Chapter 11 Detailing Practice Contents

11.1 Detailing Practice

The following is to provide basic information on drafting and the fundamentals of Bridge and Structures Office drafting practices.

11.1.1 Standard Office Practices

A. Purpose

- The purpose of these standards is to enable the Bridge and Structures Office to produce **consistent** and **effective** plan sheets that will have uniform appearance and information.
- Designers and detailers are responsible for ensuring that these criteria are implemented.
- The Bridge Design Engineer must approve deviation from these standards.

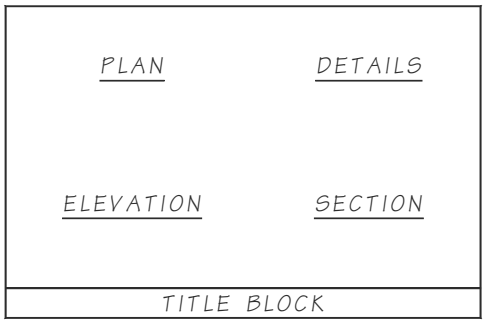
B. Planning

- The designer and the structural detailer together coordinate the **scope** of the detailing work involved in each project. Time should be allotted for checking plans for accuracy and consistency with office practices.
- Similar bridge plans and details should be reviewed and kept as **examples** for maintaining consistent detailing practices. These examples should not be older than three years.

C. Drawing Orientation and Layout Control

- Standard bridge sheet format is 34 inches × 22 inches with the bottom 2 inches used for title block and related information.
- Contract plans are printed, sealed, signed and submitted, half size, on 11″ × 17″ paper.
- Drawings shall be carefully organized so the intent of the drawing is easily understood.
  - **North arrow** shall be placed on layouts and footing/foundation layouts.
  - **Related details** shall be grouped together in an orderly arrangement: lined up horizontally and vertically and drawn to the same scale.
  - Do not crowd the drawing with details.
  - The following is a standard sheet configuration when plan, elevation, and sectional views are required.
  - The Plan view layout of structures should be oriented from left to right in the direction of increasing state route mileposts. For retaining walls, see the second bullet under subsection I. For layouts of existing bridges undergoing widening, expansion joint or thrie beam retrofit, or other structural modification, this orientation requirement may result in the bridge layout being opposite from what is shown in the original plans. In such cases, the designer and detailer should review the Bridge Preservation

Office inspection records for the bridge, and the bridge layout orientation and pier identification should be laid out to be consistent with the Bridge Preservation Office inspection records.



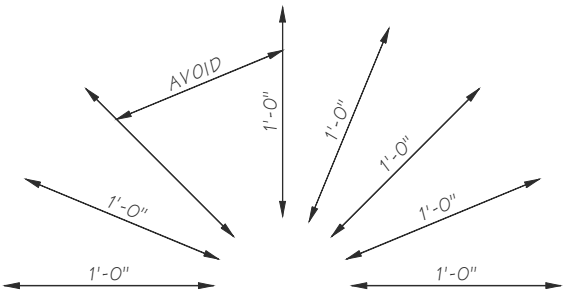
D. Lettering

1. General

- **Lettering** shall be upper case only, slanted at approximately 68 degrees. General text is to be approximately ⅛″ high.
- Text shall be **oriented** so as to be read from the **bottom** or **right edge** of the sheet.
- **Detail titles** shall be a similar font as general text, about twice as high and of a heavier weight. Underline all titles with a single line having the same weight as the lettering.

2. Dimensioning

- A dimension shall be shown **once** on a drawing. Duplication and unnecessary dimensions should be avoided.
- All dimension figures shall be placed above the dimension line, so that they may be read from the bottom or the right edge of the sheet, as shown in the following detail:

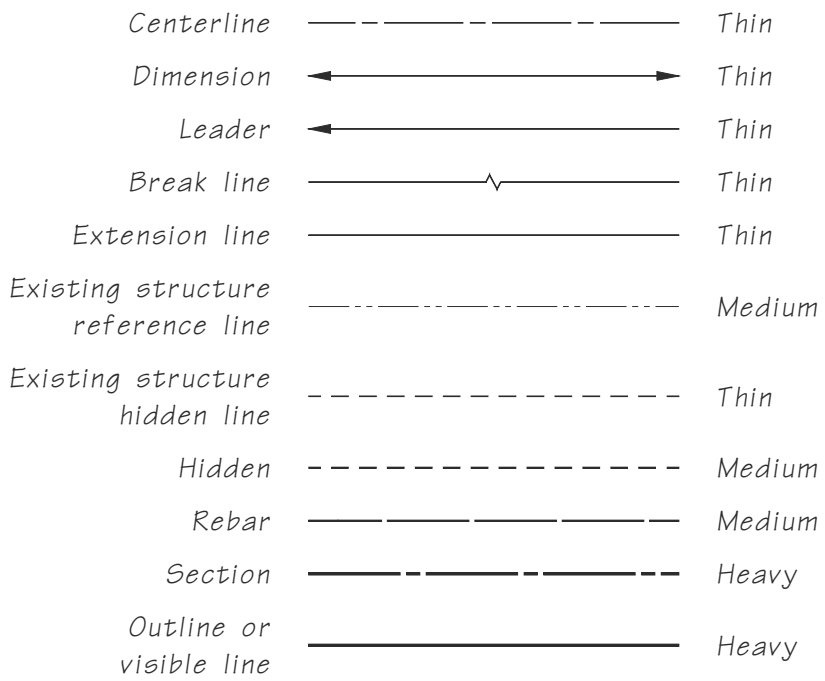


AVOID DIMENSION LINES
INCLINED AS SHOWN ABOVE.

- When details or structural elements are complex, utilize two drawings, one for dimensions and the other for reinforcing bar details.
- Dimensions 12 inches or more shall be given in feet and inches unless the item dimensioned is conventionally designated in inches (for example, 16″ pipe).
- Dimensions that are less than one inch over an even foot, the fraction shall be preceded by a zero (for example, 3′-0¾″).
- Place dimensions outside the view, preferably to the right or below. However, in the interest of clarity and simplicity it may be necessary to place them otherwise. Examples of dimensioning placement are shown on Appendix 11.1-A1.

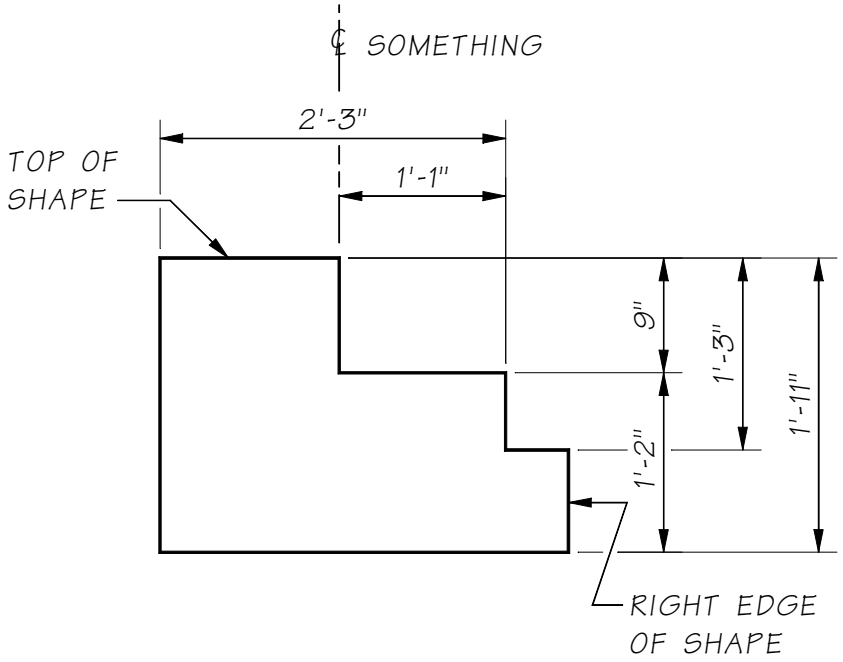
E. Line Work

- 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 11″ × 17″ or one-half the size of the original drawing.
- The line style used for a particular structural outline, centerline, etc., shall be kept consistent wherever that line is shown within a set of bridge plans.
- Line work shall have appropriate gradations of width to give line contrast as shown below. Care shall be taken that the thin lines are dense enough to show clearly when reproduced.



- When drawing structural sections showing reinforcing steel, the **outline** of the sections shall be a **heavier** line weight than the **rebar**.
- The order of **line precedence** (which of a pair of crossing lines is broken) is as follows:

  1. Dimension lines are never broken.
  2. Leader line from a callout.
  3. Extension line.



LINE PRECEDENCE DIAGRAM

THIS DIAGRAM DEMONSTRATES WHICH LINE IS TO BE BROKEN WHEN TWO LINES CROSS.

F. Scale

- Scales are not to be shown in the plans.
- When **selecting a scale**, it should be kept in mind that the drawing will be reduced. Generally, the minimum scale for a section detail with rebar is ⅜″ = 1′. The minimum scale to be used on steel details will be ¾″ = 1′.
- The contract plan sheets are not to be used to take measurements in the field. They will, however, be drawn using **scales that can be found on any standard architectural or engineering scale**.
- Care should be taken that all structural elements are **accurately** drawn to scale.
- Sections and views may be enlarged to show more detail, but the number of different scales used should be kept to a minimum.

G. Graphic Symbols

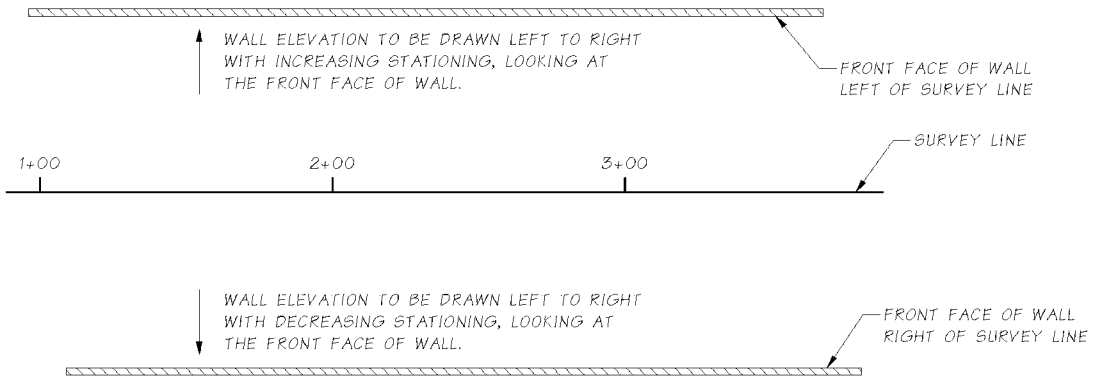
1. Graphic symbols shall be in accordance with the following:
   a. Structural steel shapes: See also AISC *Manual of Steel Construction*.
   b. Welding symbols: See Lincoln Welding Chart.
   c. Symbols for hatching different materials are shown on Appendix 11.1-A2.

H. Structural Sections, Views and Details

- A **section** cuts through the structure, a view is from outside the structure, a **detail** shows a structural element in more detail – usually a larger scale.
- Whenever possible Sections and views shall be taken looking to the **right, ahead on stationing**, or **down**.
- Care shall be taken to ensure that the **orientation** of a detail drawing is identical to that of the plan, elevation, etc., from which it is taken. Where there is a **skew** in the bridge any sections should be taken from **plan** views.
- The default is to be looking ahead on stationing. The only mention of view orientation is if the view is looking back on stationing.
- On plan and elevation drawings where there is insufficient space to show cut sections and details, the section and detail drawing should be on the plan sheet immediately following the plan and elevation drawing unless there are a series of related plans. If it is impractical to show details on a section drawing, a detail sheet should immediately follow the section drawing. In other words, the order of plan sheets should be from general plan to more minute detail.
- A circle divided into upper and lower halves shall identify structural sections, views, and details. Examples are shown in Appendix 11.1-A3.
- Breaks in lines are allowable provided that their intent is clear.

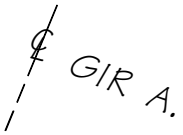
I. Miscellaneous

- **Callout arrows** are to come off either the beginning or end of the sentence. This means the top line of text for arrows coming off the left of the callout or the bottom line of text for arrows pointing right.
- Except for the Layout, **wall elevations** are to show the exposed face regardless of direction of stationing. The Layout sheet stationing will read increasing left to right. The elevation sheets will represent the view in the field as the wall is being built.



Plan

- Do not detail a bridge element in more than one location. If the element is changed there is a danger that only one of the details is updated.
- Centerline callouts shall be normal to the line itself approximately an eighth inch from the end of the line:



J. Revisions

- **Addendums** are made after general distribution and project ad but before the contract is awarded. Changes made to the plan sheets during this time shall be **shaded** or clouded in accordance with the *Plans Preparation Manual* Appendix 5 (note that all table entry revisions shall be shaded). Subsequent addendums are shaded and the shading from previous addendums is removed.
- **Change orders** are made after the contract has been awarded. Changes will be marked with a number inside a circle inside a **triangle**.  Shading for any addendums is removed.
- All addendums and change orders will be noted in the **revision block** at the bottom of the sheet using font 25.

K. Title Block

- The project title is displayed in the contract plan sheet title block. The title consists of Line 1 specifying the highway route number(s), Line 2 and possibly Line 3 specifying the title verbiage. Bridge structures use a fourth line, in a smaller font, to specify the bridge name and number in accordance with the *Bridge List* M 23-09 and BDM Sections 2.3.1.A and 2.3.2.A.
- The exact wording of Lines 1, 2, and 3 of the project title, including line arrangement, abbreviations, and punctuation, is controlled by the project definition as specified by legislative title and the Capital Program Management System (CPMS) database.
- The highway route number(s) in Line 1 shall be consistent with WSDOT naming practice. Interstate routes (5, 82, 90, 182, 205, 405, and 705) shall be specified as I-(number). US routes (2, 12, 97, 97A, 101, 195, 197, 395, and 730) shall be specified as US (number). All other routes shall be specified as SR (number). Projects including two highway routes shall include both route numbers in Line 1, as in "US 2 And I-5". Projects including three or more highway routes shall be specified with the lowest numbered route, followed by "Et Al", as in "SR 14 Et Al".
- The job number block just to the left of the middle of the title block shall display the PS&E Job Number assigned to the project by the Region Plans Office. The PS&E Job Number consists of six characters. The first two characters correspond to the last two digits of the calendar year. The third character corresponds to the letter designation assigned to the specific Region (NWR - A, NCR - B, OR - C, WSF and selected UCO projects - W, SWR - X, SCR - Y, and ER - Z). The final three characters correspond to the three digit number assigned to the specific project by the Region Plans Office.

L. Reinforcement Detailing

- Contract documents shall convey all necessary information for fabrication of reinforcing steel. In accordance with *Standard Specifications* Section 6-02.3(24), reinforcing steel details shown in the bar list shall be verifiable in the plans and other contract documents.
- Reinforcement type and grade is specified in *Standard Specifications* Section 9-07.2 and need not be provided elsewhere in the contract documents unless it differs.
- Size, spacing, orientation and location of reinforcement shall be shown on the plan sheets.
- Reinforcement shall be identified by mark numbers inside a rectangle. Reinforcing bar marks shall be called out at least twice. The reinforcement including the spacing is called out in one view (such as a plan or elevation). The reinforcement without the spacing is called out again in at least one other view taken from a different angle (such as a section).
- Epoxy coating for reinforcement shall be shown in the plans by noting an E inside a triangle.
- The spacing for reinforcement shall be on a dimension line with extension lines. Do not point to a single bar and call out the spacing. Reinforcement spacing callouts shall include a distance. If the distance is an unusual number, give a maximum spacing. Do not use "equal spaces" as in, "23 equal spaces = 18′-9″ " (the steel workers should not have to calculate the spacing). Also, never use the word "about" as in, "23 spaces @ about 10″ = 18′-9″ "(this is open to too much interpretation). Instead these should read, "23 spaces @ 10″ max. = 18′-9″."
- Reinforcement geometry shall be clear in plan details. Congested areas, oddly bent bars, etc. can be clarified with additional views/details/sections or adjacent bending diagrams. In bending diagrams, reinforcement dimensions are given out-to-out. It may be necessary to show edges of reinforcement with two parallel edge lines to clearly show working points and dimensions.
- Reinforcement lengths, angles, etc. need not be called out when they can be determined from structural member sizes, cover requirements, etc. Anchorage, embedment and extension lengths of reinforcement shall be dimensioned in the plans.
- Standard hooks per AASHTO LRFD 5.10.2.1 need not be dimensioned or called out, but shall be drawn with the proper angle (90º, 135º or 180º). Seismic hooks per AASHTO LRFD 5.10.2.2 (used for transverse reinforcement in regions of expected plastic hinges) shall be called out on the plans whenever they are used.
- Splices in reinforcement are required when reinforcement lengths exceed the fabrication lengths in BDM 5.1.2.F. They may also be necessary in other locations such as construction joints, etc. The location, length and stagger of lap splices shall be shown on the plan sheets. Tables of applicable lap splice lengths are acceptable with associated stagger requirements. Type, location and stagger of mechanical and welded splices of reinforcement shall be shown.

- Where concrete cover requirements differ from those given in the standard notes or *Standard Specifications* Section 6-02.3(24)C, they shall be shown in the plans. It shall be clear whether the cover requirement refers to ties and stirrups or the main longitudinal bars.
- Bar list sheets shall be prepared for plan sets including bridges. They shall be included at the end of each bridge plan set. They are not stamped. They are provided in the plans as a convenience for the Contractor and are to be used at their own risk. Despite this warning, Contractors sometimes use the bar list directly to fabricate reinforcement without confirming details from the plans. Designers should therefore strive for accuracy in the bar list. An accurate bar list also serves as a checking mechanism and a way to calculate reinforcement quantities.
- The reinforcing for some structural members such as approach slabs, shafts, piles, barrier, retaining walls, bridge grate inlets, sign structure foundations, precast SIP deck panels and precast girders are not shown in the bar list at the end of the bridge plan set but may include their own bar list on their plan sheets. These components typically have shop plans, include steel reinforcement within their unit costs and/or are constructed by separate sub-contractors.
- Other reinforcement detailing references include ACI 315-99 "Details and Detailing of Concrete Reinforcement", ACI 318-08 "Building Code Requirements for Structural Concrete", and CRSI "Manual of Standard Practice" May 2003.

11.1.2 Bridge Office Standard Drawings and Office Examples

A. General

- The Bridge Office provides standard drawings and example sheets of various common bridge elements.

B. Use of Standards

- The Standard Drawings are to be considered as nothing more than **examples** of items like girders or traffic barriers which are often used and are very similar from job to job.
- They are to be **copied** to a structure project and **modified to fit** the particular aspects of the structure. They are not intended to be included in a contract plan set without close scrutiny for applicability to the job.

C. Changes to Standards

- New standard drawings and revisions to existing drawings shall be approved by the Bridge Design Engineer and shall be made according to the same office practices as contract plan sheets.

11.1.3 Plan Sheets

Plan sheets should be assembled in the **order of construction** and include the items listed below. Phasing or large-scale projects may require more than one sheet to properly detail plan items.

- Layout
- General Notes/Construction Sequence
- Footing/Foundation Layout
- Piles/Shafts
- Abutment
- Intermediate Piers/Bents
- Bearing Details
- Framing Plan
- Typical Section
- Girders/Diaphragms
- Bridge Deck Reinforcement (Plan and transverse section)
- Expansion Joints (if needed)
- Traffic Barrier
- Bridge Approach Slab
- Barlist

A. Layout

- The Layout sheet shall contain, but is not limited to:
  - Plan View with ascending stations from left to right
  - Elevation View shown as an outside view of the bridge and shall be visually aligned with the plan view.
- The original preliminary plan will be copied to create the final layout. Views, data, and notes may be repositioned to improve the final product.
- Items on the preliminary plan, which should **not** appear on the final layout are as follows:
  - Typical roadway sections.
  - Vertical curve, Superelevation and curve data for other than the main line.
  - Other information that was preliminary or that will be found elsewhere in the plans.
- Items not normally found on the preliminary plan, which should be **added**:
  - **Test hole locations** (designated by $^{3}/_{16}$ inch circles, quartered) to plan view.
  - Elevation view of **footings**, **seals**, **piles**, etc. Show elevation at Bottom of footing and, if applicable, the type and size of piling.
  - **General notes** above legend on right hand side, usually in place of the typical section.
  - Title “LAYOUT” in the title block and sheet number in the space provided.
  - Other features, such as lighting, conduit, signs, excavation, riprap, etc. as determined by the designer.
- The preliminary plan checklist in Appendix A, Chapter 2 can be used for reference.

B. General Notes/Construction Sequence

The General notes shall contain the following information:

- Reference to the current edition of the WSDOT *Standard Specifications*
- Reference to the current edition of the AASHTO LRFD design specifications
- Reference to the current AASHTO Seismic design specifications and seismic design category information
- The types of concrete allowed on the project
- Abutment backfill requirements
- Concrete cover requirements
- Concrete foundation seal information
- Pile or shaft information
- Material requirements

C. Footing/Foundation Layout

- An abutment with a **spread footing** has a Footing Layout. An abutment with piles and pile cap has a Foundation Layout.
- The Footing Layout is a plan of the bridge whose details are limited to those needed to **locate the footings**. The intent of the footing layout is to minimize the possibility of error at this initial stage of construction.
- The Foundation Layout is a plan of the bridge whose details are limited to those needed to **locate the shafts or piles**. The intent of the Foundation layout is to minimize the possibility of error at this initial stage of construction.
- Other related information and/or details such as pedestal sizes, and column sizes are considered part of the pier drawing and **should not be included** in the footing layout.
- The Footing Layout should be shown on the layout sheet if space allows. It need not be in the same scale. When the general notes and footing layout cannot be included on the first (layout) sheet, the footing layout should be included on the second sheet.
- Longitudinally, footings should be located using the **survey line** to reference such items as the footing, centerline pier, centerline column, or centerline bearing, etc.
- When **seals** are required, their locations and sizes should be clearly indicated on the footing layout.
- The Wall Foundation Plan for retaining walls is similar to the Footing Plan for bridges except that it also shows dimensions to the front face of wall.
- Appendix 11.1-A4 is an example of a footing layout showing:
  - The basic information needed.
  - The method of detailing from the survey line.

D. Piles/Shafts

E. Abutment

- Bridge elements that have not yet been built will not be shown. For example, the superstructure is not to be shown, dashed or not, on any substructure details.
- Elevation information for seals and piles or shafts may be shown on the abutment or pier sheets.
- Views are to be oriented so that they represent what the contractor or inspector would most likely see on the ground. Pier 1 elevation is often shown looking back on stationing. A note should be added under the Elevation Pier 1 title saying "Shown looking back on stationing".

F. Intermediate Piers/Bents

- Each pier shall be detailed separately as a general rule. If the intermediate piers are identical except for height, then they can be shown together.

G. Bearing Details

H. Framing Plan

- Girder Lines must be identified in the plan view (Gir. A, Gir. B, etc.).

I. Typical Section

- Girder spacing, which is tied to the bridge construction baseline
- Roadway slab thickness, as well as web and bottom slab thicknesses for box girders
- "A" dimension
- Limits of pigmented sealer
- Profile grade and pivot point and cross slopes
- Utility locations
- Curb to curb roadway width
- Soffit and drip groove geometry

J. Girders/Diaphragms

- Prestressed girder sheets can be copied from the Bridge Office library but they must be modified to match the project requirements.

K. Bridge Deck Reinforcement

- Plan and transverse section views

L. Expansion Joints

M. Traffic Barrier

- Traffic barrier sheets can be copied from the Bridge Office library but they must be modified to match the project requirements.

N. Bridge Approach Slab

- Approach slab sheets can be copied from the Bridge Office library and modified as necessary for the project.

O. Barlist

- The barlist sheets do not require stamping because they are not officially part of the contract plan set.

11.1.4 Electronic Plan Sharing Policy

The following procedure describes the Bridge Design Office or WSDOT consultants' electronic plan sharing policy with other WSDOT offices, consultants, contractors and other agencies:

Plan sheets prepared by the Bridge Design Office or WSDOT consultants may be electronically sent out to other WSDOT offices, consultants, contractors and other agencies in DWG format only if all of the following steps are taken:

1. Entire information in the title block is removed from the plan sheet.
2. A disclaimer reading "FOR INFORMATION ONLY" is printed diagonally across each plan sheet; and
3. A letter of disclaimer is sent as a cover or an attachment to the plan sheet(s), indicating that attached plans are for information only and that WSDOT has no responsibility for accuracy of the contents.

Bridge Office plan sheets may also be electronically shared if requested in PDF format. PDF files need to only include the disclaimer noted in Step 2 above. Examples of bridge plan sheets modified for electronic sharing are shown for clarity. Time spent modifying and submitting electronic plan sheets shall be charged to the job number provided by the construction PE's office.

This policy applies only to current projects under design or under contract. Historical or as-built plan sheets may only be shared in PDF format, and only if condition #3 is followed, as described above.

11.1.5 Structural Steel

A. General

- Flat pieces of steel are termed plates, bars, sheets or strips, depending on the dimensions.

B. Bars

- Up to 6 inches wide, 0.203 in. ($^{3}/_{16}$ inch) and over in thickness, or 6 inches to 8 inches wide, 0.230 in. ($^{7}/_{32}$ inch) and over in thickness.

C. Plates

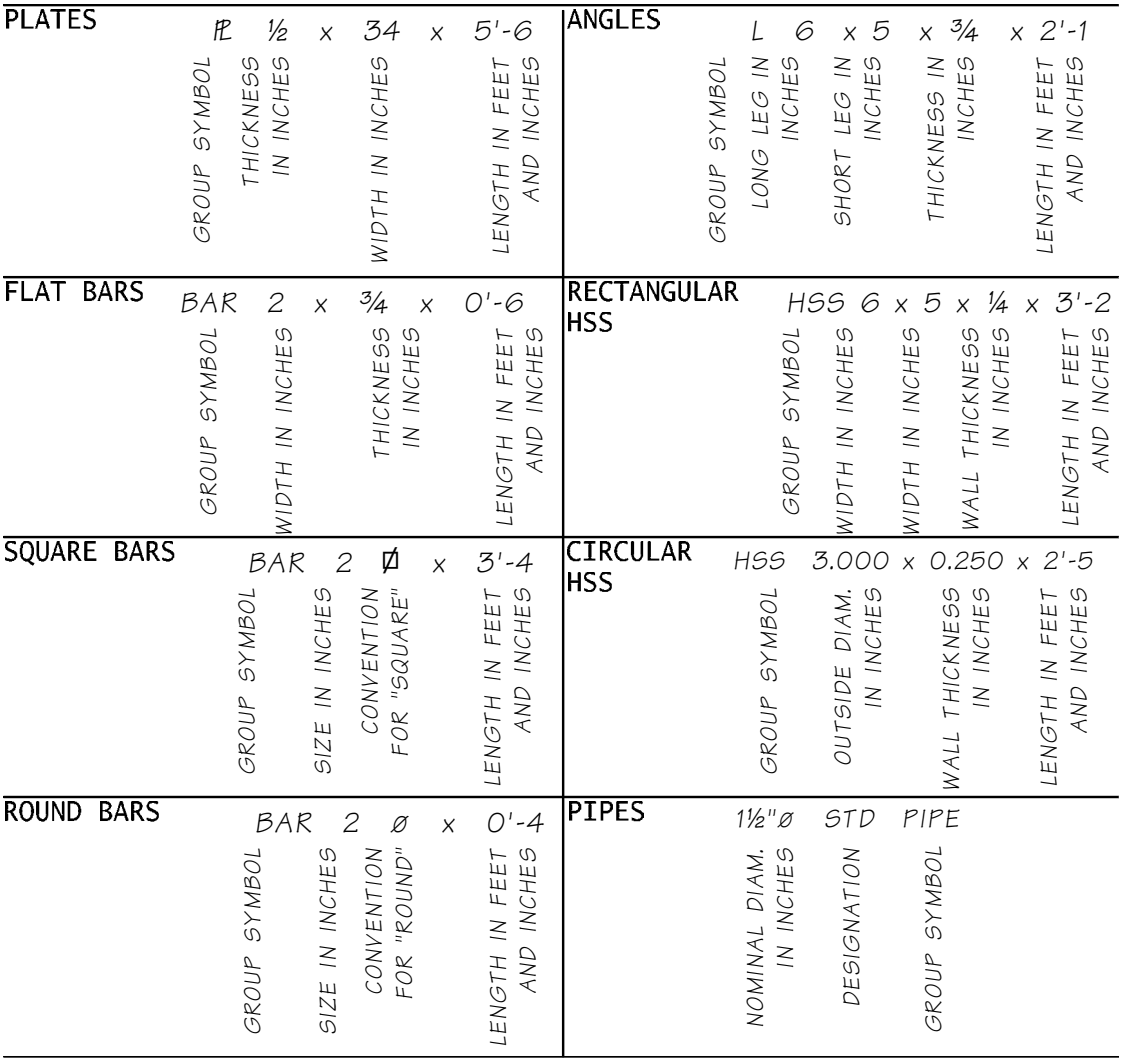
- Over 8 inches wide, 0.230 in. ($^{7}/_{32}$ inch) and over in thickness, or over 48 inches wide, 0.180 in ($^{11}/_{64}$ inch) and over in thickness.

D. Strips

- Thinner pieces up to 12 inches wide are strips and over 12 inches are sheets. A complete table of classification may be found in the AISC Manual of Steel Construction, 8th Ed. Page 6-3.

E. Labeling

- The following table shows the usual method of labeling some of the most frequently used structural steel shapes. Note that the inches symbol (") is omitted, but the foot symbol (') is used for length including lengths less than a foot.


PLATES
PL ½ x 34 x 5'-6
GROUP SYMBOL
THICKNESS IN INCHES
WIDTH IN INCHES
LENGTH IN FEET AND INCHES
ANGLES
L 6 x 5 x ¾ x 2'-1
GROUP SYMBOL
LONG LEG IN INCHES
SHORT LEG IN INCHES
THICKNESS IN INCHES
LENGTH IN FEET AND INCHES
FLAT BARS
BAR 2 x ¾ x 0'-6
GROUP SYMBOL
WIDTH IN INCHES
THICKNESS IN INCHES
LENGTH IN FEET AND INCHES
RECTANGULAR HSS
HSS 6 x 5 x ¼ x 3'-2
GROUP SYMBOL
WIDTH IN INCHES
WIDTH IN INCHES
WALL THICKNESS IN INCHES
LENGTH IN FEET AND INCHES
SQUARE BARS
BAR 2 ▯ x 3'-4
GROUP SYMBOL
SIZE IN INCHES
CONVENTION FOR "SQUARE"
LENGTH IN FEET AND INCHES
CIRCULAR HSS
HSS 3.000 x 0.250 x 2'-5
GROUP SYMBOL
OUTSIDE DIAM. IN INCHES
WALL THICKNESS IN INCHES
LENGTH IN FEET AND INCHES
ROUND BARS
BAR 2 ø x 0'-4
GROUP SYMBOL
SIZE IN INCHES
CONVENTION FOR "ROUND"
LENGTH IN FEET AND INCHES
PIPES
1½"ø STD PIPE
NOMINAL DIAM. IN INCHES
DESIGNATION
GROUP SYMBOL

11.1.6 Aluminum Section Designations

The designations used in the tables are suggested for general use.

Section	Designation	Example
I-Beams	I *DEPTH* × *WT*	14 × 3.28
Wide-Flange Sections	WF *DEPTH* × *WT*	WF4 × 4.76
Wide-Flange Sections, Army-Navy Series	WF(A-N) *DEPTH* × *WT*	WF(A-N)4 × 1.79
American Standard Channels	C *DEPTH* × *WT*	C4 × 1.85
Special Channels	CS DEPTH × WT	CS4 × 3.32
Wing Channels	CS(WING) *WIDTH* × *WT*	CS(WING)4 × 0.90
Army-Navy Channels	C(A-N) *DEPTH* × *WT*	C(A-N)4 × 1.58
Angles	L *LL* × *LL* × *TH*	L3 × 3 × 0.25
Square End Angles	LS *LL* × *LL* × *TH*	LS2 × 2 × 0.187
Bulb Angles	BULB L *LL1* × *LL2* × *TH1* × *TH2*	BULB L4 × 3.5 × 0.375 × 0.375
Bulb Angle, Army-Navy Series	BULB L(A-N) *LL1* × *LL2* × *TH1* × *TH2*	BULB L(A-N) 3 × 2 × 0.188 × 0.188
Tees	T *DEPTH* × *WIDTH* × *WT*	T4 × 4 × 3.43
Army-Navy Tees	T(A-N) *DEPTH* × *WIDTH* × *WT*	T(A-N)4 × 4 × 2.27
Zees	Z *DEPTH* × *WIDTH* × *WT*	Z4 × 3.06 × 2.85
Plates	PL *TH* × *WIDTH*	PL¼ × 8
Rods	RD *DIA*	RD 1
Square Bars	SQ *SDIM*	SQ 4
Rectangle Bars	RECT *TH* × *WIDTH*	RECT¼ × 4
Round Tubes	*ODIA OD* × *TH* WALL	4OD × 0.125 WALL
Square Tubes	*ODIM SQ* × *TH* WALL	3SQ × 0.219 WALL
Rectangle Tubes	*DEPTH* × *WIDTH RECT* × *TH* WALL	4 × 1.5 RECT × 0.104 WALL

WT - WEIGHT in LB/FT based on density of 0.098
TH - THICKNESS, LL - LEG LENGTH, DIA – DIAMETER
ODIA - OUTSIDE DIAMETER, ODIM - OUTSIDE DIMENSION
SDIM - SIDE DIMENSION

All lengths in inches

11.1.7 Abbreviations

A. General

- Abbreviations, as a rule, are to be **avoided**.
- Because different words sometimes have identical abbreviations, the word should be spelled out where the meaning may be in doubt.
- A few **standard signs** are in common use in the Bridge and Structures Office. These are listed with the abbreviations.
- A **period** should be placed after all abbreviations, except as listed below.
- **Apostrophes** are usually not used. Exceptions: pav't., req'd.
- Abbreviations for **plurals** are usually the same as the singular. Exceptions: figs., no., ctrs., pp.
- No abbreviations in titles.

B. List of abbreviations commonly used on bridge plan sheets:

A

abutment	ABUT.
adjust, adjacent	ADJ.
aggregate	AGG.
alternate	ALT.
ahead	AHD.
aluminum	AL.
American Society for Testing and Materials	ASTM
American Association of State Highway and Transportation Officials	AASHTO
and	&
angle point	A.P.
approved	APPRD.
approximate	APPROX.
area	A
asbestos cement pipe	ASB. CP
asphalt concrete	AC
asphalt treated base	ATB
at	@ (used only to indicate spacing or pricing, otherwise spell it out)
avenue	AVE.
average	AVG.

B

back	BK.
back of pavement seat	B.P.S.
bearing	BRG.
begin horizontal curve (Point of Curvature)	P.C.
begin vertical curve	BVC
bench mark	BM
between	BTWN.
bituminous surface treatment	BST
bottom	BOT.
boulevard	BLVD.
bridge	BR.
bridge drain	BR. DR.
building	BLDG.
buried cable	BC

C

cast-in-place	CIP
cast iron pipe	(C.I.P.)
center, centers	CTR., CTRS.
centerline	℄
center of gravity	CG
center to center	CTR. TO CTR., C/C
Celsius (formerly Centigrade)	C
cement treated base	CTB
centimeters	CM.
class	CL.
clearance, clear	CLR.
compression, compressive	COMP.
column	COL.
concrete	CONC.
conduit	COND.
concrete pavement	PCCP (Portland Cement Concrete Pavement)
construction	CONST. or CONSTR.
continuous	CONT. or CONTIN.
corrugated	CORR.
corrugated metal	CM
corrugated steel pipe	CSP
countersink	CSK.
county	CO.
creek	CR.
cross beam	X-BM.
crossing	XING
cross section	X-SECT.
cubic feet	CF or CU. FT. or $FT.^3$
cubic inch	CU. IN. or $IN.^3$
cubic yard	CY or CU. YD. or YD^3
culvert	CULV.

D

degrees, angular	° or DEG.
degrees, thermal	C or F
diagonals(s)	DIAG.
diameter	DIAM. or ø
diaphragm	DIAPH.
dimension	DIM.
double	DBL.
drive	DR.

E

each	EA.
each face	E.F.
easement	EASE., ESMT.
East	E.
edge of pavement	EP
edge of shoulder	ES
endwall	EW
electric	ELECT
elevation	EL. or ELEV.
embankment	EMB.
end horizontal curve (Point of Tangency)	P.T.
end vertical curve	EVC
Engineer	ENGR.
equal(s) or = (mathematical result)	EQ. (as in eq. spaces)
estimate(d)	EST.
excavation	EXC.
excluding	EXCL.
expansion	EXP., EXPAN.
existing	EXIST.
exterior	EXT.

F

Fahrenheit	F
far face	F.F.
far side	F.S.
feet (foot)	FT. or ’
feet per foot	FT./FT. or ’/’ or ’/FT.
field splice	F.S.
figure, figures	FIG., FIGS.
flat head	F.H.
foot kips	FT-KIPS
foot pounds	FT-LB
footing	FTG.
forward	FWD.
freeway	FWY.

G

gallon(s)	GAL.
galvanized	GALV.
galvanized steel pipe	GSP
gauge	GA.
General Special Provisions	GSP
girder	GIR.
ground	GR.
guard railing	GR

H

hanger	HGR.
height	HT.
height (retaining wall)	H
hexagonal	HEX.
high strength	H.S.
high water	H.W.
high water mark	H.W.M.
highway	HWY.
horizontal	HORIZ.
hot mix asphalt	HMA
hour(s)	HR.
hundred(s)	HUND.

I

included, including	INCL.
inch(es)	IN. or “
inside diameter	I.D.
inside face	I.F.
interior	INT.
intermediate	INTERM.
interstate	I
invert	INV.

J

joint	JT.
junction	JCT.

K

kilometer(s)	KM.
kilopounds	KIPS, K.

L

layout	LO
left	LT.
length of curve	L.C.
linear feet	L.F.
longitudinal	LONGIT.
lump sum	L.S.

M

maintenance	MAINT.
malleable	MALL.
manhole	MH
manufacturer	MFR.
maximum	MAX.
mean high water	MHW
mean higher high water	MHHW
mean low water	MLW
mean lower low water	MLLW
meters	M.
mile(s)	MI.
miles per hour	MPH
millimeters	MM.
minimum	MIN.
minute(s)	MIN. or ‘
miscellaneous	MISC.
modified	MOD.
monument	MON.

N

National Geodetic Vertical Datum 1929	NGVD 29
near face	N.F.
near side	N.S.
North	N.
North American Vertical Datum 1988	NAVD 88
Northbound	NB
not to scale	NTS
number; numbers	#, NO., NOS.

O

or	/
original ground	O.G.
ounce(s)	OZ.
outside diameter	O.D.
outside face	O.F.
out to out	O to O
overcrossing	O-XING
overhead	OH

P

page; pages	P.; PP.
pavement	PAV'T
pedestrian	PED.
per cent	%
pivot point	PP
Plans, Specifications and Estimates	PS&E
plate	PL or PL
point	PT.
point of compound curve	PCC
point of curvature	P.C.
point of intersection	P.I.
point of reverse curve	PRC
point of tangency	P.T.
point on vertical curve	PVC
point on horizontal curve	POC
point on tangent	POT
polyvinyl chloride	PVC
portland cement concrete	PCC
pound, pounds	LB., LBS., #
pounds per square foot	PSF, LBS./FT.^{2}, LBS./ ',or #/'
pounds per square inch	PSI, LBS./IN.^{2}, LBS./ ",or #/"
power pole	PP
precast	P.C.
pressure	PRES.
prestressed	P.S.
prestressed concrete pipe	P.C.P.
Puget Sound Power and Light	P.S.P.&L.

Q

quantity	QUANT.
quart	QT.

R

radius	R.
railroad	RR
railway	RWY.
Range	R.
regulator	REG.
reinforced, reinforcing	REINF.
reinforced concrete	RC
reinforced concrete box	RCB
reinforced concrete pipe	RCP
required	REQ'D
retaining wall	RET. WALL
revised (date)	REV.
right	RT.
right of way	R/W
road	RD.
roadway	RDWY.
route	RTE.

S

seconds	SEC. or “
Section (map location)	SEC.
Section (of drawing)	SECT.
sheet	SHT.
shoulder	SHLD. or SH.
sidewalk	SW. or SDWK
South	S.
southbound	SB
space(s)	SPA.
splice	SPL.
specification	SPEC.
square foot (feet)	SQ. FT. or FT.^{2}
square inch	SQ. IN. or IN.^{2}
square yard	SY, SQ. YD. or YD.^{2}
station	STA.
standard	STD.
state route	SR
stiffener	STIFF.
stirrup	STIRR.
structure, structural	STR.
support	SUPP.
surface, surfacing	SURF.
symmetrical	SYMM.

T

tangent	TAN. or T.
telephone	TEL.
temporary	TEMP.
test hole	T.H.
thick(ness)	TH.
thousand	M
thousand (feet) board measure	MBM
ton(s)	T.
total	TOT.
township	T.
transition	TRANS.
transportation	TRANSP.
transverse	TRANSV.
treatment	TR.
typical	TYP.

U

ultimate	ULT.
undercrossing	U-XING

V

variable, varies	VAR.
vertical	VERT.
vertical curve	V.C.
vitrified clay pipe	VCP
volume	VOL. or V

W

water surface	W.S.
weight(s)	WT.
welded steel pipe	WSP
welded wire fabric	W.W.F.
West	W.
Willamette Meridian	W.M.
wingwall	W.W.
with	W/
without	W/O

Y

yard, yards	YD., YDS.
year(s)	YR.

11.2 Bridge Standard Drawings

11.1-A4 Footing Layout

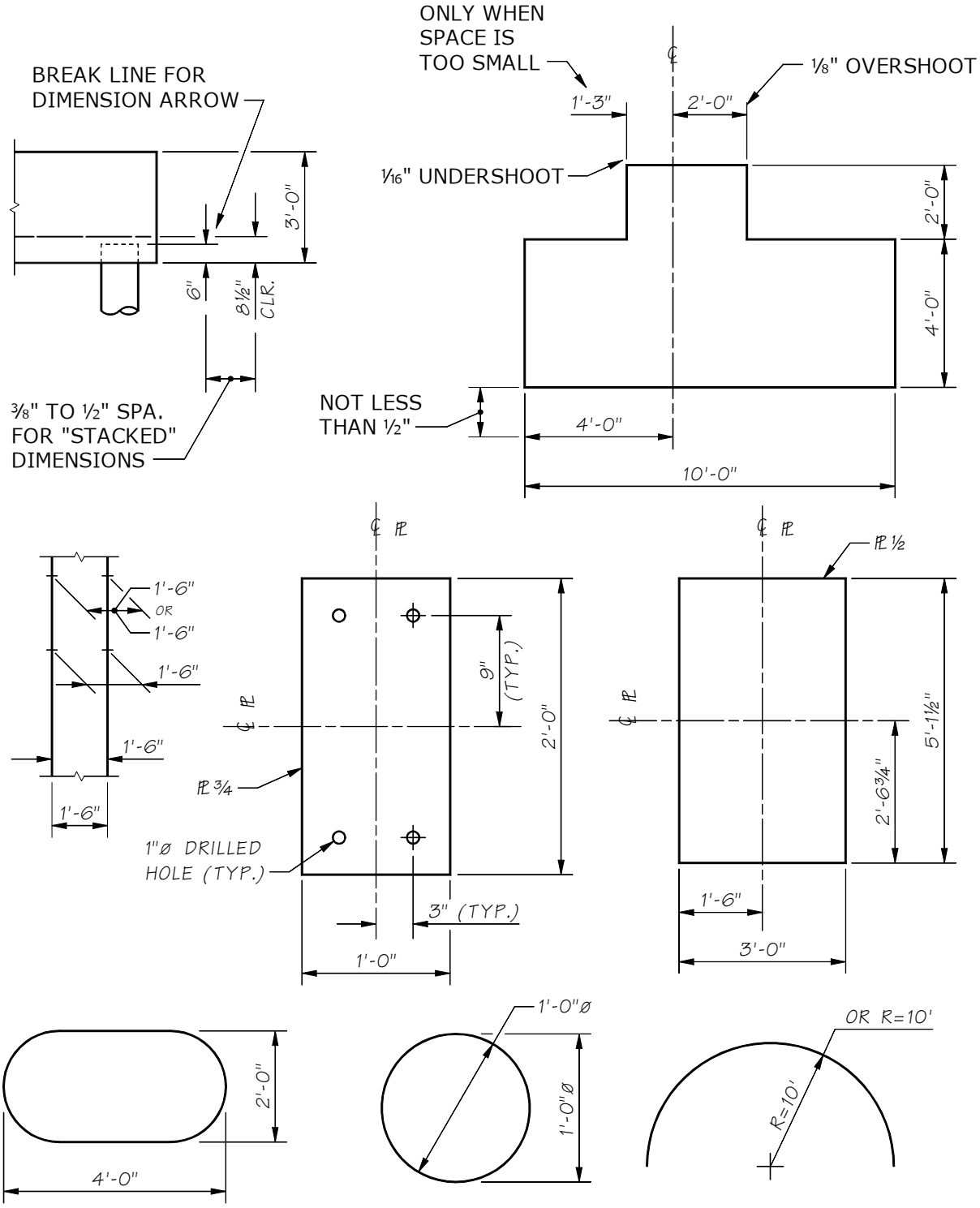
11.3 Appendices

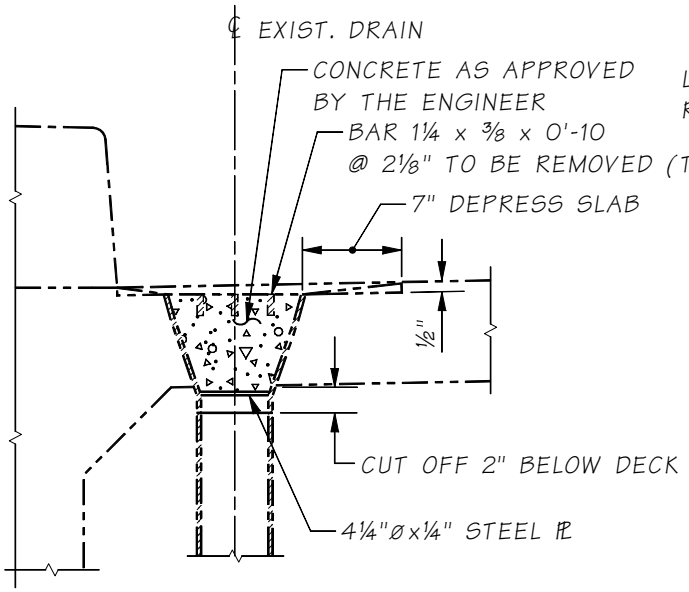
Appendix 11.1-A1 Dimensional Callout Example

Appendix 11.1-A2 Typical Details

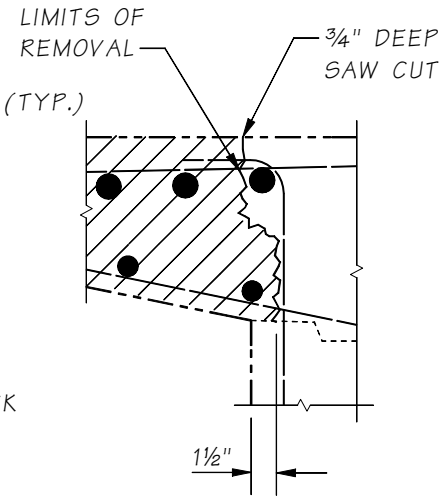
Appendix 11.1-A3 Typical Section Callouts

Appendix 11.1-A1 Dimensional Callout Example

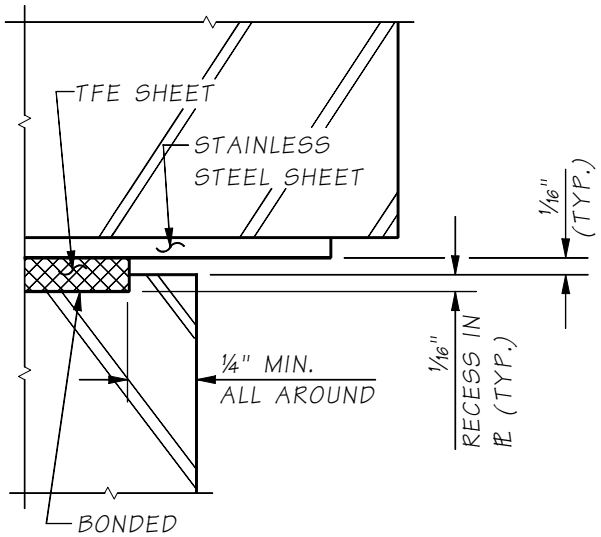




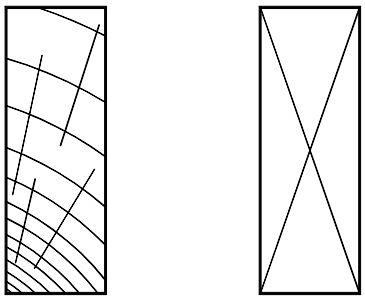
TYPICAL CONCRETE DETAIL



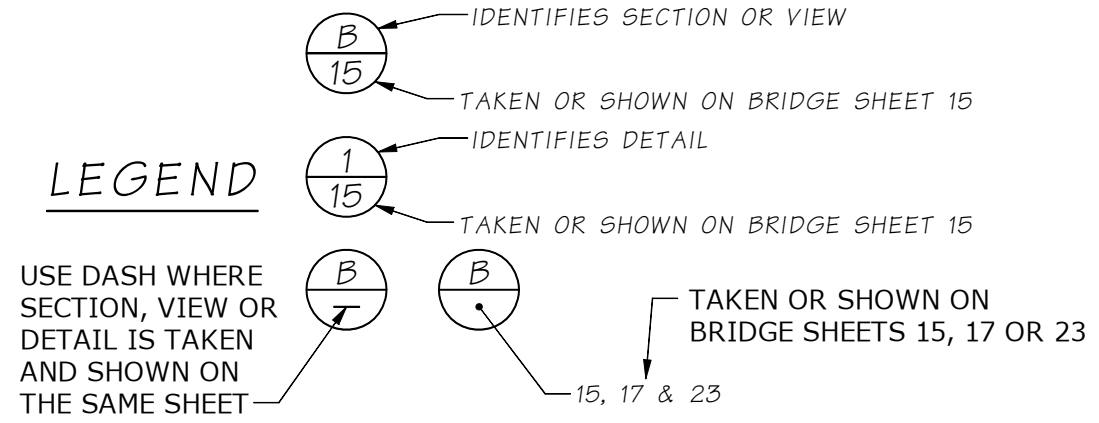
TYPICAL REMOVAL DETAIL

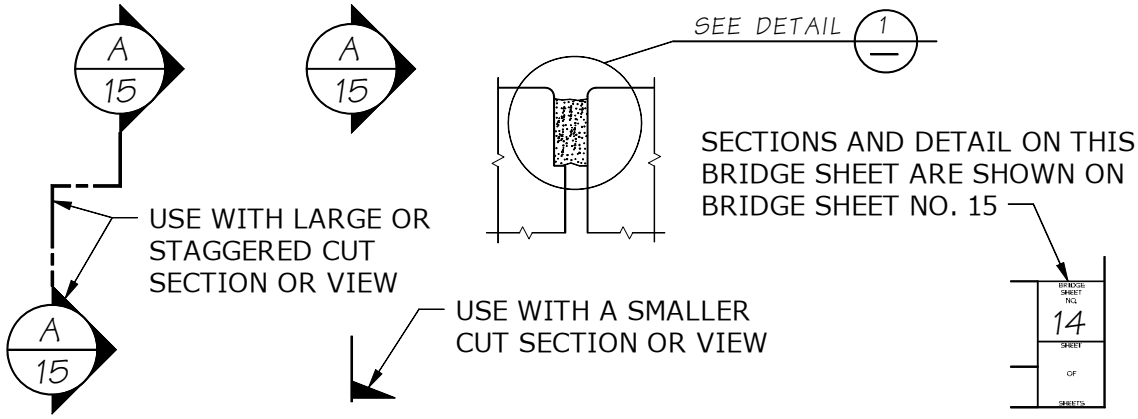


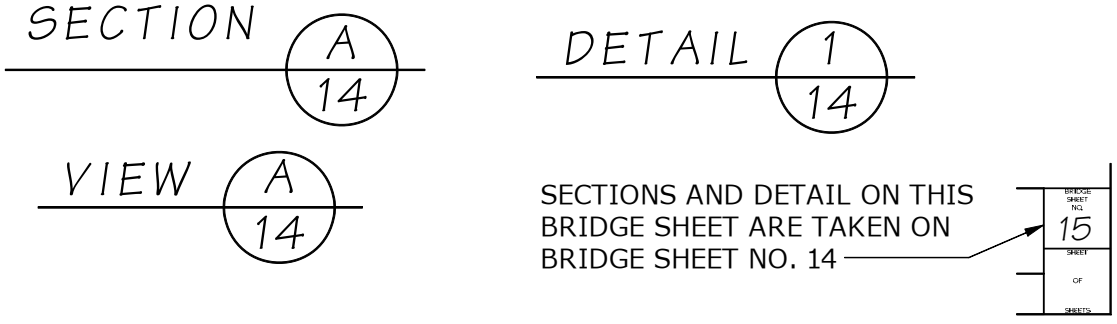
TYPICAL STEEL DETAIL

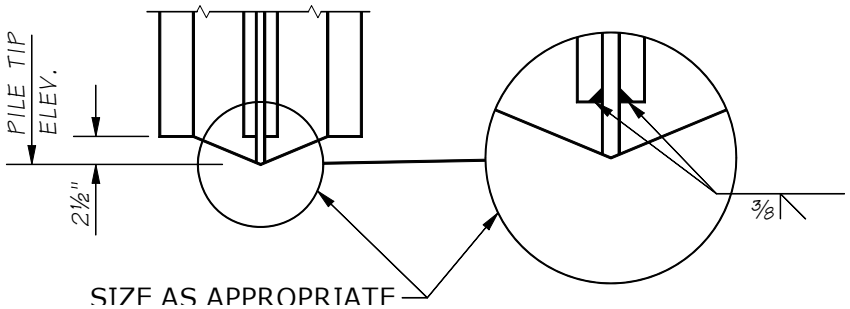


TYPICAL TIMBER DETAIL


B
15
IDENTIFIES SECTION OR VIEW
TAKEN OR SHOWN ON BRIDGE SHEET 15
LEGEND
1
15
IDENTIFIES DETAIL
TAKEN OR SHOWN ON BRIDGE SHEET 15
USE DASH WHERE SECTION, VIEW OR DETAIL IS TAKEN AND SHOWN ON THE SAME SHEET
B
B
TAKEN OR SHOWN ON BRIDGE SHEETS 15, 17 OR 23
15, 17 & 23


A
15
A
15
SEE DETAIL 1
SECTIONS AND DETAIL ON THIS BRIDGE SHEET ARE SHOWN ON BRIDGE SHEET NO. 15
USE WITH LARGE OR STAGGERED CUT SECTION OR VIEW
A
15
USE WITH A SMALLER CUT SECTION OR VIEW
BRIDGE SHEET NO.
14
SHEET
OF
SHEETS


SECTION A 14
DETAIL 1 14
VIEW A 14
SECTIONS AND DETAIL ON THIS BRIDGE SHEET ARE TAKEN ON BRIDGE SHEET NO. 14
BRIDGE SHEET NO.
15
SHEET
OF
SHEETS


PILE TIP ELEV.
2½"
3/8
SIZE AS APPROPRIATE