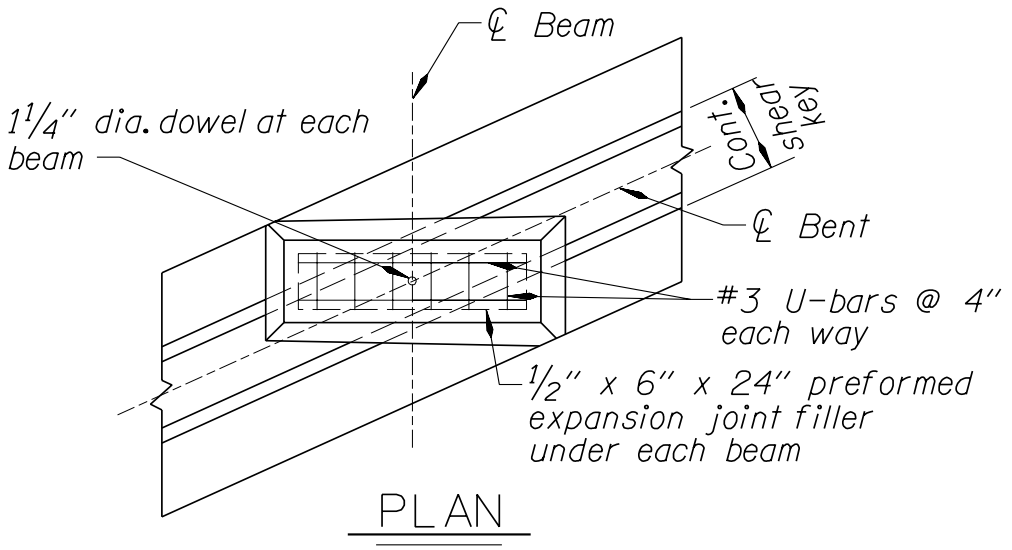


SECTION

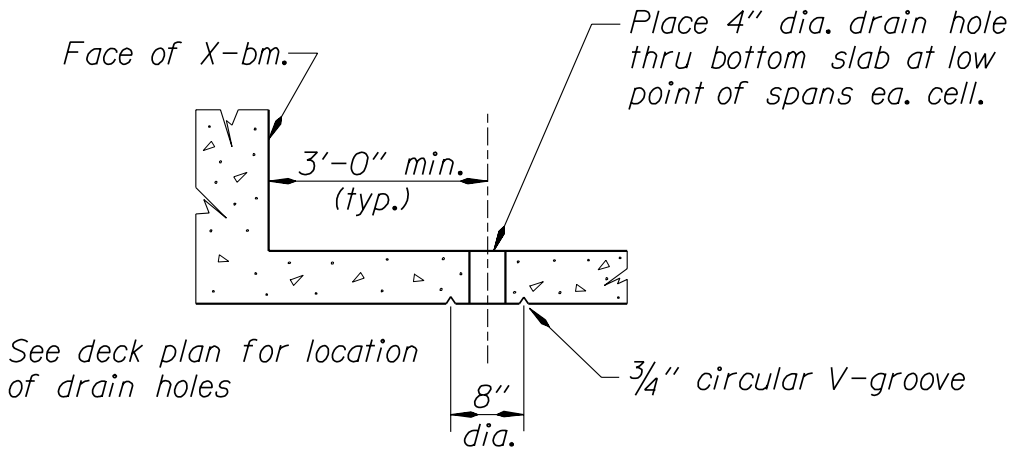
TYPICAL CONCRETE PAD

A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_Brg_PrecastBmPad
Descrip: Concrete Pad for Precast Beams - Plan

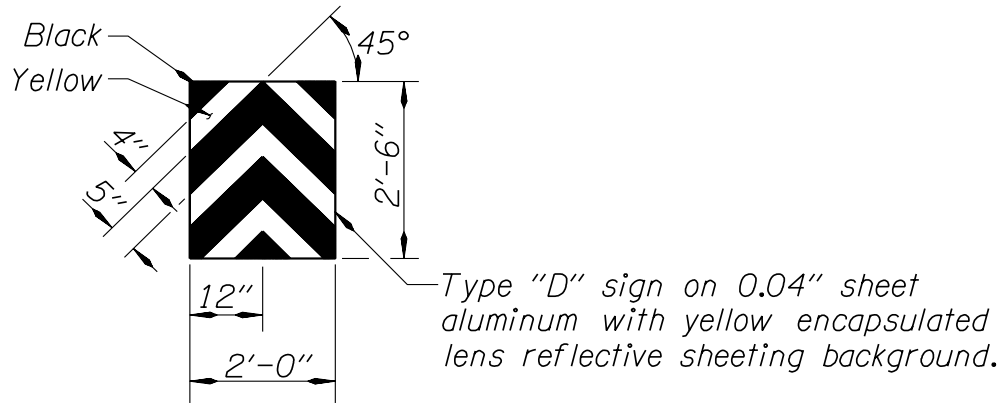


Cell Name: D_BtmSlabDrain
Descrip: Bottom Slab Drain for Box Girder



A2.1.3 Cell Library: Bridge.cel (continued)

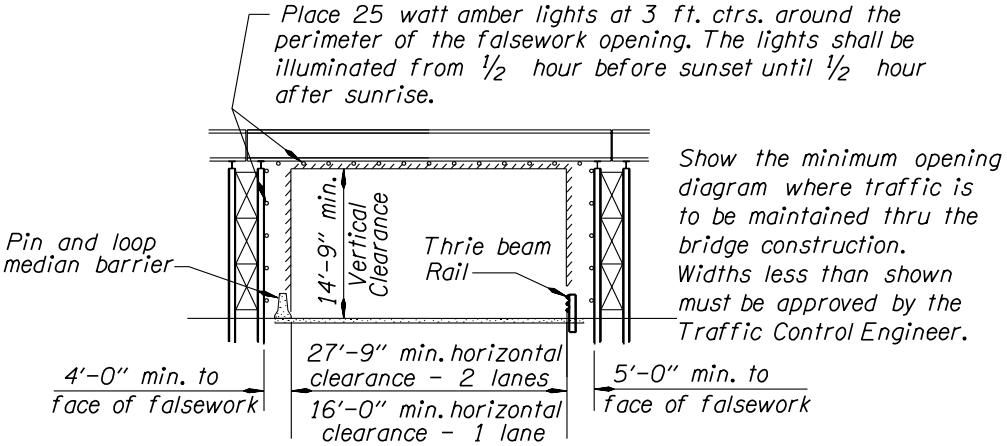
Cell Name: D_Chevron
Descrip: Chevron Marker



CHEVRON OBSTRUCTION MARKER

No Scale

Cell Name: D_ClearanceDiagram1
Descrip: Construction Clearance Diagram

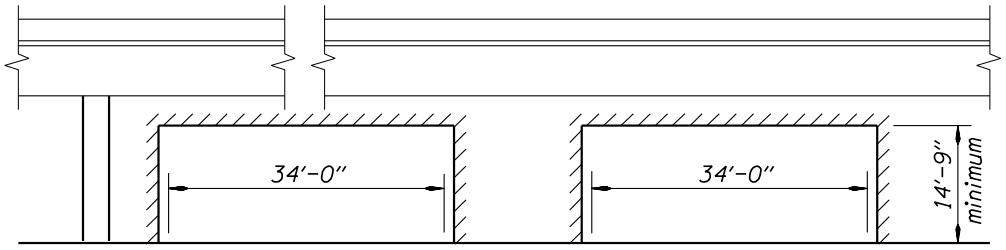


TYPICAL CONSTRUCTION CLEARANCE DETAILS

No Scale

A2.1.3 Cell Library: Bridge.cel (continued)

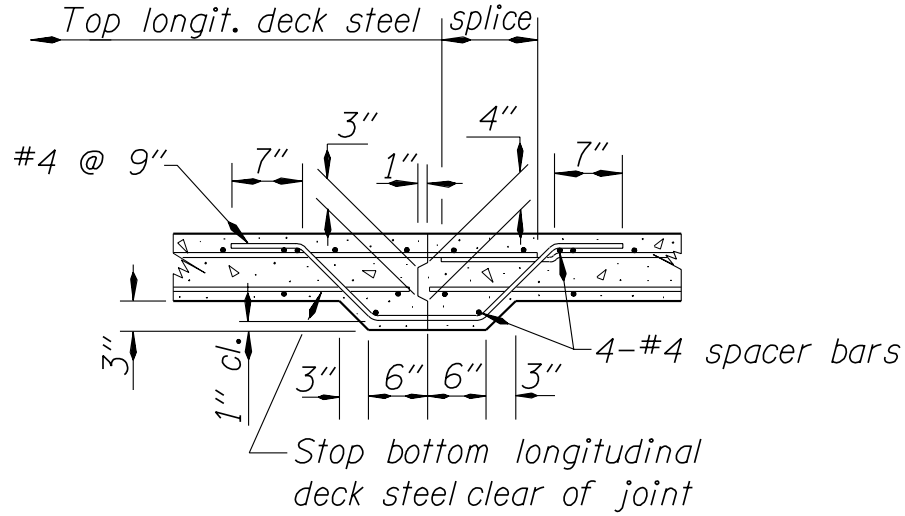
Cell Name: D_ClearanceDiagram2
Descrip: Clearance Diagram



TYPICAL CONSTRUCTION CLEARANCE DETAILS
No Scale

NOTE: All Construction horizontal clearances shown are between shoulder barriers and normal to roadway traffic. Place 25 Watt amber lights at 3'-0" ctrs. around perimeter of falsework openings facing oncoming traffic.

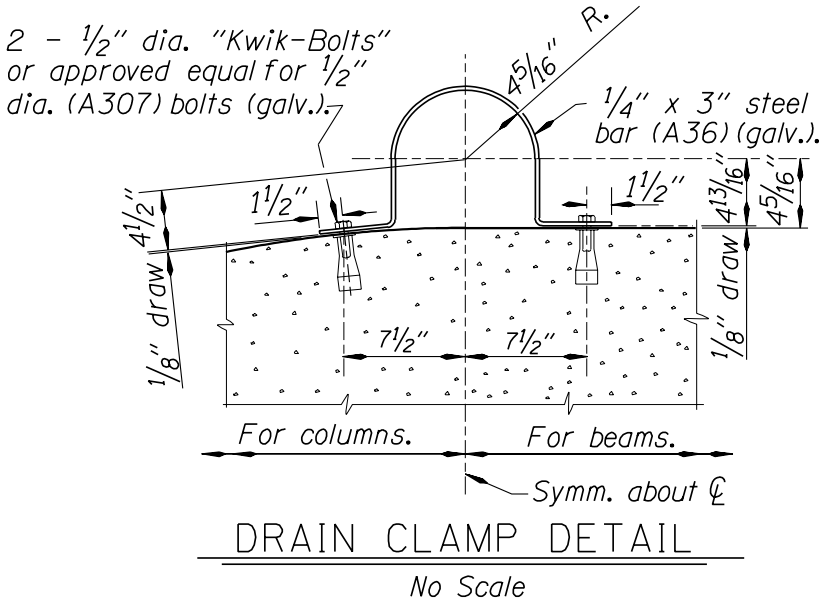
Cell Name: D_ConstructionJoint
Descrip: Deck Construction Joint - Detail



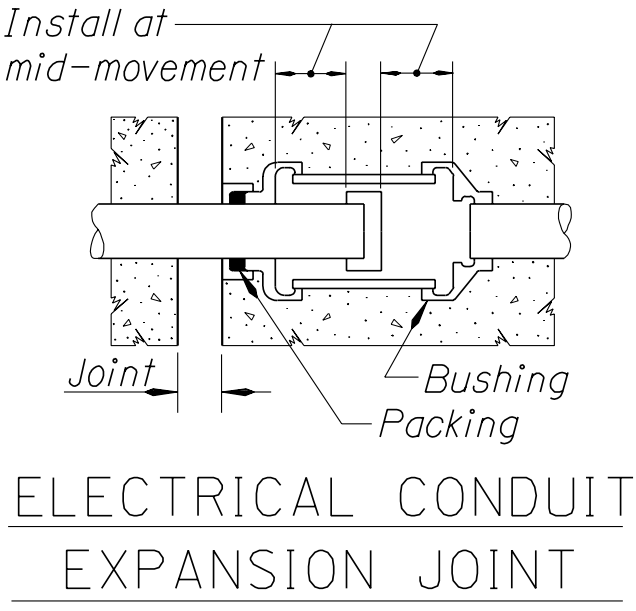
DECK CONSTRUCTION JOINT

A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_DrainClamp
Descrip: Drain Pipe Clamp Detail

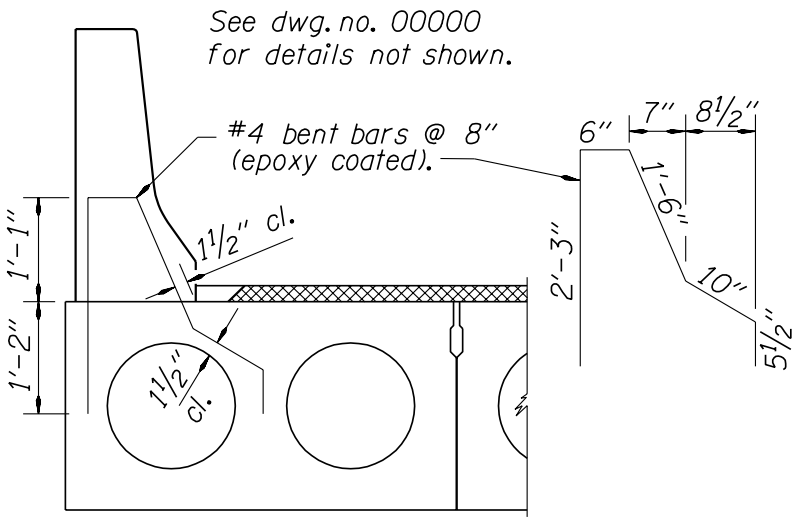


Cell Name: D_ElectricalExpansion
Descrip: Electrical Expansion Joint



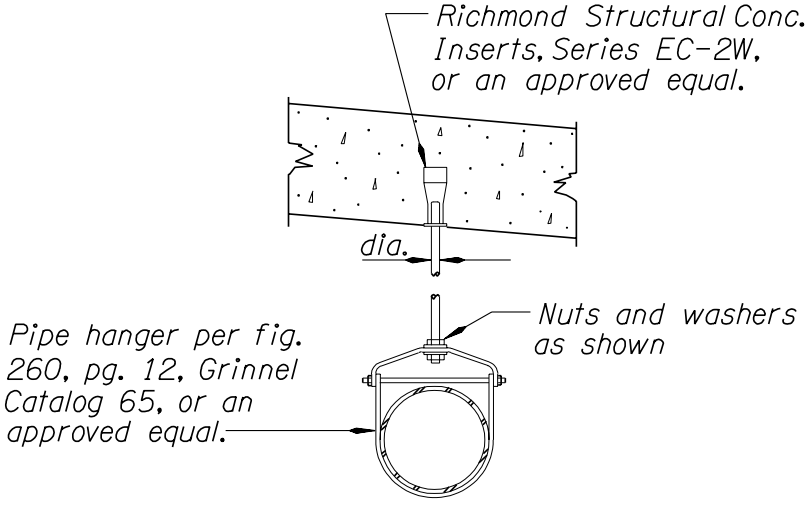
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_ExtSlabRail
Descrip: 26" Exterior Slab with Type F Rail - Section



EXTERIOR SLAB SECTION
No Scale

Cell Name: D_Hanger
Descrip: Pipe Hanger Details



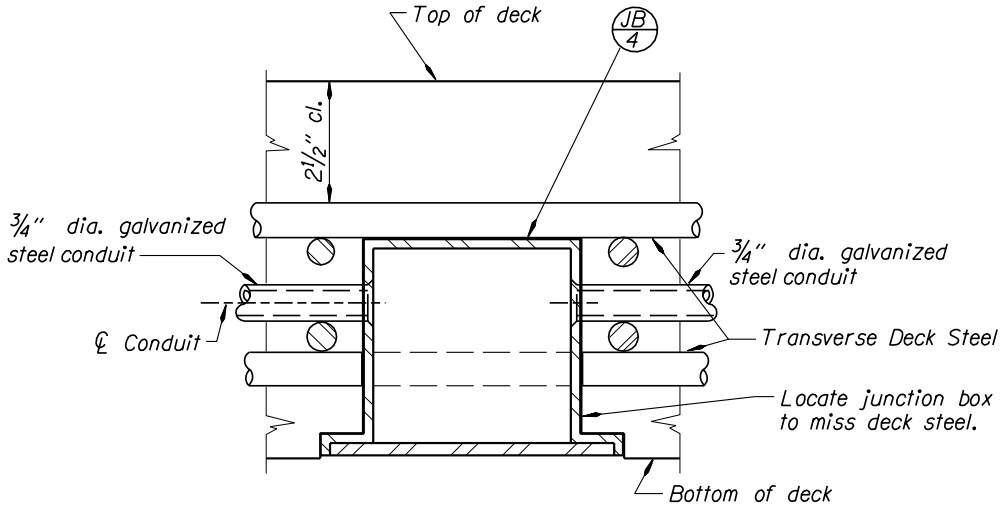
PIPE HANGER DETAIL
No Scale

A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_HydraulicData
Descrip: Hydraulic Data Chart

HYDRAULIC DATA				
ITEMS	(UNITS)	DESIGN FLOOD	BASE FLOOD	MAX. PROBABLE FLOOD
DISCHARGE	(ft^3/s)			
RECURRENCE INTERVAL	(YRS.)			
H.W. ELEV. AT UPSTREAM FACE OF BRIDGE ALONG EMBANKMENT	(ft.)			
BACKWATER	(ft.)			

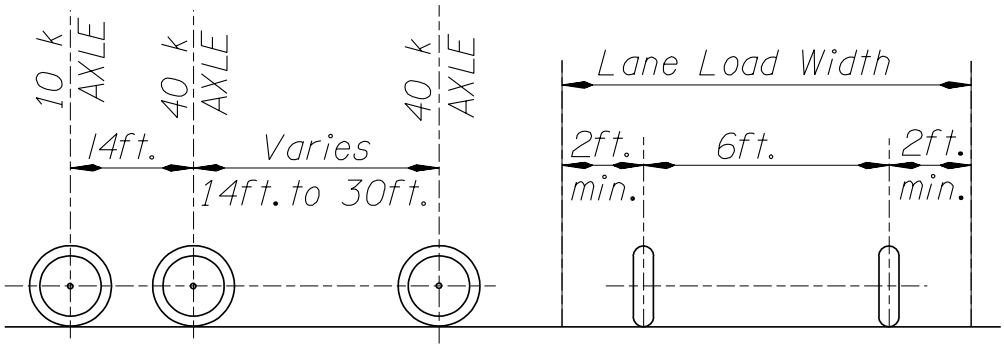
Cell Name: D_JunctionBox
Descrip: Junction Box Detail



JUNCTION BOX DETAIL
No Scale

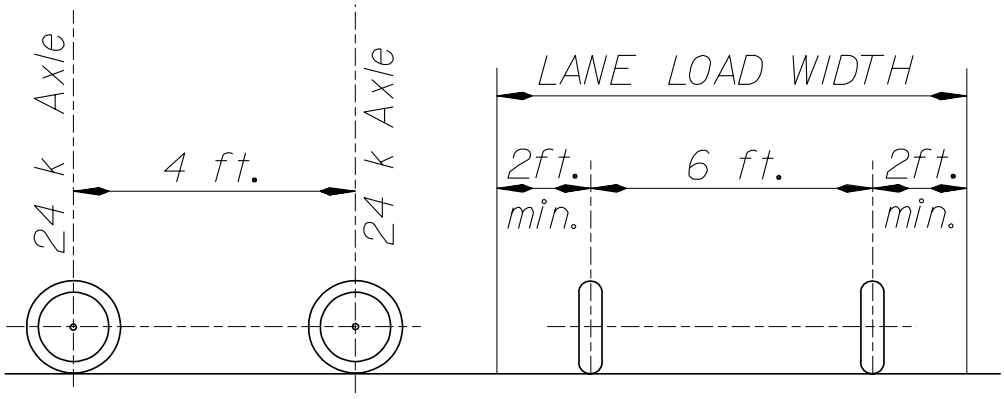
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_L_HS25
Descrip: HS 25Design Truck Loading Diagram



HS25 DESIGN TRUCK LOADING

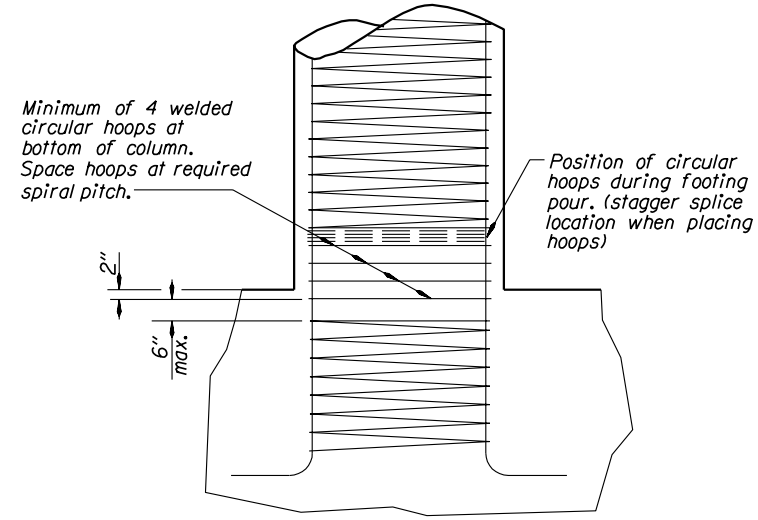
Cell Name: D_L_Military
Descrip: Military Loading Diagram



MILITARY LOADING

A2.1.3 Cell Library: Bridge.cel (continued)

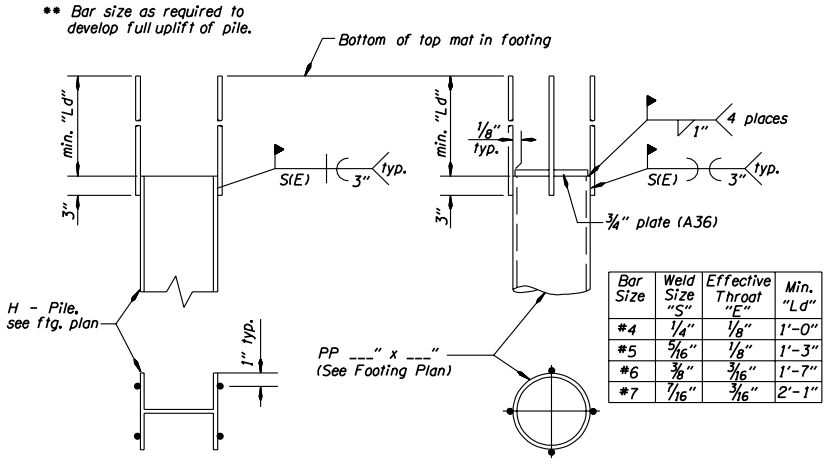
Cell Name: D_OptHoopDetails
Descrip: Optional Hoop Details at Bottom of Column



OPTIONAL HOOP DETAIL AT BOTTOM OF COLUMN

No Scale

Cell Name: D_Pile_Anchor
Descrip: Anchor Pile Details



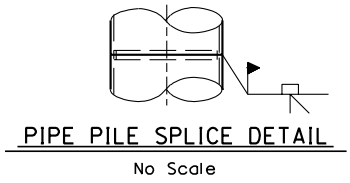
Bar Size	Weld Size "S"	Effective Throat "E"	Min. "Ld"
#4	1/4"	1/8"	1'-0"
#5	5/16"	1/8"	1'-3"
#6	3/8"	3/16"	1'-7"
#7	7/16"	3/16"	2'-1"

* Provide ASTM A706, except ASTM A615 Grade 400 or ASTM A496 may be used if copies of the chemical composition analysis are submitted and approved as weldable by the engineer.

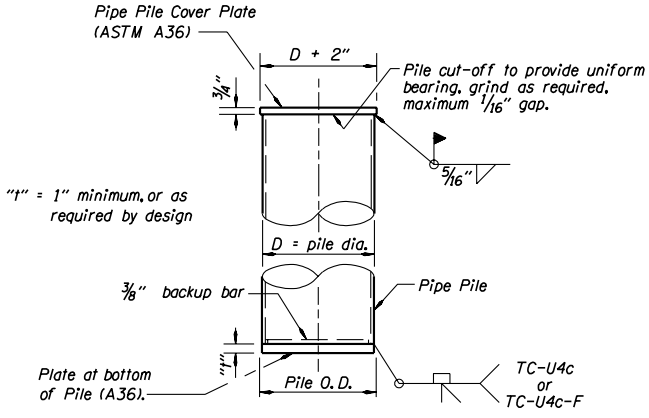
ANCHOR PILE DETAILS

A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_Pile_ClosedSplice
Descrip: Pipe Pile Both Ends Closed with Splice Details



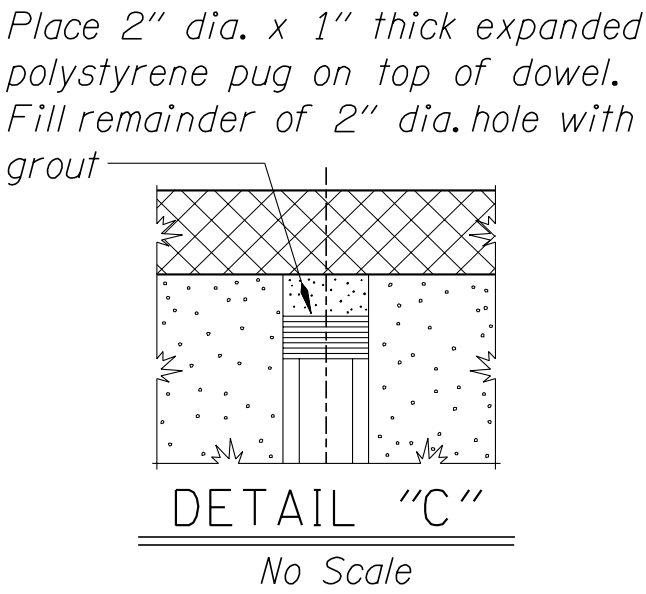
PIPE PILE SPLICE DETAIL
No Scale



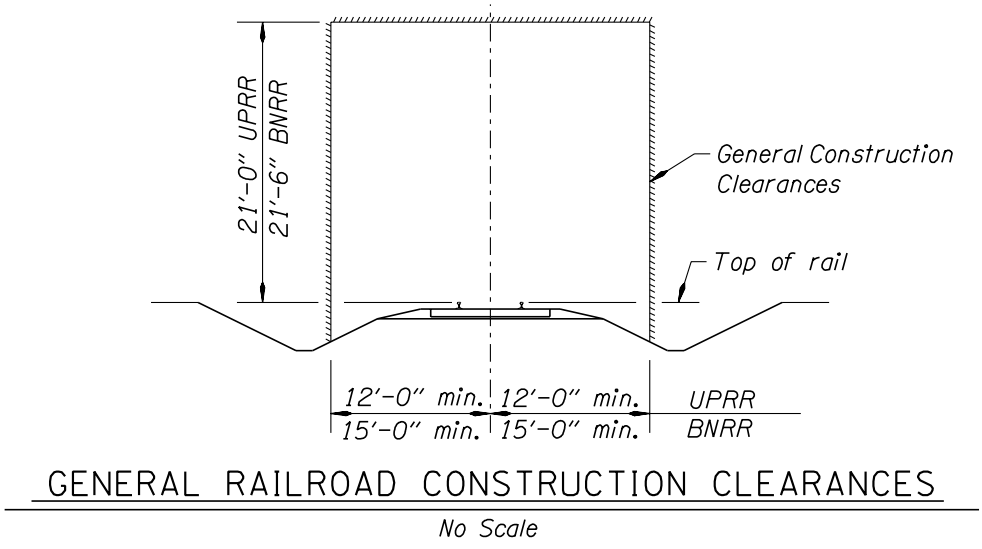
PIPE PILE DETAIL
(Closed End)
No Scale

A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_Plug
Descrip: Polystyrene Plug on top of Dowel

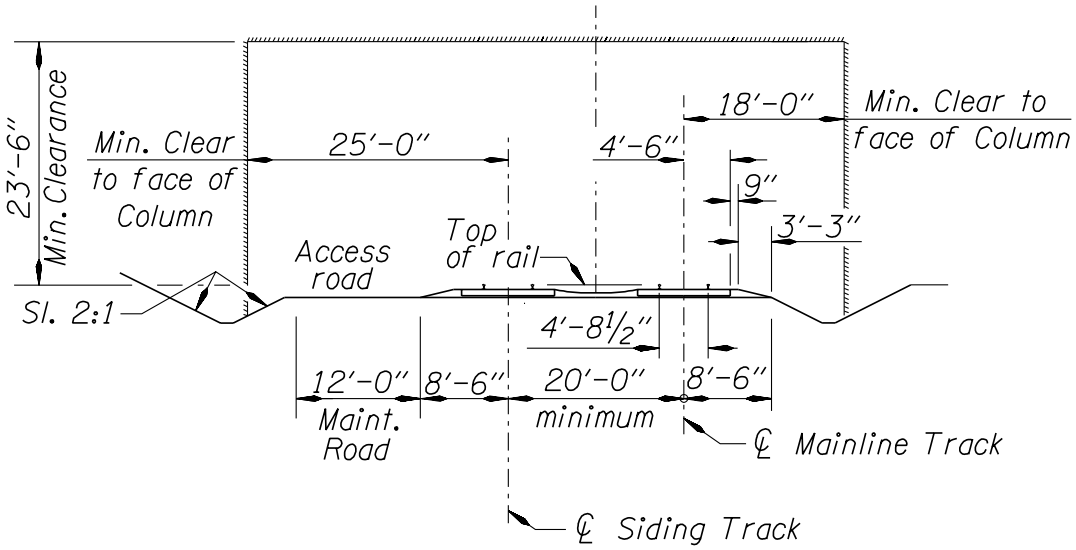


Cell Name: D_RRClear_1Track
Descrip: Railroad Clearance Diagram - 1 Track



A2.1.3 Cell Library: Bridge.cel (continued)

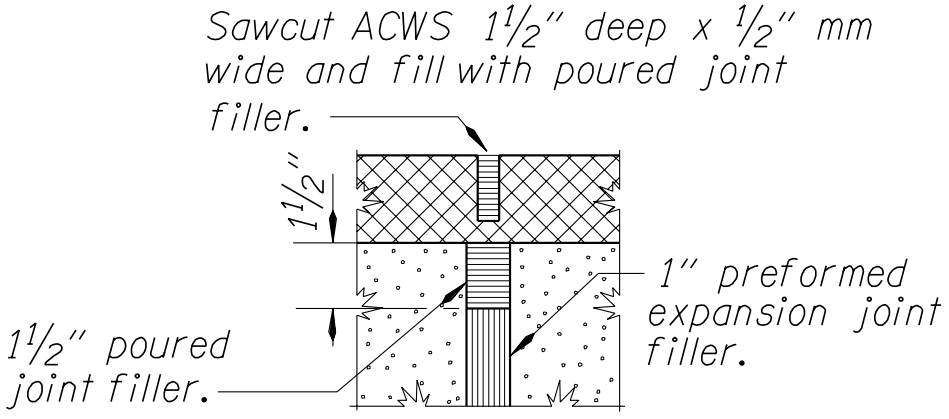
Cell Name: D_RRClear_2Tracks
Descrip: Railroad Clearance Diagram - 2 Tracks



GENERAL RAILROAD CLEARANCES

No Scale

Cell Name: D_Sawcut
Descrip: Sawcut through ACWS

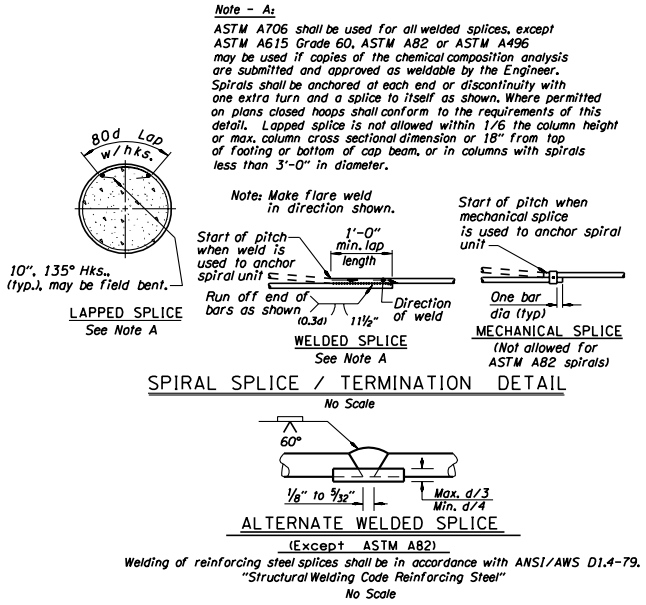


DETAIL "A"

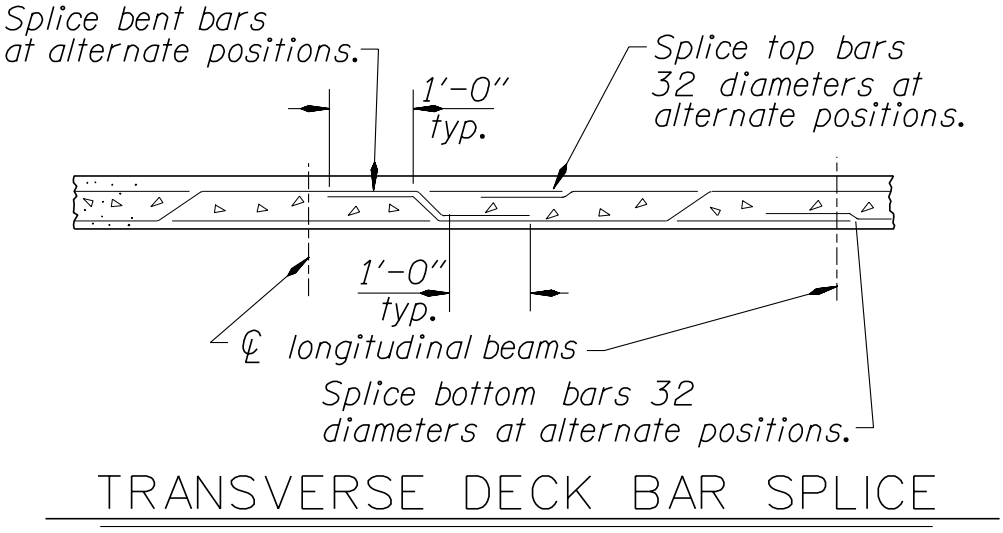
No Scale

A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_SpiralPlice
Descrip: Spiral Splice and Termination Details

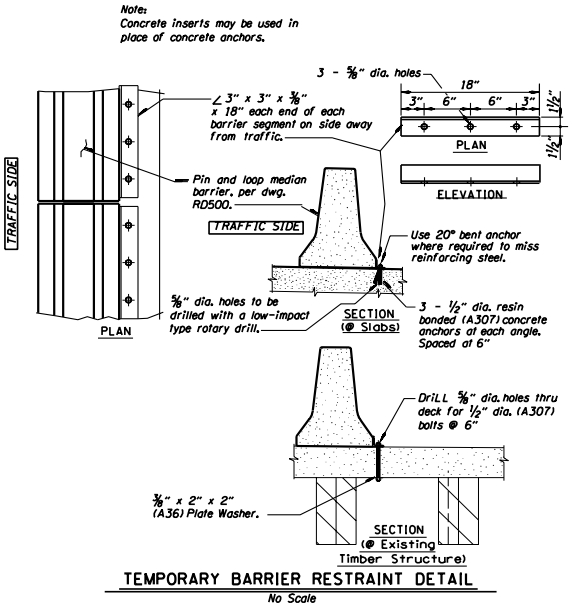


Cell Name: D_Splice
Descrip: Deck Reinforcing Steel Splice Detail

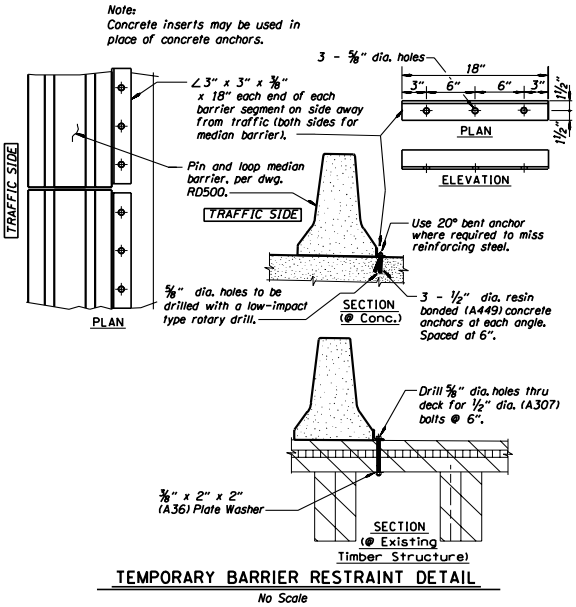


A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_T_BarrierConn1
Descrip: Temporary Median Barrier Connection over Concrete Deck

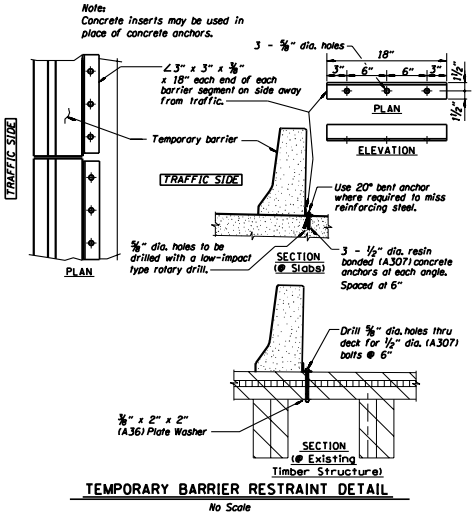


Cell Name: D_T_BarrierConn2
Descrip: Temporary Median Barrier Connection over Wooden Deck

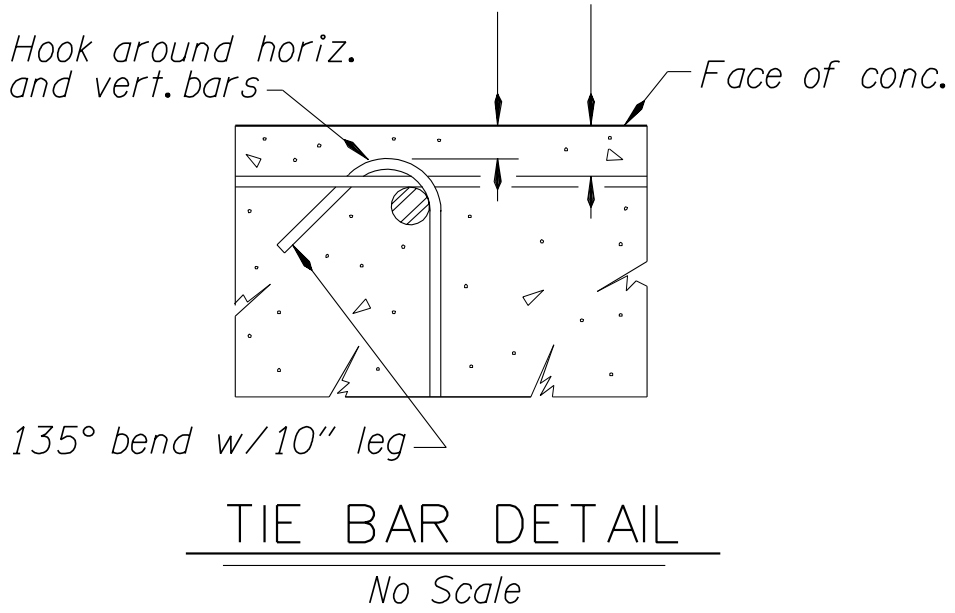


2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: D_T_BarrierConn3
Descrip: Temporary Type F Rail Connection over Concrete Deck

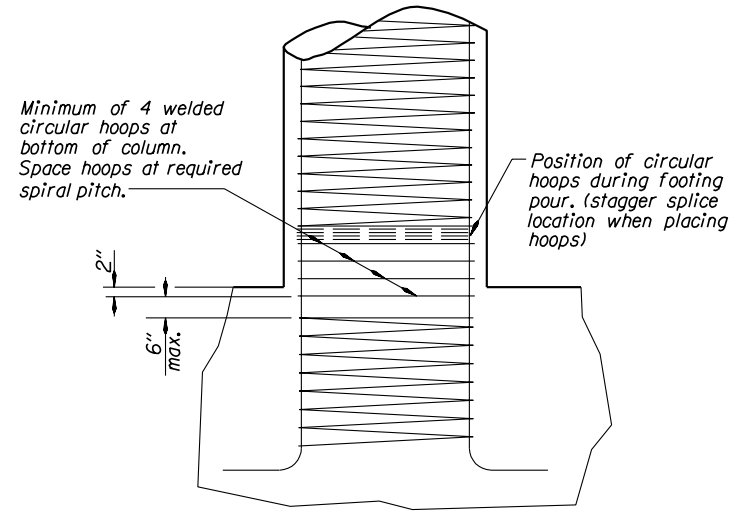


Cell Name: D_TieBar
Descrip: Tie Bar Detail



A2.1.3 Cell Library: Bridge.cel (continued)

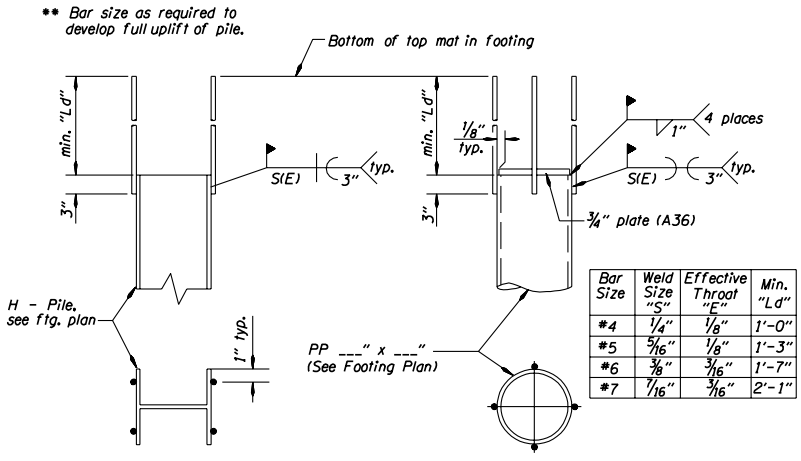
Cell Name: D_OptHoopDetails
Descrip: Optional Hoop Details at Bottom of Column



OPTIONAL HOOP DETAIL AT BOTTOM OF COLUMN

No Scale

Cell Name: D_Pile_Anchor
Descrip: Anchor Pile Details



Bar Size	Weld Size "S"	Effective Throat "E"	Min. "Ld"
#4	1/4"	1/8"	1'-0"
#5	5/16"	1/8"	1'-3"
#6	3/8"	3/16"	1'-7"
#7	7/16"	3/16"	2'-1"

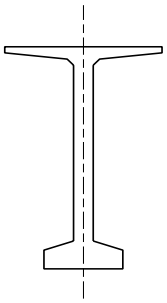
STEEL H-PILE STEEL PIPE PILE

* Provide ASTM A706, except ASTM A615 Grade 400 or ASTM A496 may be used if copies of the chemical composition analysis are submitted and approved as weldable by the engineer.

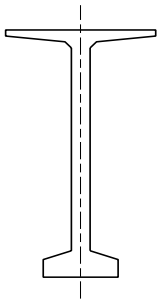
ANCHOR PILE DETAILS

A2.1.3 Cell Library: Bridge.cel (continued)

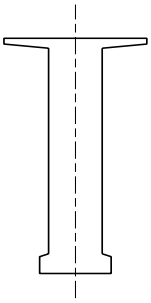
Cell Name: G_BT_72
Descrip: 72" Precast Concrete Bulb-T Beam - Section



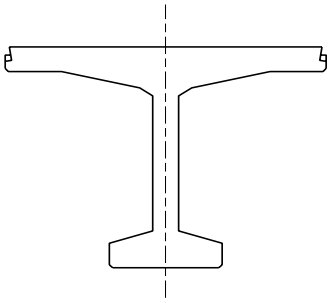
Cell Name: G_BT_84
Descrip: 84" Precast Concrete Bulb-T Beam - Section



Cell Name: G_BT_84EB
Descrip: 84" Precast Concrete Bulb-T End Block - Section

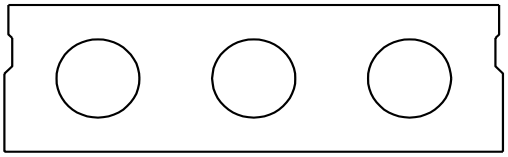


Cell Name: G_IDBT_IntergralBulbT
Descrip: Intergral Deck Bulb-T - Section

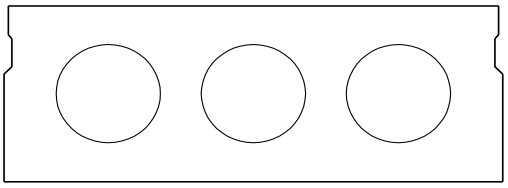


Cell Name: G_SLB_12
Descrip: 12" Precast Concrete Slab - Section

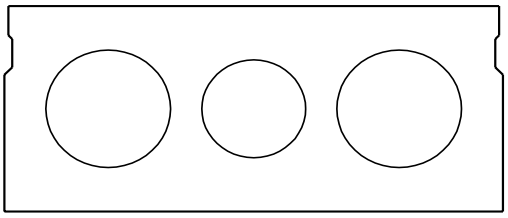
Cell Name: G_SLB_15
Descrip: 15" Precast Concrete Slab - Section



Cell Name: G_SLB_18
Descrip: 18" Precast Concrete Slab - Section

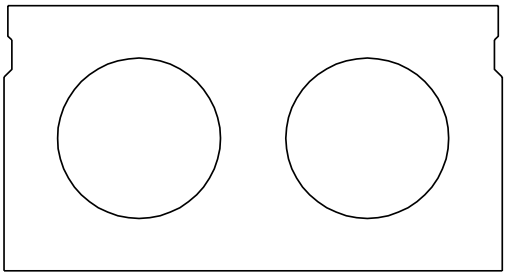


Cell Name: G_SLB_21
Descrip: 21" Precast Concrete Slab - Section

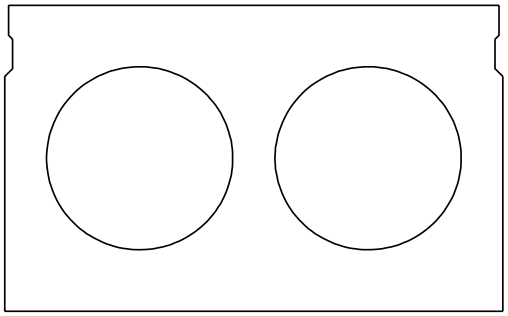


A2.1.3 Cell Library: Bridge.cel (continued)

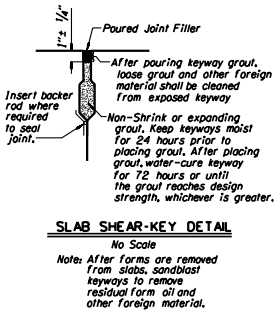
Cell Name: G_SLB_26
Descrip: 26" Precast Concrete Slab - Section



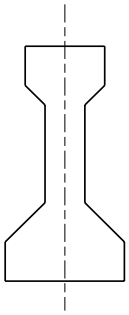
Cell Name: G_SLB_30
Descrip: 30" Precast Concrete Slab - Section



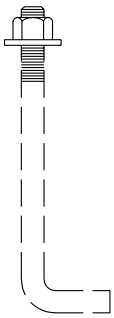
Cell Name: G_SLB_ShearKey
Descrip: Precast Slab Shear Key



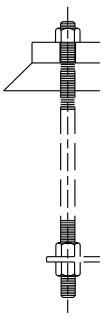
Cell Name: G_Type2
Descrip: Type 2 AASHTO Beam - Section



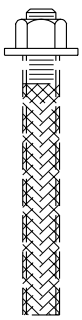
Cell Name: H_A_JBolt
Descrip: J-Bolt Anchor



Cell Name: H_A_Luminaire
Descrip: Luminaire Pole Base Anchor



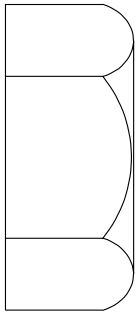
Cell Name: H_A_ResinBonded
Descrip: Resin Bonded Anchor



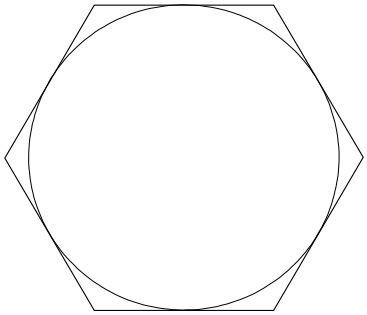
Cell Name: H_A_Wedge
Descrip: Concrete Wedge Anchor

A2.1.3 Cell Library: Bridge.cel (continued)

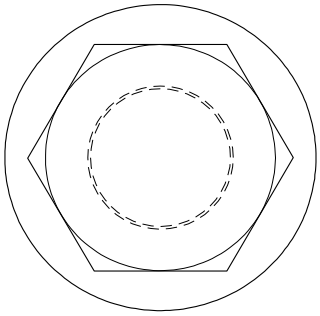
Cell Name: H_B_Bolt
Descrip: Bolt Head - Terminator



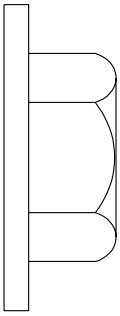
Cell Name: H_B_BoltPlan
Descrip: Bolt Head - Plan



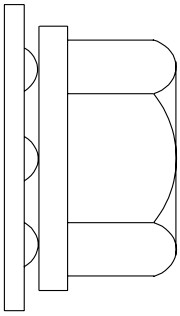
Cell Name: H_B_BoltPlanW
Descrip: Bolt with Washer - Plan



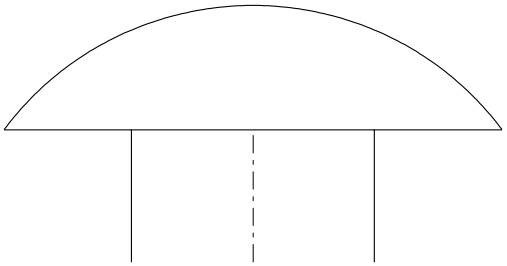
Cell Name: H_B_BoltW
Descrip: Bolt Head with Washer - Terminator



Cell Name: H_B_DTIBolt
Descrip: Direct Tension Indicator Bolt - Terminator

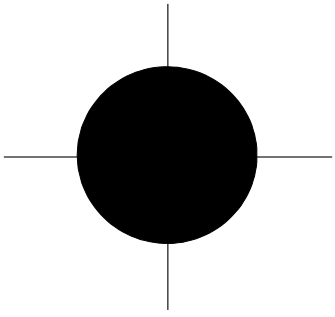


Cell Name: H_B_RoundHead
Descrip: Bolt - Round Head



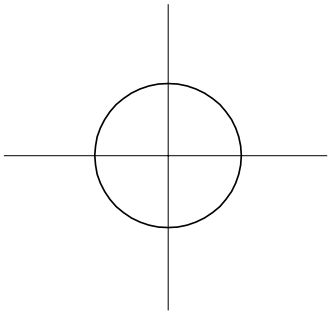
Cell Name: H_EQAssembly
Descrip: Earthquake Restrainer Assembly

Cell Name: H_Hole_FieldDrill
Descrip: Hole - Field Drill Mark

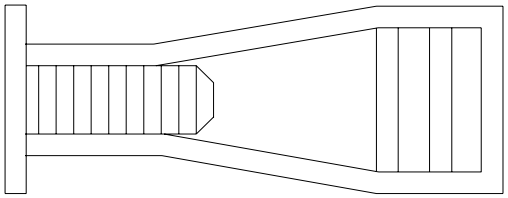


A2.1.3 Cell Library: Bridge.cel (continued)

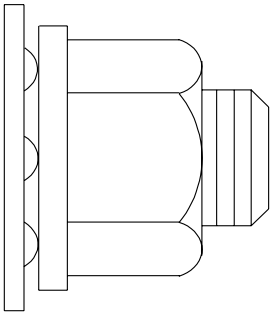
Cell Name: H_Hole_ShopDrill
Descrip: Hole - Shop Drill Mark



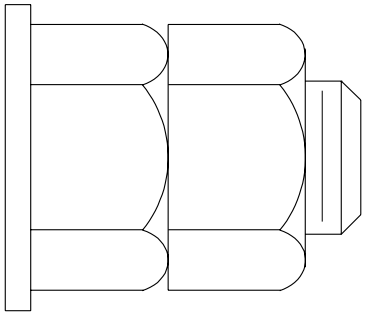
Cell Name: H_Insert
Descrip: Concrete Insert



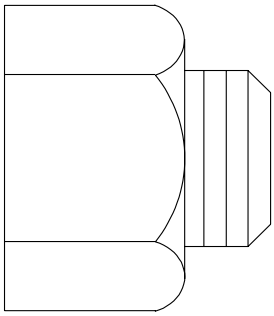
Cell Name: H_N_DTINut
Descrip: Direct Tension Indicator Nut - Terminator



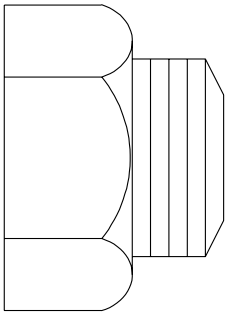
Cell Name: H_N_DoubleNut
Descrip: Double Nuts - Terminator



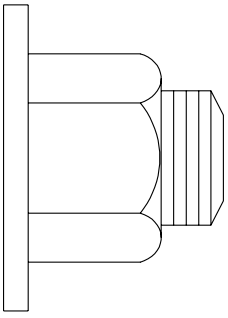
Cell Name: H_N_HSNuts
Descrip: High Strength Nut - Terminator



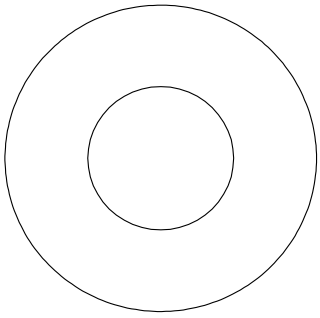
Cell Name: H_N_Nut
Descrip: Nut - Terminator



Cell Name: H_N_NutW
Descrip: Nut with Washer - Terminator

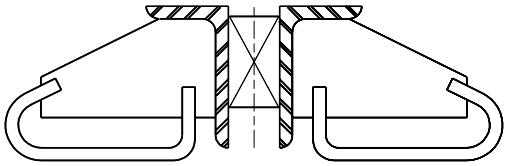


Cell Name: H_Washer
Descrip: Nominal Size Washer - Plan

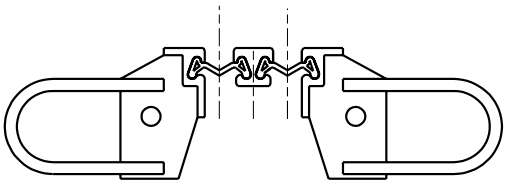


A2.1.3 Cell Library: Bridge.cel (continued)

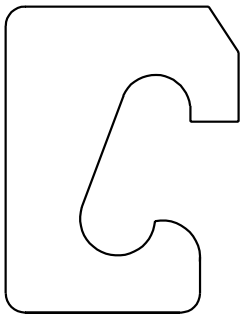
Cell Name: J_ArmouredCorner
Descrip: Armoured Corner for Compression Joint Seal



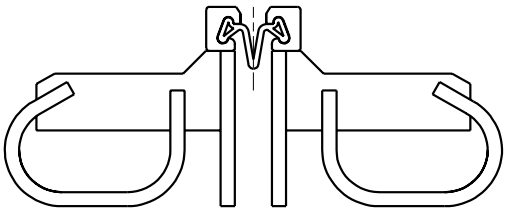
Cell Name: J_DoubleExpansion
Descrip: Double Expansion Joint - Section



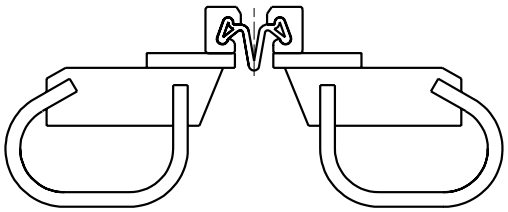
Cell Name: J_Extrusion
Descrip: Extrusion Piece for Strip Seal - Section



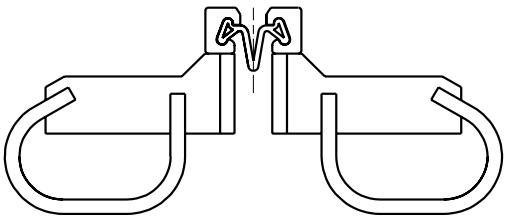
Cell Name: J_SingleStripSeal
Descrip: Single Strip Seal Expansion Joint - Section



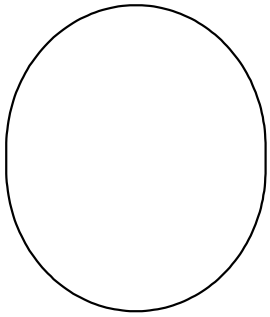
Cell Name: J_SingleStripSealA
Descrip: Single Strip Seal Expansion Joint - Section



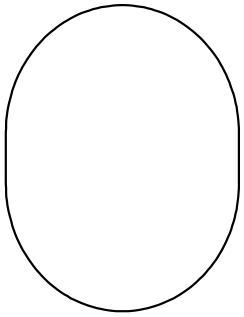
Cell Name: J_SingleStripSealB
Descrip: Single Strip Seal Expansion Joint - Section



Cell Name: M_AccessHole1
Descrip: Access Hole through Bottom Slab of Girder



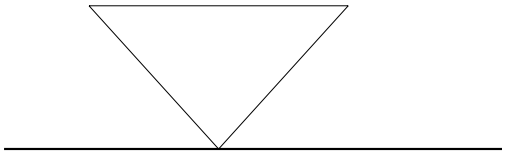
Cell Name: M_AccessHole2
Descrip:
Access Hole through Crossbeams, Diaphragms, etc.



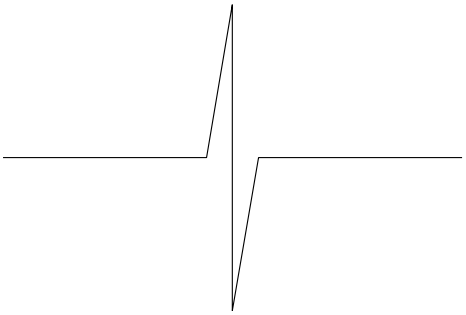
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: M_ElevationScale
Descrip: Elevation Scale

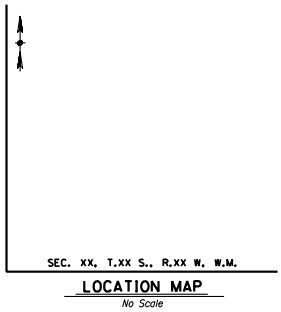
Cell Name: M_GroundWater
Descrip: Ground Water Symbol



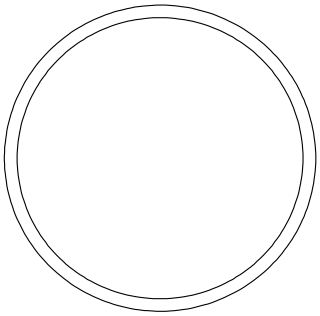
Cell Name: M_LineBreak
Descrip: Line Beak Symbol



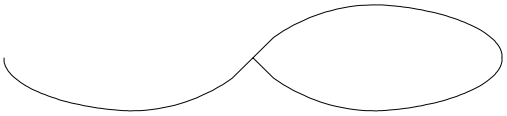
Cell Name: M_LocationMap
Descrip: Location Map Border and Title



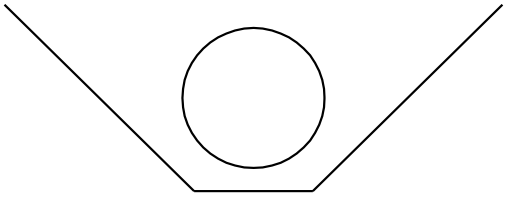
Cell Name: M_Pipe
Descrip: Structural Steel Pipe - Section



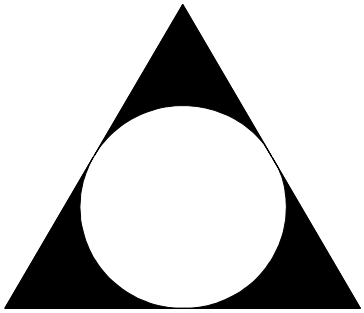
Cell Name: M_PipeBreak
Descrip: Pipe Break Symbol



Cell Name: M_PoleBase
Descrip: Structure Mount Luminaire Pole Base

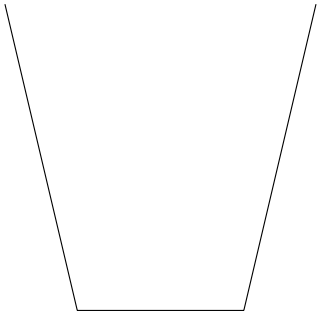


Cell Name: M_Revision
Descrip: Revision Triangel

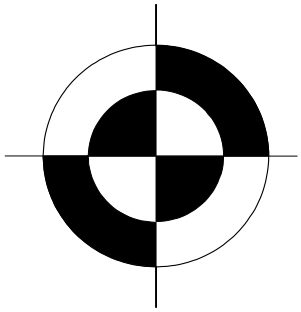


A2.1.3 Cell Library: Bridge.cel (continued)

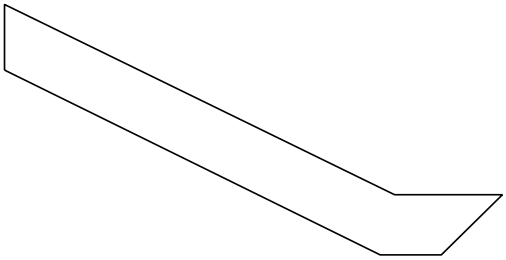
Cell Name: M_ShearKey
Descrip: Shear Key - Section



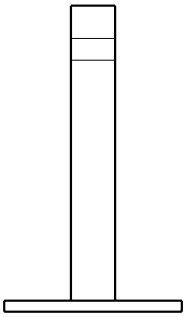
Cell Name: M_Target
Descrip: Target Symdol



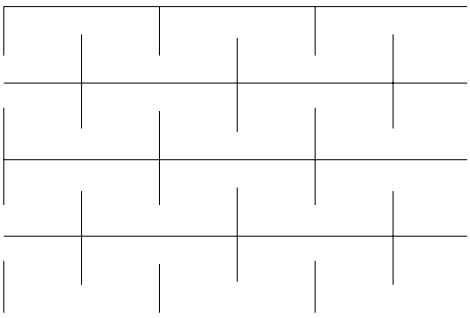
Cell Name: M_ToeTrench
Descrip: Slope Riprap with Toe Trench



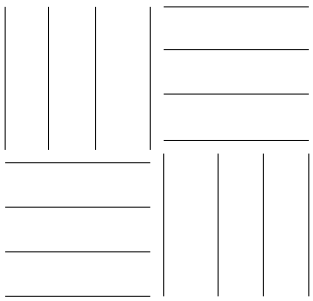
Cell Name: M_TubularMarker
Descrip: Tubular Marker



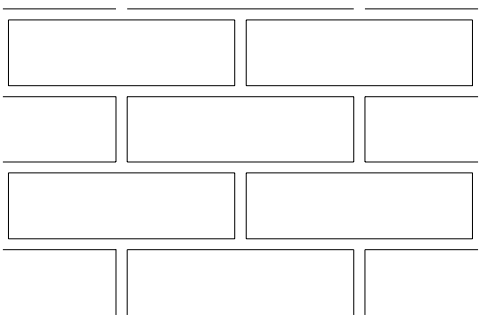
Cell Name: P_A_Aluminum
Descrip: Aluminum Pattern - Area



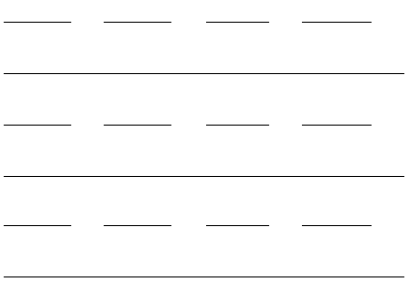
Cell Name: P_A_Basket
Descrip: Basket Pattern - Area



Cell Name: P_A_Brick
Descrip: Brick Pattern - Area

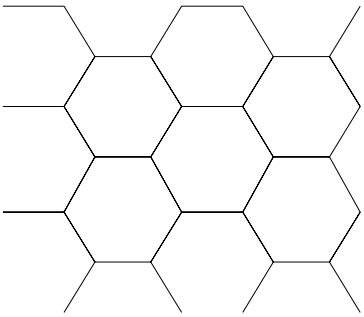


Cell Name: P_A_Bronze
Descrip: Bronze or Brass Pattern - Area

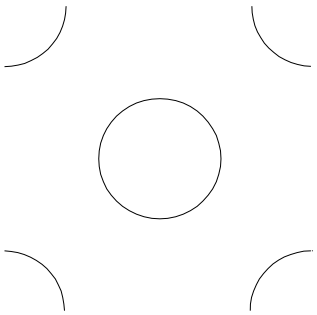


A2.1.3 Cell Library: Bridge.cel (continued)

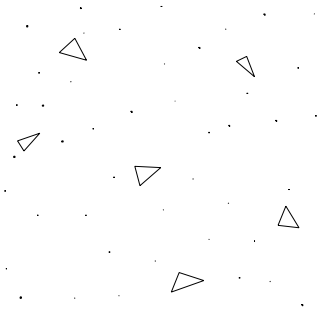
Cell Name: P_A_ChickenWire
Descrip: Chicken Wire Pattern - Area



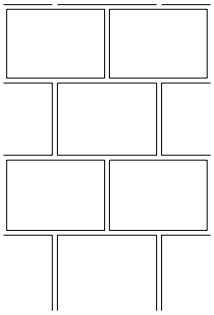
Cell Name: P_A_Circle
Descrip: Circle Pattern - Area



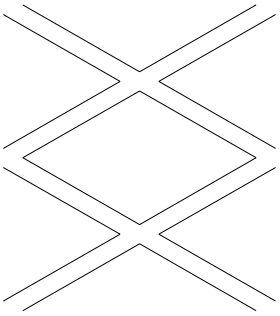
Cell Name: P_A_Concrete
Descrip: Concrete Pattern - Area



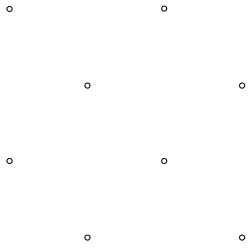
Cell Name: P_A_ConcreteBlock
Descrip: Concrete Block Pattern - Area



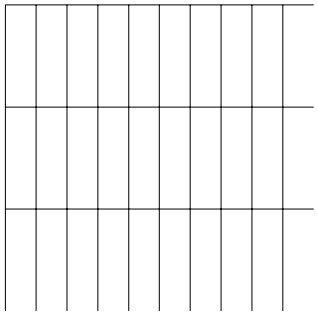
Cell Name: P_A_Diamond
Descrip: Diamond Pattern - Area



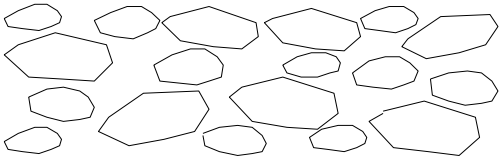
Cell Name: P_A_Dot
Descrip: Dot Pattern - Area



Cell Name: P_A_Grate
Descrip: Grate Pattern - Area



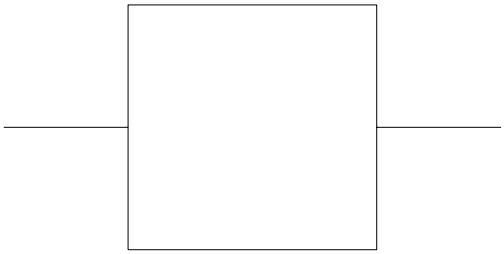
Cell Name: P_A_Gravel
Descrip: Gravel Pattern - Area



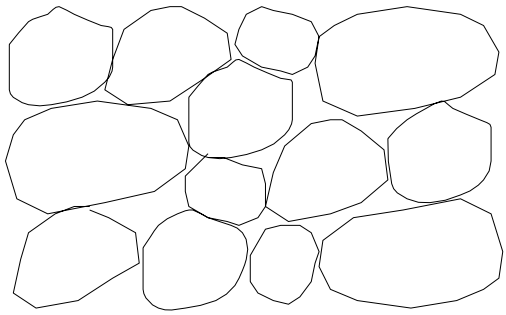
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: P_A_Hatch
Descrip: Hatch Pattern - Area

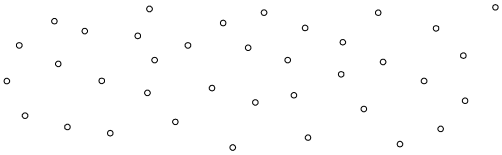
Cell Name: P_A_MSE
Descrip: MSE Wall Pattern - Area



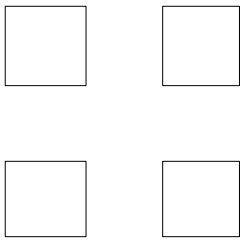
Cell Name: P_A_Riprap
Descrip: Riprap Pattern - Area



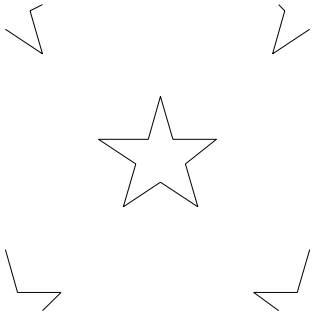
Cell Name: P_A_Sand
Descrip: Sand Pattern - Area



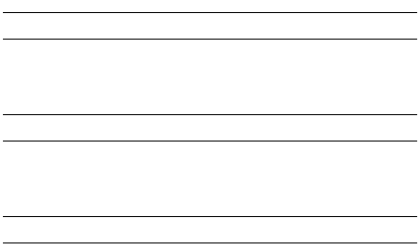
Cell Name: P_A_Square
Descrip: Square Pattern - Area



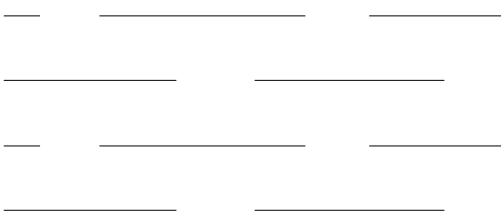
Cell Name: P_A_Star
Descrip: Star Pattern - Area



Cell Name: P_A_Steel
Descrip: Structural Steel Pattern - Area

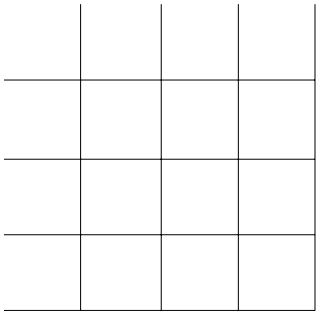


Cell Name: P_A_Water
Descrip: Water Pattern - Area

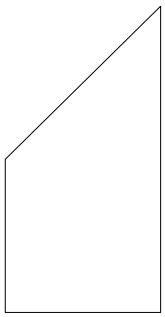


A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: P_A_WeldedWire
Descrip: Welded Wire Pattern - Area



Cell Name: P_Concrete
Descrip: Concrete Symbol

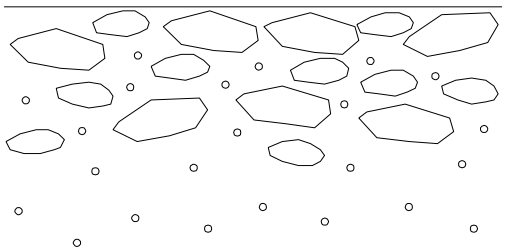


Cell Name: P_L_Corrugated
Descrip: Corrugated Pattern - Linear

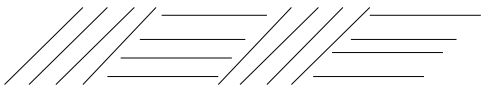
Cell Name: P_L_Fence
Descrip: Fence Pattern - Linear

Cell Name: P_L_Gas
Descrip: Gas Pattern - Linear

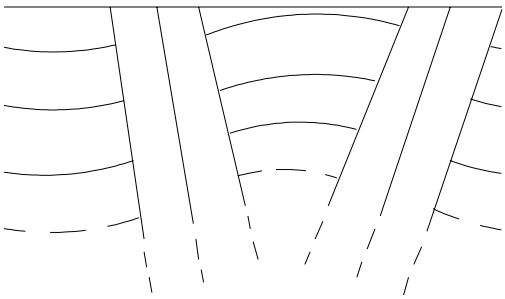
Cell Name: P_L_Gravel
Descrip: Gravel Pattern - Linear



Cell Name: P_L_Ground
Descrip: Ground Pattern - Linear



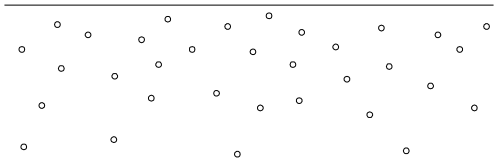
Cell Name: P_L_Rock
Descrip: Rock Pattern - Linear



A2.1.3 Cell Library: Bridge.cel (continued)

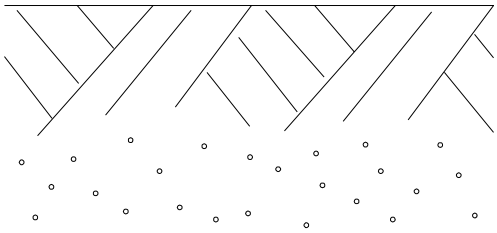
Cell Name: P_L_RoughConcrete
Descrip: Rough Concrete Pattern - Linear

Cell Name: P_L_Sand
Descrip: Sand Pattern - Linear



Cell Name: P_L_SheetPile
Descrip: Sheet Pile Pattern - Linear

Cell Name: P_L_Soil
Descrip: Soil Pattern - Linear



Cell Name: P_L_Util_Electrical
Descrip: Electrical Line Pattern - Linear

Cell Name: P_L_Util_Railroad
Descrip: Railroad Track Pattern - Linear

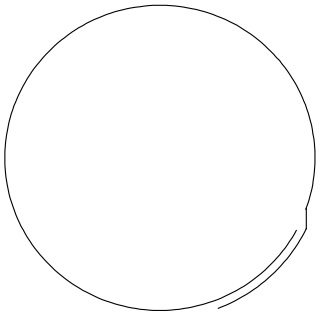
Cell Name: P_L_Util_Sewer
Descrip: Sewer Line Pattern - Linear

Cell Name: P_L_Util_Telephone
Descrip: Telephone Pattern - Linear

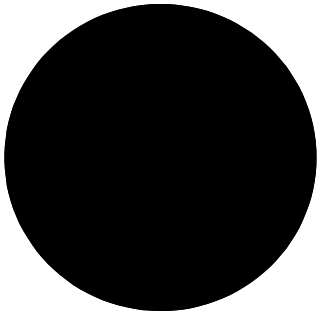
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: P_L_Water
Descrip: Water Pattern - Linear

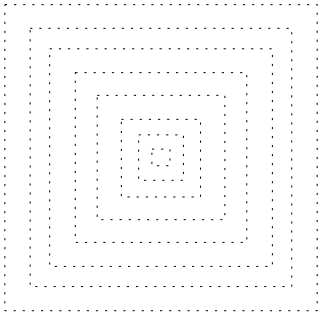
Cell Name: REINF_CircularHoop
Descrip: Circular Hoop



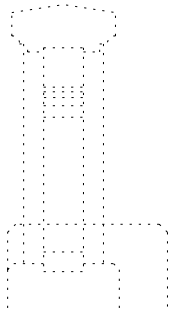
Cell Name: REINF_Rebar
Descrip: Rebar - Dot



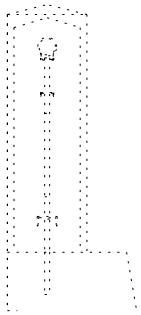
Cell Name: REINF_SquareBar
Descrip: Existing Square Bar



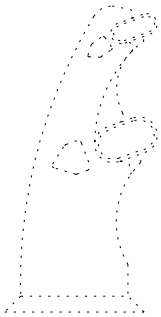
Cell Name: R_02010
Descrip: Existing Concrete Baluster Rail



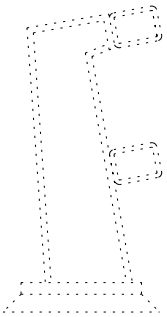
Cell Name: R_09233
Descrip: Rail with Concrete Post and Metal Rail - Secti



Cell Name: R_23603
Descrip:
Oblong 2-tube aluminum rail, dwg. 23603 - Section

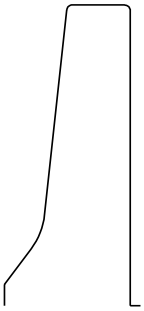


Cell Name: R_23610
Descrip:
Square 2-tube aluminum rail, dwg. 23610 - Section

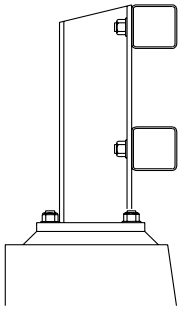


A2.1.3 Cell Library: Bridge.cel (continued)

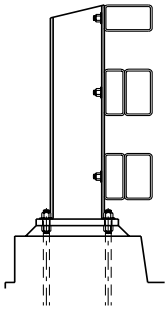
Cell Name: R_BR200Tall
Descrip: Type F Concrete Rail (42" high) - Section



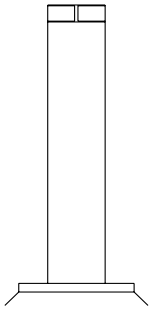
Cell Name: R_BR206
Descrip: 2-Tube Curb Mount Rail, dwg BR206 - Section



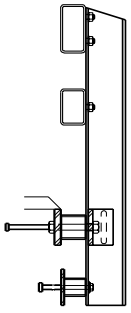
Cell Name: R_BR208
Descrip:
3-Tube Curb Mount Rail, dwg BR208 - Section



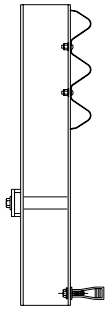
Cell Name: R_BR208B
Descrip: 3-Tube Curb Mount Rail -Backside of Rail



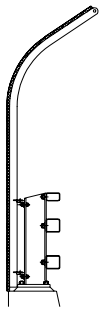
Cell Name: R_BR226
Descrip:
2-Tube Side Mount Rail, dwg. BR226 - Section



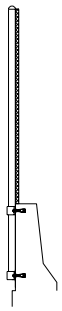
Cell Name: R_BR233
Descrip: Side Mounted Thrie Beam Rail - Section



Cell Name: R_BR240TypeA
Descrip:
Protective Fence (Type A) with 3-Tube Rail - Section

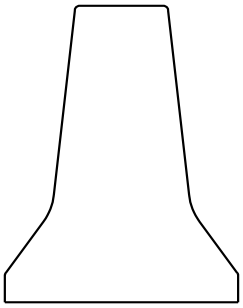


Cell Name: R_BR240TypeC
Descrip:
Protective Fence (Type C) with Type F Rail - Section

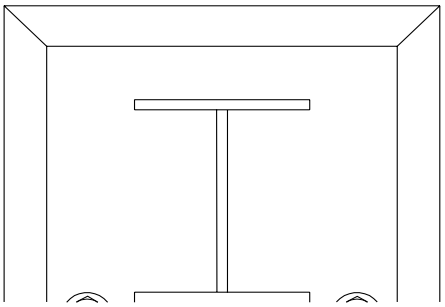


A2.1.3 Cell Library: Bridge.cel (continued)

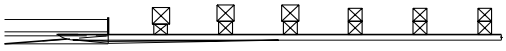
Cell Name: R_Median
Descrip: Median Barrier - Section



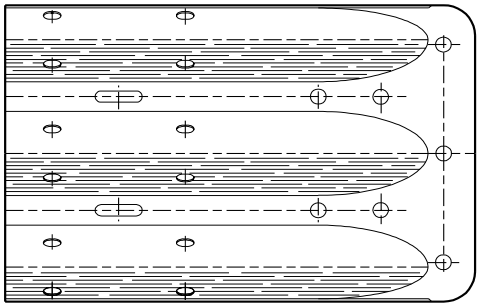
Cell Name: R_PostPlan
Descrip: Steel Rail Post - Plan



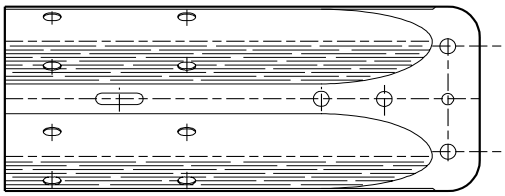
Cell Name: R_T_BR203 *Scale: 0.1166*
Descrip: Guardrail Transition, dwg BR203 - Plan



Cell Name: R_T_Terminal Conn
Descrip: Thrie Beam Terminal Connector -Elevation



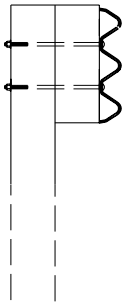
Cell Name: R_T_TerminalConn2
Descrip: W-Shape Terminal Connector



Cell Name: R_T_ThrieRail
Descrip:
Thrie Beam Transition without post - Front Elevation

Cell Name: R_T_ThrieRailBack
Descrip:
Thrie Beam Transition without post - Back Elevation

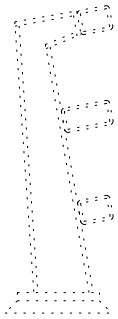
Cell Name: R_T_ThrieRailSection
Descrip: ThrieBeam Rail with Wood Post - Section



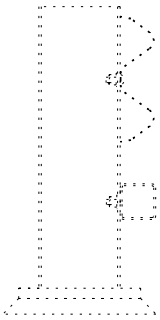
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: R_31754
Descrip:
Oblong 3-Tube Aluminum Rail, dwg. 31754 - Section

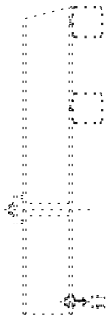
Cell Name: R_31755
Descrip:
Square 3-Tube Aluminum Rail, dwg. 31755 - Section



Cell Name: R_33258
Descrip:
W-Shape Rail with Tubing, dwg. 33258 - Section

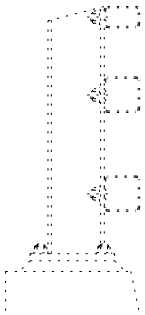


Cell Name: R_35268
Descrip:
2-Tube Side Mount Rail, dwg. 35268 - Section

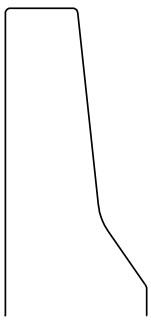


Cell Name: R_43444
Descrip:
Side Mounted W-Shape Rail, dwg 43444 - Section

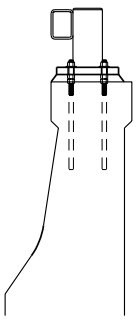
Cell Name: R_43498
Descrip:
3-Tube Curb Mount Rail, dwg 43498 - Section



Cell Name: R_BR200
Descrip: Type F Concrete Rail, dwg BR200 - Section



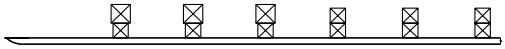
Cell Name: R_BR200Achitectural
Descrip: Architectural Type F Rail with Tube - Section



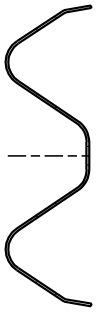
A2.1.3 Cell Library: Bridge.cel (continued)

Cell Name: R_T_ThrieShape
Descrip: Thrie Beam Rail - Section

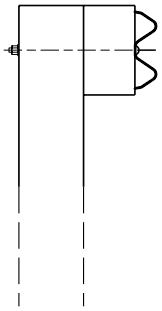
Cell Name: R_T_TransitionPlan
Descrip: Guardrail Transition - Plan



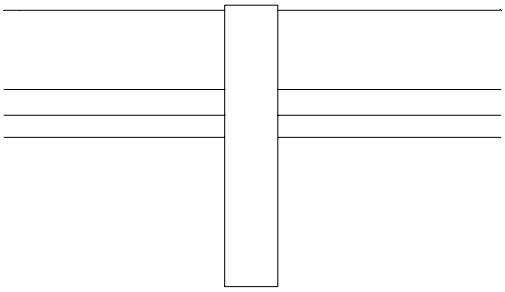
Cell Name: R_T_Wshape
Descrip: W-Shape Rail - Section



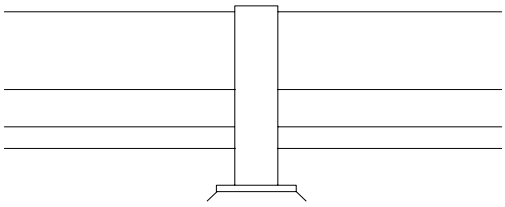
Cell Name: R_T_WshapePost
Descrip: W-Shape Rail with Wood Post - Section



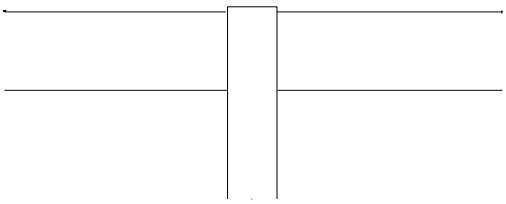
Cell Name: R_T_WshapeSM
Descrip: W-Shape Rail and Tubing with Post - Side Mount - Elevation



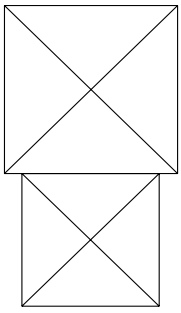
Cell Name: R_T_WshapeTM
Descrip: W-Shape Rail and Tubing with Post - Top Mount - Elevation



Cell Name: R_T_WshapeTransition
Descrip: W-Shape Rail with Post - Elevation

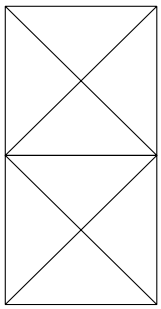


Cell Name: R_WoodPost10
Descrip: 10" Wood Post - Plan

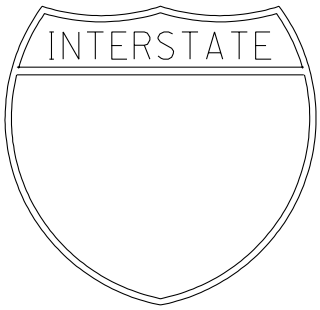


A2.1.3 Cell Library: Bridge.cel (continued)

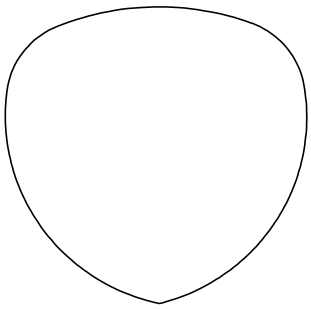
Cell Name: R_WoodPost8
Descrip: 8" Wood Post - Plan



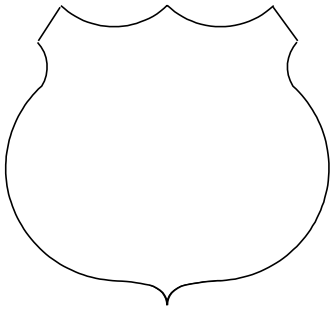
Cell Name: SHIELD_Interstate
Descrip: Interstate Highwat Sign



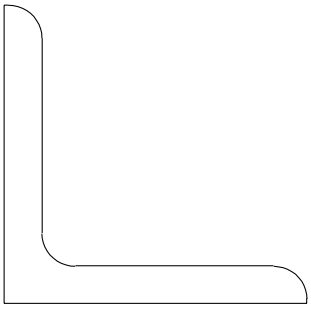
Cell Name: SHIELD_State
Descrip: Oregon Highway Sign



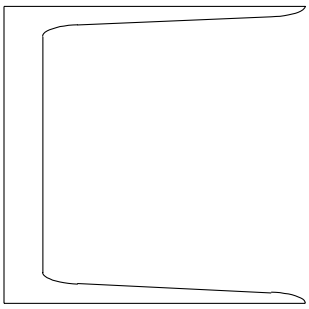
Cell Name: SHIELD_US
Descrip: US Highway Sign



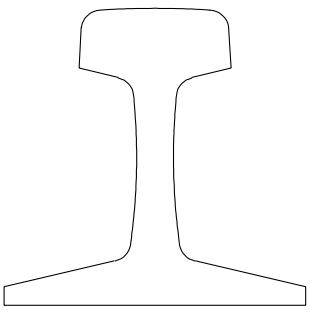
Cell Name: S_Angle
Descrip: Structural Steel Angle - Section



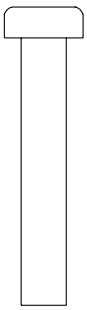
Cell Name: S_Channel
Descrip: Structural Steel Channel - Section



Cell Name: S_Railroad
Descrip: Railroad Rail - Section

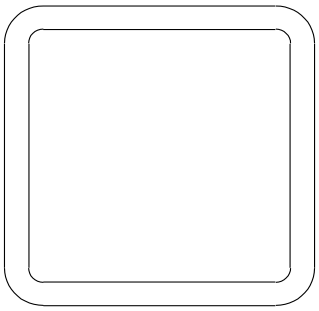


Cell Name: S_Stud
Descrip: Welded Shear Stud - Elevation

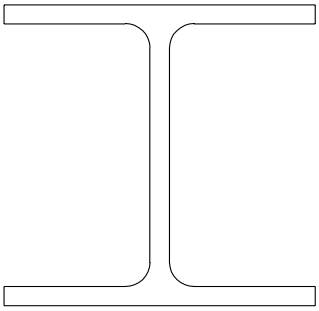


A2.1.3 Cell Library: Bridge.cel (continued)

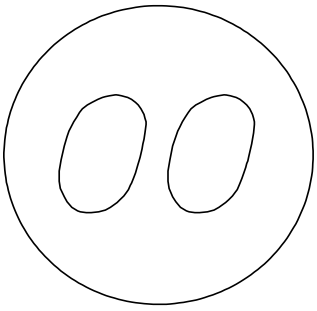
Cell Name: S_Tube
Descrip: Structural Steel Tube - Section



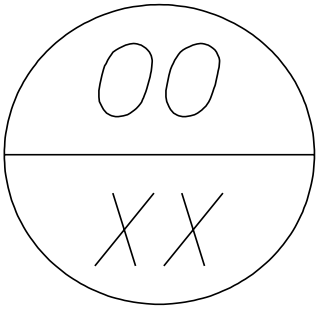
Cell Name: S_WideFlange
Descrip: Structural Steel Wide Flange - Section



Cell Name: T_BubbleNote1
Descrip: One Number Bubble Note

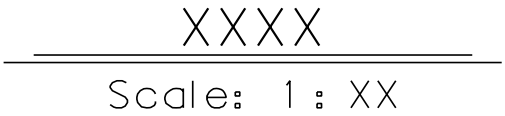


Cell Name: T_BubbleNote2
Descrip: Two Number Bubble Note

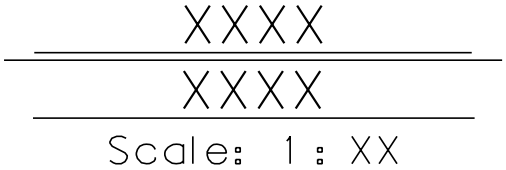


Cell Name: T_DetailRef
Descrip: Detail Reference Notes for Deck Plan

Cell Name: T_DetailTitle1
Descrip: Title pf Detail - 1 line



Cell Name: T_DetailTitle2
Descrip: Title of Detail - 2 Lines



Cell Name: T_Disclaimer
Descrip: Disclaimer Note

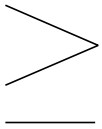
THIS DRAWING IS AN UNSTAMPED AND UNSIGNED COPY PROVIDED IN ELECTRONIC FORMAT. THE DRAWING DETAILS MAY NOT BE DRAWN TO SCALE AND MAY NOT REFLECT THE MOST CURRENT INFORMATION. THE CURRENT ORIGINAL STAMPED AND SIGNED DRAWING IS ON FILE WITH THE OREGON DEPARTMENT OF TRANSPORTATION.

A2.1.3 Cell Library: Bridge.cel (continued)

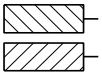
Cell Name: T_Expire
Descrip: Registration Seal Expiration Date

EXPIRES : 12-31-

Cell Name: T_GreaterorEqual
Descrip: Greater than or Equal



Cell Name: T_PayLimits
Descrip:
Structure Excavation and Backfill Pay Limits



Pay Limits of Structure Excavation
Pay Limits of Granular Structure Backfill

Cell Name: T_Review
Descrip: Review Stamp for Plans

REVIEW PLANS
DD-MMM-YYYY
DO NOT SCALE
DO NOT USE FOR CONSTRUCTION

Cell Name: T_SpliceChart
Descrip: Bar Splice Length Chart - With Epoxy

Bar Size		#3	#4	#5	#6	#7	#8	#9	#10	#11	#14	#18
Splice Length	Uncoated	1'-0"	1'-4"	1'-8"	2'-0"	2'-8"	3'-6"	4'-4"	5'-7"	6'-9"	Not Permitted	
	Epoxy Coated	1'-5"	1'-10"	2'-4"	2'-10"	3'-9"	4'-11"	6'-1"	7'-10"	9'-6"	Not Permitted	

A2.2.2 Linework

Level Name	Existing Level Description	Color	Linestyle	Weight
E_BR_ALL_Patterns	All existing patterns used on bridge drawings	0	1	0
E_BR_SUB_General	Existing bridge substructure features	0	1	0
E_BR_SUB_Tx	Existing bridge substructure text	4	0	2
E_BR_SUPER_General	Existing bridge superstructure features	0	1	0
E_BR_SUPER_Tx	Existing bridge superstructure text	4	0	2
	Proposed Level Description	**Color**	**Linestyle**	**Weight**
P_BR_ALL_Patterns	All Patterns, Concrete, steel, wood, etc.	0	0	0
P_BR_ALL_Tx	General Notes, Construction Notes, Staging Notes, etc.	4	0	2
P_BR_ALL_Rebar	All Reinforcing steel	3	0	1
P_BR_ALL_TempBr	All lines and text that make up a temporary structure	8	0	1
P_BR_ALL_General	General (If you don't know where else to put it.	0	0	0
P_BR_SUB_Footing	Footing object and hidden lines	5	0	3
P_BR_SUB_FootingCL	Footing Centerlines	5	7	1
P_BR_SUB_FootingTx	Footing Text	21	0	2
P_BR_SUB_Wall	Retaining or Wing Wall (part of bridge) object and hidden lines	6	0	3
P_BR_SUB_WallCL	Retaining or Wing Wall (part of bridge) Centerline	6	7	0
P_BR_SUB_WallTx	Retaining or Wing Wall Text	22	0	2
P_BR_SUB_Bent	Bent Object and Hidden Lines	7	0	3
P_BR_SUB_BentCL	Bent Centerline	7	7	2
P_BR_SUB_BentTx	Bent Text	23	0	2
P_BR_SUPER_Beam	Beam Object and Hidden Lines	4	0	3
P_BR_SUPER_BeamCL	Beam Centerline	4	7	0
P_BR_SUPER_BeamTx	Beam Text	20	0	2
P_BR_SUPER_Deck	Deck Object and Hidden Lines	1	0	3
P_BR_SUPER_DeckCL	Deck Centerline	1	7	2
P_BR_SUPER_DeckTx	Deck Text	17	0	2
P_BR_SUPER_Rail	Rail Object and Hidden Lines	2	0	3
P_BR_SUPER_RailCL	Rail Centerline	2	7	0
P_BR_SUPER_RailTx	Rail Text	18	0	2

A2.2.2 LINEWORK - (continued)

Level Name	General Information (Not a catch-all)	Color	Linestyle	Weight
P_BR_SUB_General	General Substructure	0	0	0
P_BR_SUPER_General	General Superstructure	0	0	0

	Titleblock Information	Color	Linestyle	Weight
P_BR_PLANS_TitleblockTx	Plan sheet: title block (Bridge unit text)	4	0	2
P_BR_PLANS_Detail	Plan sheet: Bridge details	4	0	2
P_BR_PLANS_DetailTx	Plan sheet: Bridge detail text	4	0	2
P_BR_PLANS_NotesTx	Plan sheet: Bridge construction notes	4	0	2
P_BR_PLANS_General	General	0	0	0

A2.2.2 Line Work (continued)

SYMBOLS FOR MATERIALS IN BRIDGE SECTION

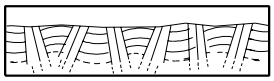
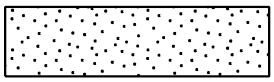
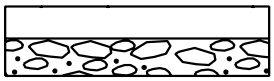
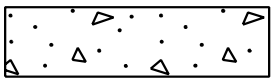
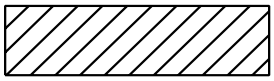
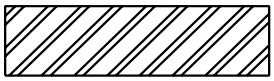
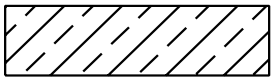
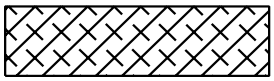
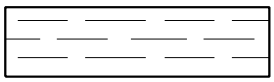
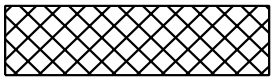
Linear Pattern Name		Material	Area Pattern Name
P_L_Ground		Earth	P_A_Ground
P_L_Rock		Rock	
P_L_Sand		Sand	P_A_Sand
P_L_Gravel		Gravel	P_A_Gravel
_____		Concrete	P_A_Concrete
_____		Masonry	P_A_Hatch
_____		Structural Steel	P_A_Steel
_____		Bronze, Brass or Copper	P_A_Bronze
_____		Aluminum	P_A_Aluminum
_____		Water	P_A_Water
_____		Joint Filler or AC Wearing Surface	P_A_Xhatch

Figure A2.2.2A

A2.2.2 Line Work (continued)

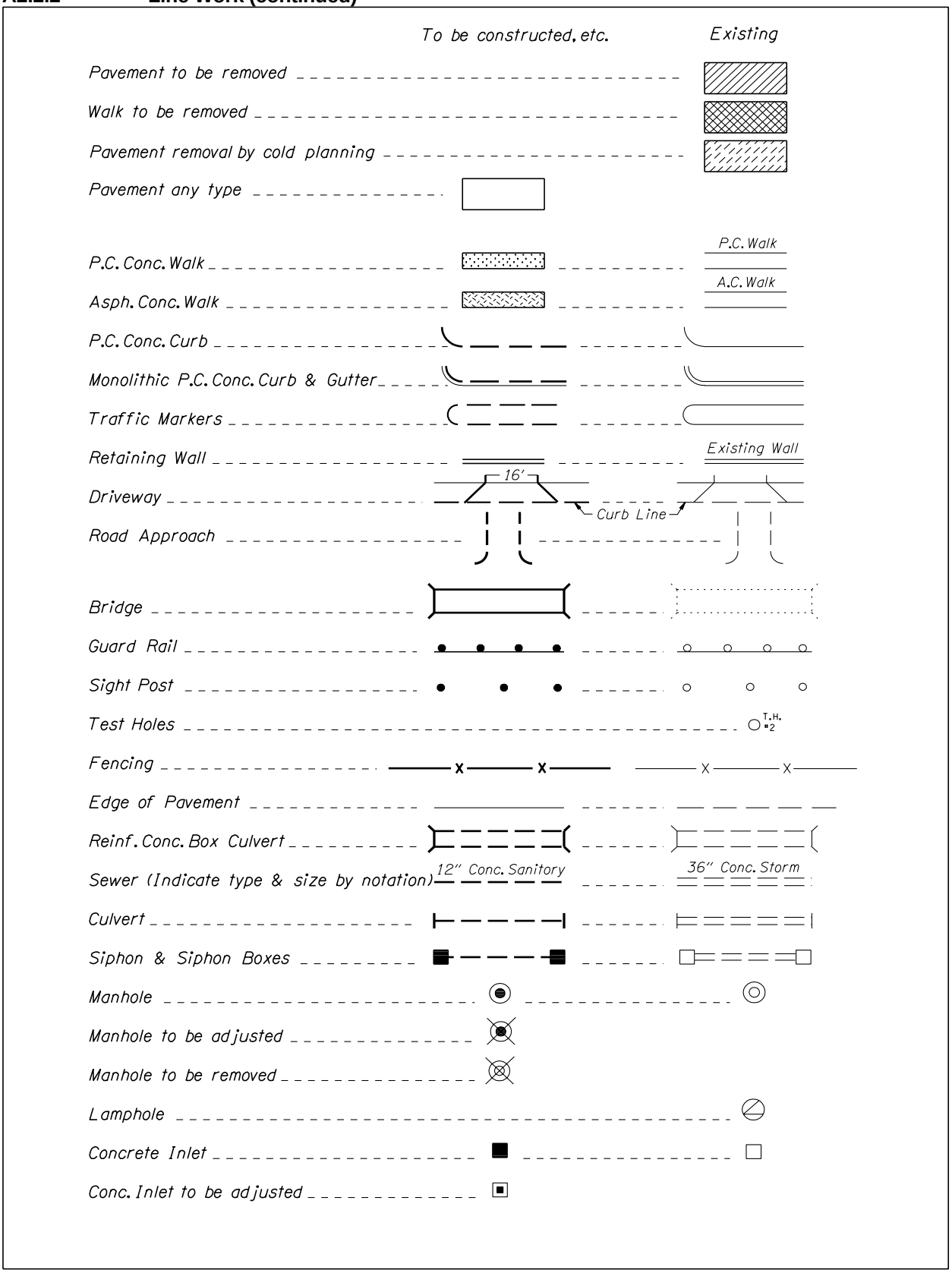


Figure A2.2.2B

A2.2.2 Line Work (continued)

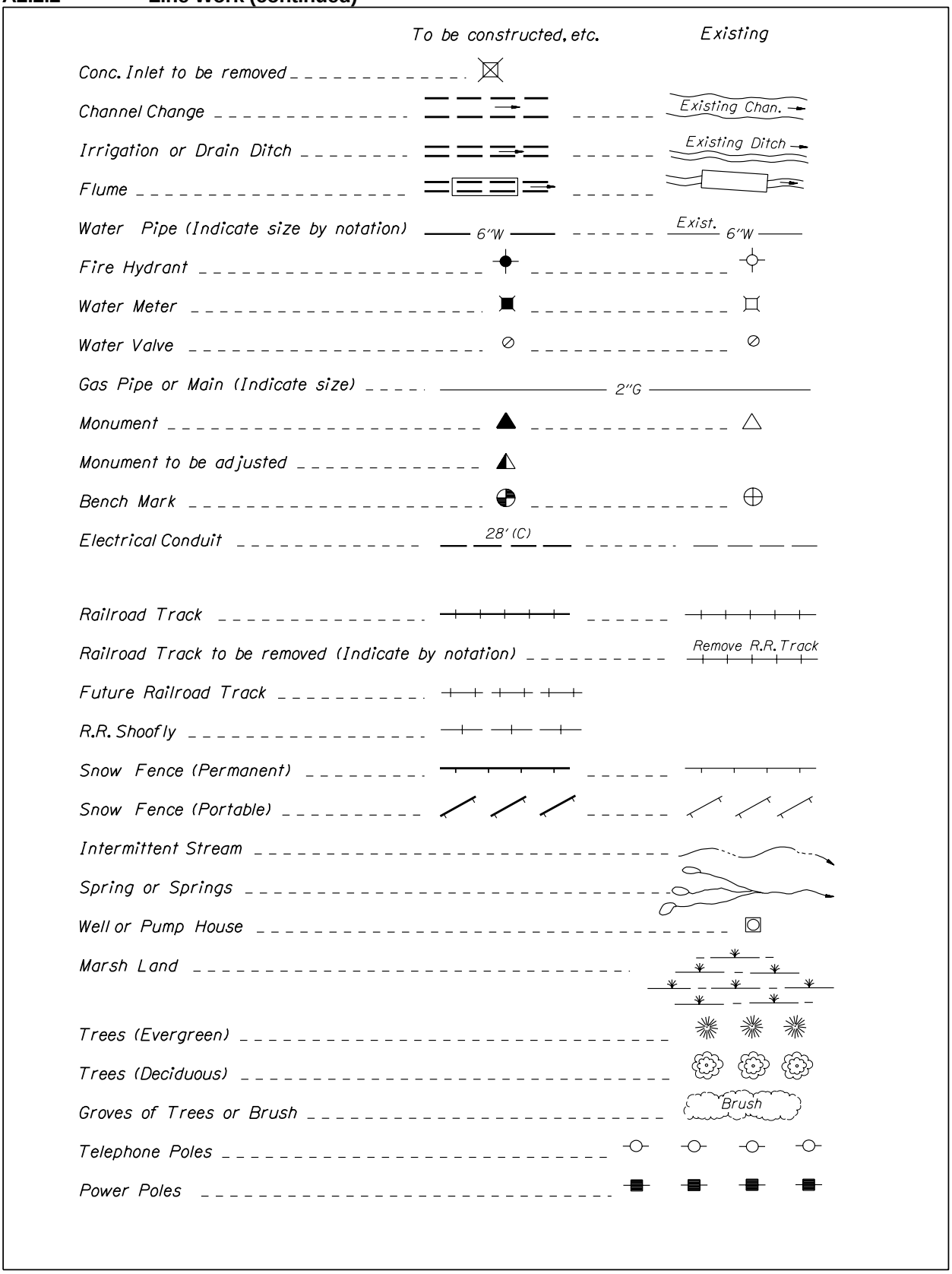
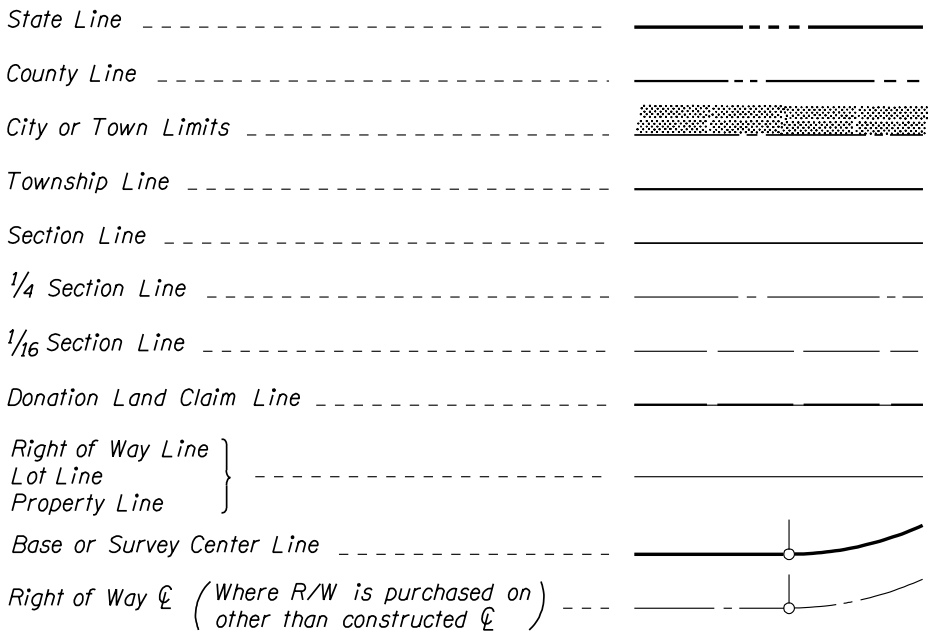


Figure A2.2.2C

A2.2.2 Line Work (continued)



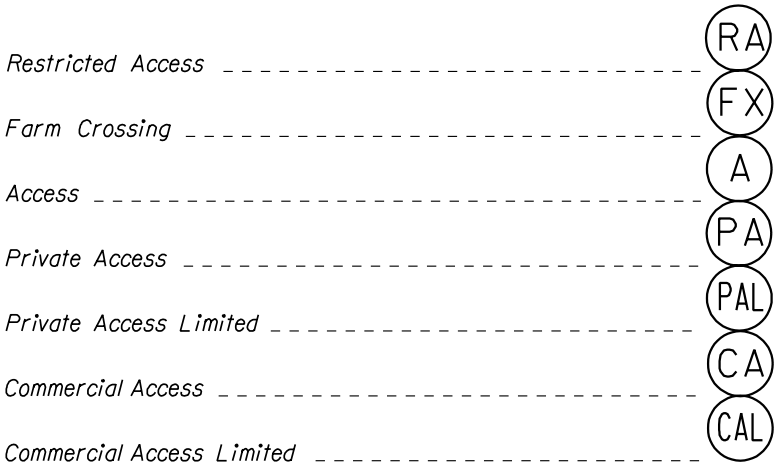


Figure A2.2.2D

A2.3.1 Directory Setup

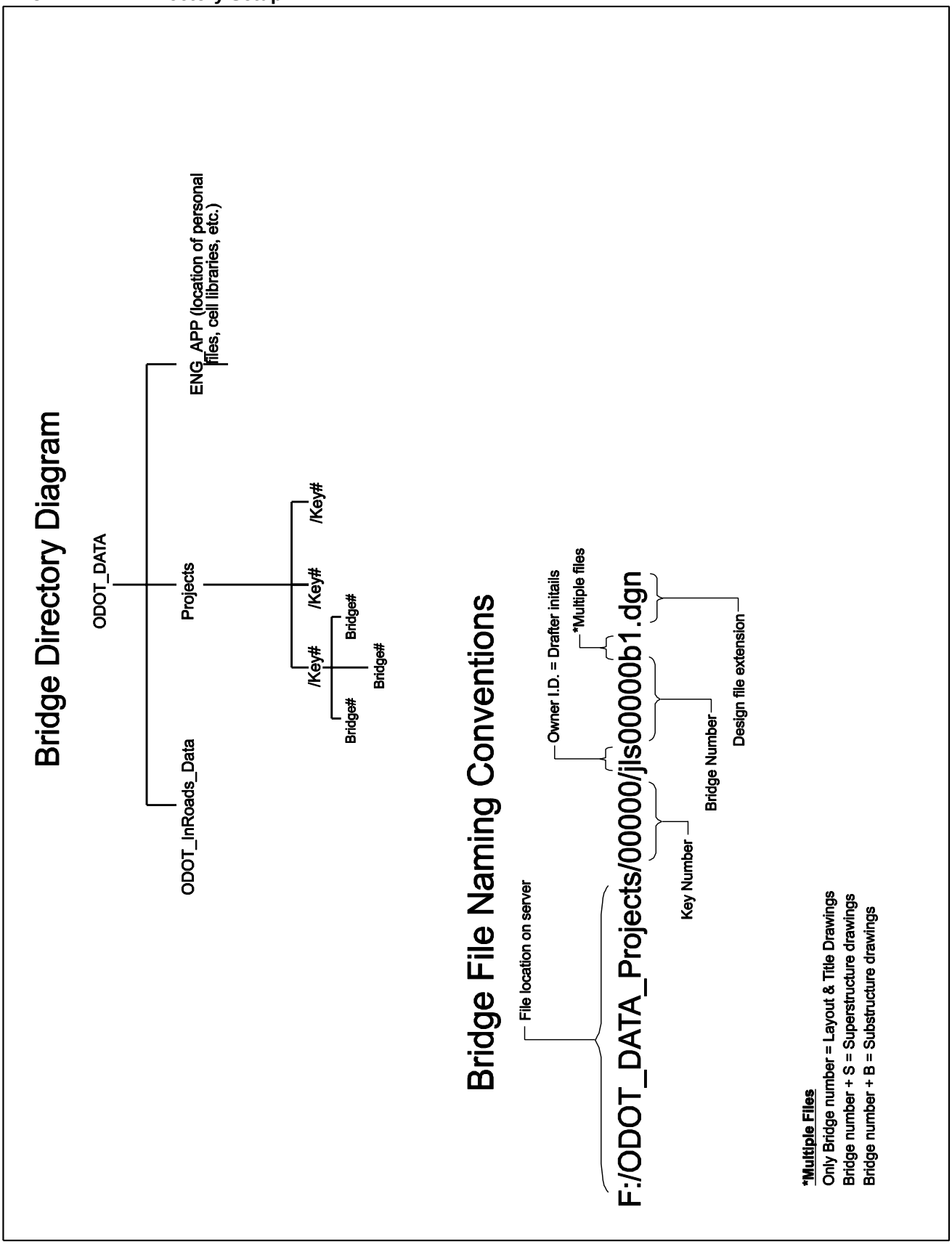


Figure A2.3.1A

A2.4 Drawing Borders

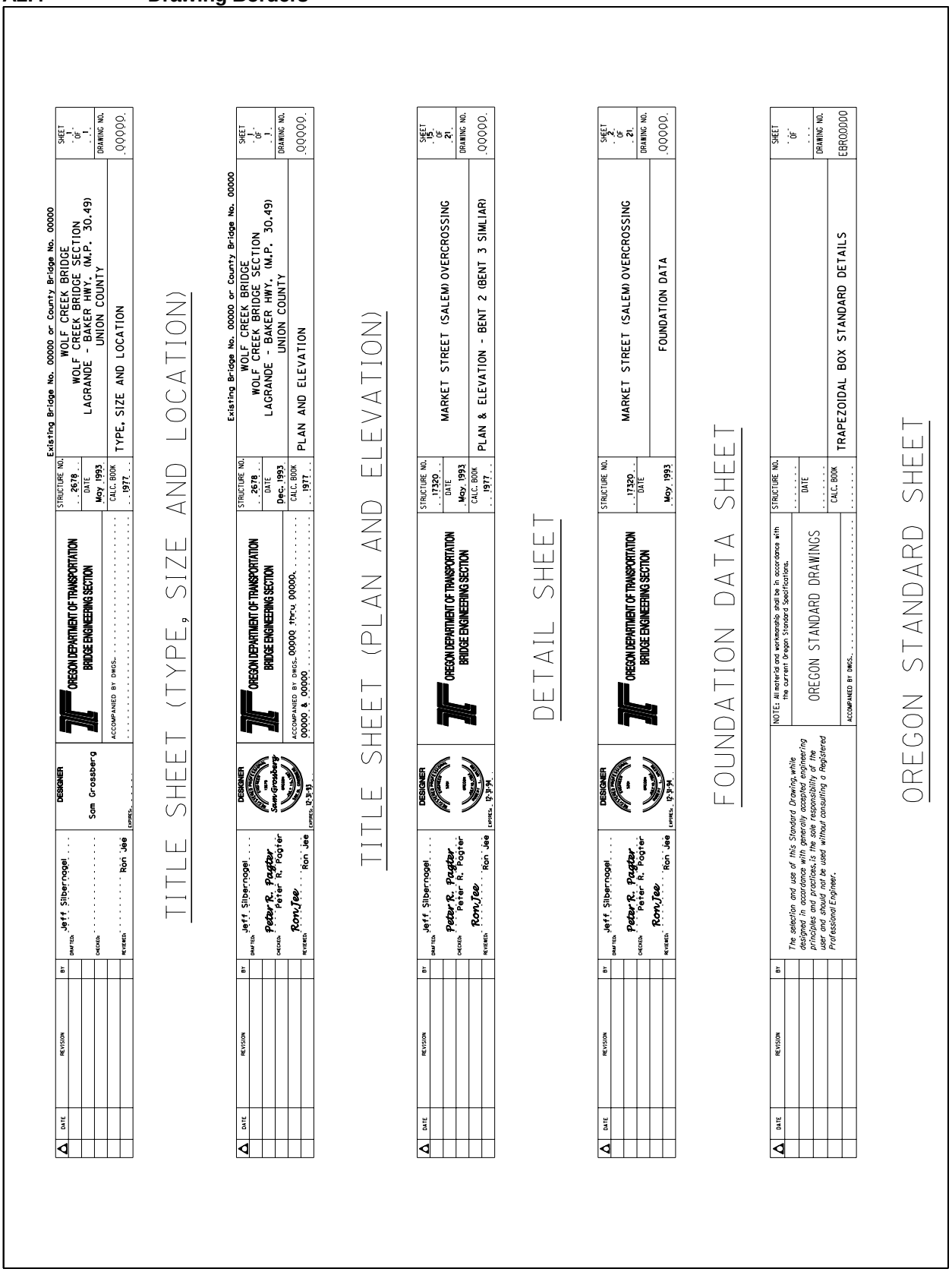


Figure A2.4A

A2.7.1 Deck Plan

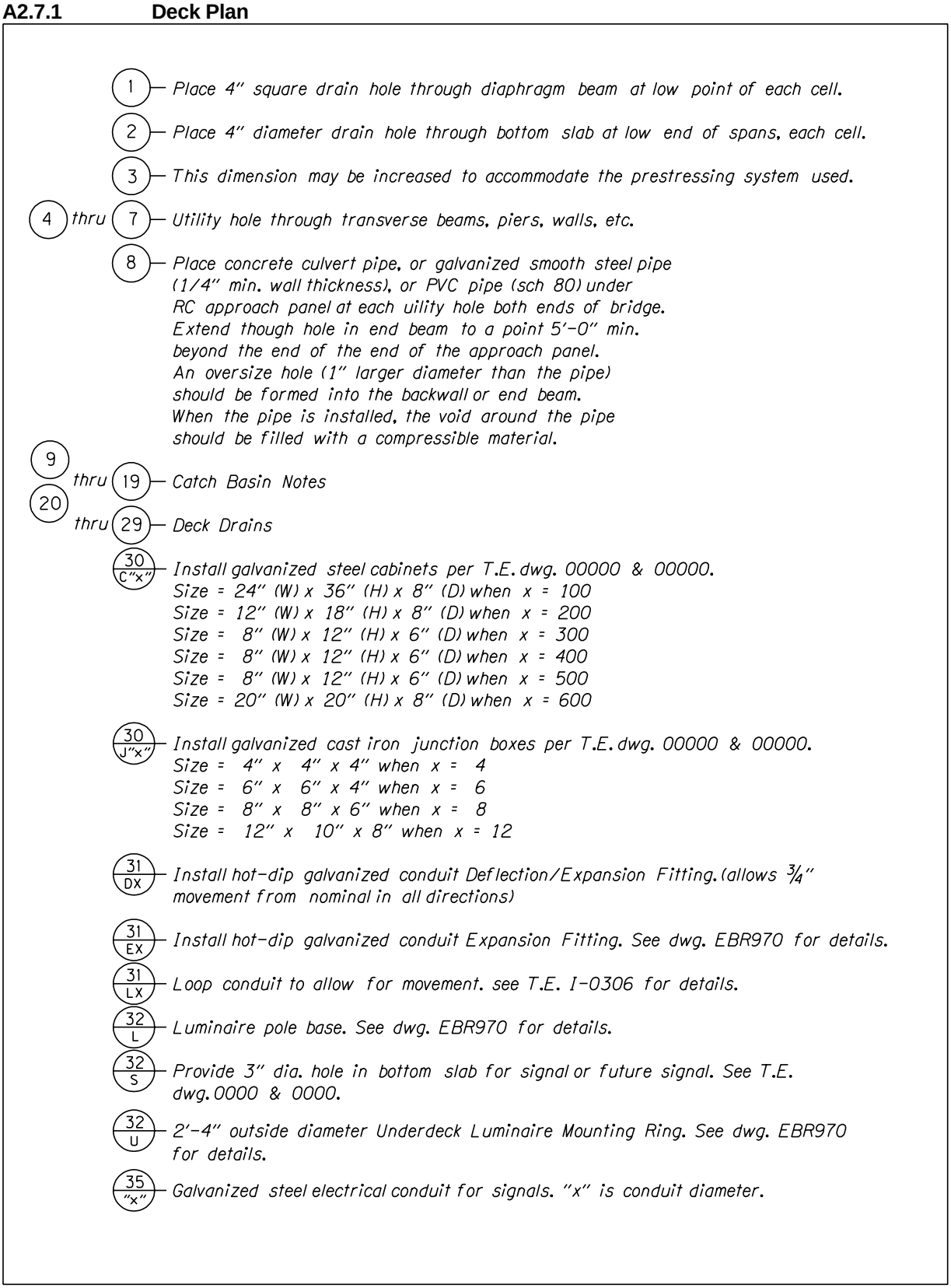


Figure A2.7.1A

A2.7.1 Deck Plan (continued)

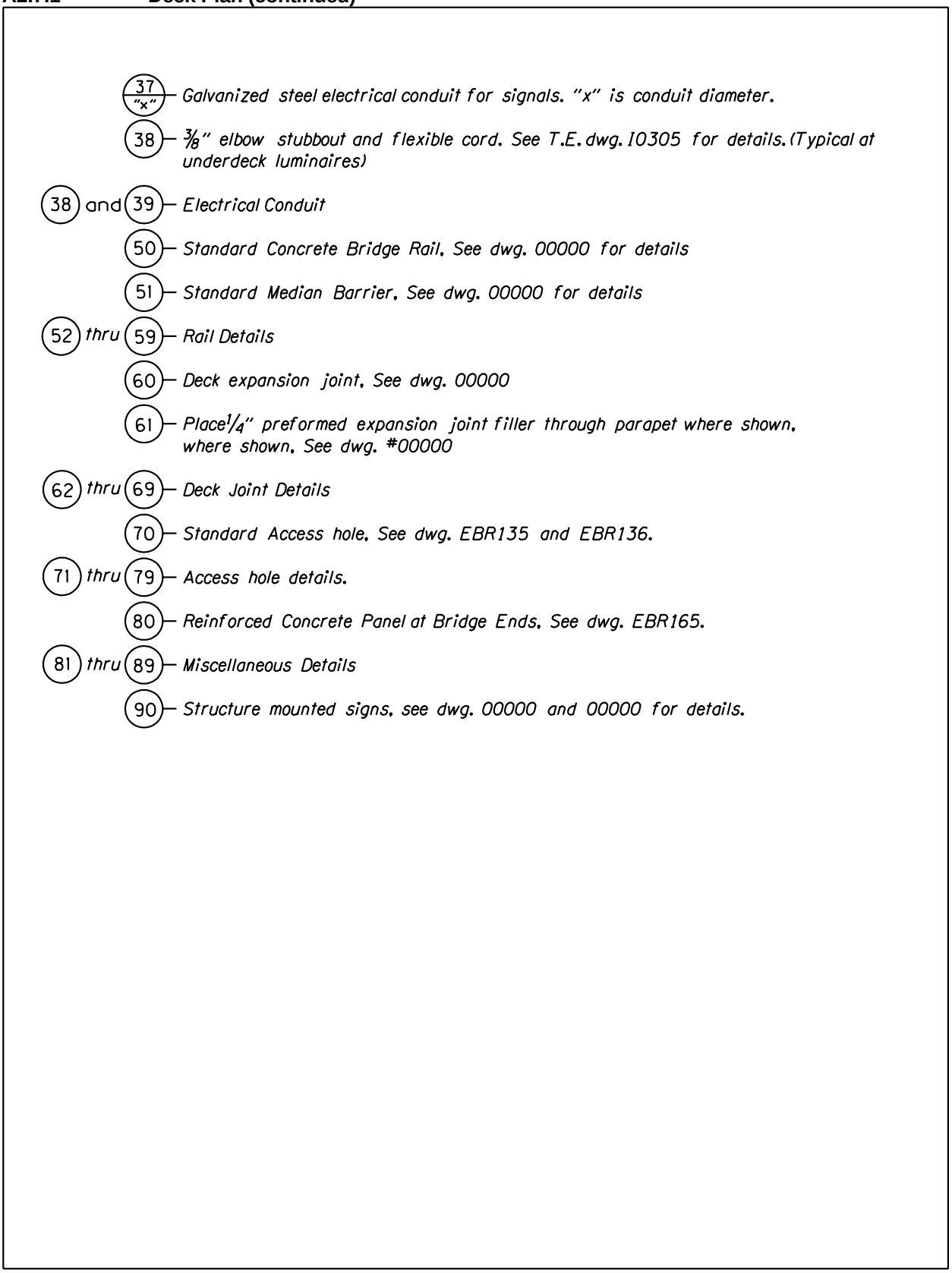


Figure A2.7.1B

A2.7.3 Plan and Elevation

[Note: The following is only a guide for General Notes. Omit those sections, items and terms in parenthesis that are not applicable, except retain the parenthetical references to ASTM equivalents to AASHTO Specifications.]

General Notes:

Provide all materials and perform all work according to the 2002 Oregon Standard Specifications for Construction.

Bridge(s) is(are) designed with an allowance of (25psf for present wearing surface) (and) (25psf, 50psf) for future wearing surface and all of the following Live Loads according to the current AASHTO LRFD Bridge Design Specifications:

Service and Strength-1 Limit States:

- HL-93: Design truck (or trucks per LRFD 3.6.1.3) or the design tandems and the design lane load.
- ODOT Type CTP-3 Permit truck (or trucks per LRFD 3.6.1.3) and the design lane load.

Strength-2 Limit State:

- ODOT Type STP-5A Permit truck (or trucks per LRFD 3.6.1.3).
- ODOT Type STP-5C Permit truck
- ODOT Type STP-SL Permit truck

[New Seismic Designs ----- Multi-Span Bridges]:
Seismic design is by single-mode (multi-mode) analysis in accordance with the "AASHTO LRFD Bridge Design Specifications" as modified by the "ODOT Bridge Design & Drafting Manual". The site peak bedrock acceleration coefficients (A) for the 500 year (serviceable) and 1000 year (no collapse) return periods are ___g and ___g respectively and the assumed site coefficient (S) is ____. The Response Modification factors used are: R=___ for column moments, R= 0.8 for abutment connections, and R= 1.0 for other components.

[New Seismic Designs -----Single-Span Bridges]:
Seismic design is in accordance with the "AASHTO LRFD Bridge Design Specifications" as modified by the "ODOT Bridge Design & Drafting Manual" for 500- and 1000-year criteria. The site peak bedrock acceleration coefficients (A) for the 500 year (serviceable) and 1000 year (no collapse) return periods are ___g and ___g respectively and the assumed site coefficient (S) is ___.

[Widenings which do not carry the existing structure]:
Seismic design for widening is by single-mode (multi-mode) analysis, with Response Modification Factors, in accordance with the "AASHTO LRFD Bridge Design Specifications" as modified by the "ODOT Bridge Design & Drafting Manual". Seismic design is based on __ ft of superstructure width and is not designed to carry the seismic load of the existing structure. The site peak bedrock acceleration coefficients (A) for the 500 year (serviceable) and 1000 year (no collapse) return periods are ___g and ___g respectively and the assumed site coefficient (S) is __.

General Notes: - (continued)

[Widenings which do carry the existing structure]:
Seismic design for widening is by single-mode (multi-mode) analysis, with Response Modification Factors, in accordance with the “AASHTO LRFD Bridge Design Specifications" as modified by the “ODOT Bridge Design & Drafting Manual”. The widened structure is designed to resist the full seismic load including the existing structure. The site bedrock acceleration coefficients (A) for the 500 year (serviceable) and 1000 year (no collapse) return periods are ___g and ___g respectively and the assumed site coefficient (S) is __.

[Phase 1 Seismic Retrofit Designs - select appropriate sections:]

Seismic retrofit design to prevent superstructure pull-off is based on a site bedrock acceleration coefficient (A) of ____g and an assumed site coefficient (S) of ____.

[Simple Span Support Connections:]
Longitudinal design forces:
Force to prevent pull-off by single-mode analysis, without substructure stiffness considered, with a maximum response not greater than 2.5 x A.

Transverse design forces:
Force equal to 2.5 x A x supported dead load.

[Continuous Span Series Support Connections:]
Longitudinal design forces:
"Plastic hinging" of columns and forces to prevent pull-off by single-mode analysis, considering substructure stiffness with column capacity limitation (strength), maximum response not greater than 2.5 x A.

Transverse design forces:
"Plastic hinging" of column(s) (and x-beam frame).

[In-Span Hinges:]
Longitudinal design forces:
"Plastic hinging" of columns and forces to prevent pull-off by single-mode analysis, considering substructure stiffness with column capacity limitation (strength), maximum response not greater than 2.5 x A.

Transverse design forces:
Force equal to 2.5 x A x supported dead load.

Cable for seismic restraint devices will be furnished by the Department. See Section 00160.30 of the Special Provisions.

General Notes: - (continued)

( ) indicates (Options), [ ] indicates [Instructions]

All Bent(s), Provide _____ [insert pile type & grade of steel*] piling (with reinforced tips) driven (open-ended or closed-ended) to an ultimate capacity of _____ kips per pile.

* *example* ==> Pipe Pile ==> 12-3/4 x 0.375, ASTM A252 (Grade 2)(Grade 3)

H-Pile ==> HP 10 x 42, ASTM (A36) (A572)

Pile tip elevation for minimum pile penetration at (All) Bent(s) (___) (is elevation _____ feet) (according to the Pile Penetration Table).

[Use one of the following as directed by the Foundation Designer]

Drive (Bent ___), (All) piling to the specified ultimate capacity using driving criteria developed from a Wave Equation Analysis.

Drive(Bent ___), (All) piling to the specified ultimate capacity using driving criteria developed from the ODOT Gates Equation.

Determine (Pile capacities from the results of Capwap Analysis and/or Dynamic Pile Load Tests as specified in the Special Provisions.

(If applicable:)

Support all falsework on driven piling.

NOTE: If project plans have a separate footing plan sheet, place all foundation design notes on the footing plan sheet and reference them in the "General Notes"; "See Footing Plan for foundation design notes."

Provide spiral column reinforcement according to ASTM Specification A706, AASHTO Specifications M31 (ASTM A615) Grade 60, AASHTO M225 (ASTM A496), or AASHTO M32 (ASTM A82).

Provide all (other) reinforcing steel according to ASTM Specification A706, or AASHTO M31 (ASTM A615) Grade 60. (Provide Field bent stirrups according to ASTM Specification A706.) Use the following splice lengths (unless shown otherwise):

Reinforcing Splice Lengths (Class B) Grade 60										
Bar Size	#3	#4	#5	#6	#7	#8	#9	#10	#11	#14 & #18
Uncoated	1’-0”	1’-4”	1’-8”	2’-0”	2’-8”	3’-6”	4’-4”	5’-7”	6’-9”	Not permitted
Coated	1’-5”	1’-10”	2’-4”	2’-10”	3’-9”	4’-11”	6’-1”	7’-10”	9’-6”	Not permitted

Splice reinforcing steel at alternate bars, staggered at least one splice length or as far as possible, unless shown otherwise.

General Notes: - (continued)

Support the bottom mat reinforcing steel from the forms with precast mortar blocks at 24" maximum centers each way. Support the top mat of reinforcing steel from the bottom mat of reinforcing steel with reinforcing bar supports by Dayton Superior Co. (SBU, BBU, or CHCU) or approved equal at 24" maximum centers.

Use (Stainless steel)(Epoxy coated)(uncoated) reinforcing steel in the deck (and bridge end panel). This includes top and bottom longitudinal bars, (and) top and bottom transverse bars, (and all bars extending into the (sidewalk)(curb)(parapet)).

Epoxy coat reinforcing steel, except prestressing steel, in precast beams (slabs, boxes).

Epoxy coat reinforcing steel in the upper portion of the prestressed (slab) [or] (box). This includes top longitudinal bars, top transverse stirrup ties and bars extending from the prestressed (slab) [or] (box) into the parapets or curbs.

Place bars 2" clear of the nearest face of concrete (unless shown otherwise). The top bends of stirrups extending from beam stems into the top slab may be shop or field bent (unless shown otherwise). The top bends of stirrups extending from prestressed precast units may be shop or field bent (unless shown otherwise).

Do not fabricate reinforcing steel for columns (and walls) until final footing elevations have been determined in the field.

Provide Class ____ - ___ concrete in post-tensioned box girder superstructure (prestressed-precast units) and as shown on detail plans. See dwg. _____.

Provide Class **HPC**4350 – 3/4 concrete in deck (except in prestressed or post-tensioned sections).

Provide Class ____ - 1 1/2, 1 or 3/4 concrete in (columns, footings, etc.).

Provide Class 3600 (Seal Concrete) - 1 1/2, 1 or 3/4 concrete in seals.

Provide Class 4350 - 1 1/2, 1 or 3/4 concrete in reinforced concrete end panels.

Provide Class 3600 - 1 1/2, 1 or 3/4 concrete for All (other) concrete.

Provide Class 3600 - 1 1/2, 1, 3/4 or 3/8 concrete in walls with form liners.

Provide Class _____ - _____ concrete in precast prestressed (beams, boxes, slabs) according to detail plans. See dwg. _____. The minimum strength of concrete at transfer of prestress is ____ psi.

Provide prestressing steel according to detail plans.

General Notes: - (continued)

Provide structural steel according to (AASHTO) [or] (ASTM) Specifications in accordance with detail plans.

("Galvanize-Control Silicon" – provided silicon content of the base metal in either of the ranges 0 to 0.04 percent, or 0.15 to 0.25 percent.)

Provide (7/8" diameter) (Type 3) high-strength fasteners at structural connections according to AASHTO Specification M164 (ASTM Specification A325) (unless shown otherwise).

Provide (lock-pin and collar) (black) (coated) (mechanically galvanized) (hot dip galvanized), high-strength fasteners (including washers).

Tighten high-strength fasteners using the (lock-pin and collar fastener tightening) (direct tension indicator tightening) (tension control fasteners tightening) (turn-of-nut tightening) method(s).

See the Special Provisions for detailed coating and tightening requirements.

Note: Consult with the Steel Design Standards and Practice Engineer to review structural steel and painting General Notes.

General Notes: - (continued)

Provide Douglas Fir (non-laminated) timber conforming to _____ Grade [insert lumber grade] according to WCLIB rules.

Incise and treat sawn members with _____ [insert appropriate treatment from Section 02190] to a minimum retention level of _____ pcf [insert appropriate treatment level] in accordance with AWPA Specification C-2.

Provide all glued laminated timber members according to the requirements of the current American Institute of Timber Construction (AITC) Timber Construction Standards.

Allowable stresses in glued laminated members are per the latest version of AITC Specification 117.

Provide [insert wood species] glued laminated stringers according to combination symbol _____. [insert combination symbol]

Provide [insert wood species] glued laminated deck panels and rail posts according to combination symbol 2. [insert combination symbol]

Mark glued laminated stringers "Top" on the top at both ends.

Incise and treat glued laminated timber members with _____ [insert appropriate material from Section 02190] to a minimum retention level of _____ pcf. [insert appropriate level of retention] Treat laminated members after laminating in accordance with AWPA Specification C-28.

Perform cutting and drilling of timber members before preservative treatment. No field cutting of treated material will be permitted unless absolutely necessary. In the event of injury, drilling or cutting of treated material, field treat according to AWPA Specification M-4.

Provide structural steel, dowels (etc.) according to ASTM Specification _____. [insert Specification number] Provide all bolts, lag nuts and drift pins shall conform to AASHTO Specification M314, Grade 35 (ASTM A307) and/or AASHTO M314 Grade 105 (ASTM A449) as shown on the detail plans. Hot-dip galvanize structural steel, dowels, miscellaneous metal, bolts, lag bolts and drift pins after fabrication.