Chapter 11 Detailing Practice

11.0 Detailing Practice

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

11.1 Standard Office Practices

11.1.1 General

11.1.1.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.
- Limited deviations from the standards listed in this chapter, unless otherwise noted, may be approved by the WSDOT State Bridge Design Engineer as a specific situation requires, so long as all possible attempts to maintain the standards are made prior to authorizing a deviation. All deviations must be approved by the WSDOT State Bridge Design Engineer.
- Definitions used in this chapter:
  - ***Should:*** Denotes when best practice dictates a standard is to be followed, but may be deviated from or omitted if necessary, as approved by the design engineer.
  - ***Shall:*** Denotes when a standard ***must*** be followed with no deviations or omissions allowed.

11.1.1.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. When available, these examples *should* not be older than three years. Care *shall* be taken to identify and update revisions in code or policy between the example set design date and current practice.

11.1.1.C Drawing Orientation and Layout Control

- **Standard format** for a bridge plan sheet is 34 inches × 22 inches with the bottom 2 inches used for title block and related information. The use of a sheet format that is 17 inches x 11 inches with the bottom 1 inch used for title block and related information is permitted so long as the final printed product maintains the same graphical standards as a 34 inch x 22 inch format plotted at half size. For the purposes of this manual, all sizes and dimensions referenced herein are in relation to the 34 inch x 22 inch format.

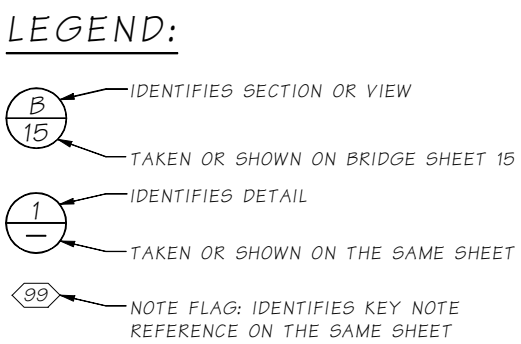
- **Contract plans** are printed, sealed, signed and submitted on 11″ × 17″ paper. This is accomplished by either plotting a 34 inch x 22 inch format at half size, or a 17 inch by 11 inch format at full size, depending on the sheet format that is used.
- **Drawings** *shall* be carefully organized so the intent of the drawing is easily understood.
  - **North arrow** *shall* be placed on layouts and footing/foundation layouts. The North arrow *should* be placed in the upper right corner of the sheet whenever possible.
  - **Related details** *shall* be grouped together in an orderly arrangement: lined up horizontally and vertically and drawn to the same scale.
  - 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.
  - Do not crowd the drawing with details.
  - The Plan view layout of structures and retaining walls *should* be oriented from left to right in the direction of increasing state route mileposts. 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 *shall* 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.

11.1.1.D Annotation

11.1.1.D.1 *Text and Labeling*

- **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.
- A primary **Legend** *shall* be placed on the first sheet of the plan set. At a minimum this will include a Section Callout reference, followed by a Detail Callout reference, and finally a Key Note reference. Anything else that is to be added to the legend *shall* be placed after these 3 items. See Figure 11.1.1-D1.

Figure 11.1.1-D1 Primary Legend

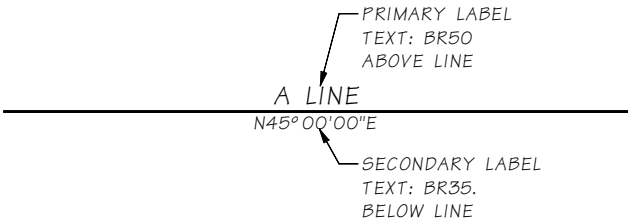


- **Detail titles** *shall* be a similar font as general text, about twice as high and of a heavier weight. Underline all titles with a single line having the same weight as the lettering. Additional detail information or description *shall* be the standard text style and placed directly under the title. See Figure 11.1.1-D2.

Figure 11.1.1-D2 Detail Titles

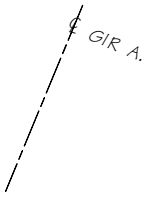
- **Primary Line Labels** for alignments, highway or bridge centerline (in plan view), creeks/rivers, and under-crossings *shall* be aligned with the associated line work and placed above the line. Any **Secondary Labels** such as survey bearing *shall* be placed below the line, and *should* be centered on the primary label. See Figure 11.1.1-D3.

Figure 11.1.1-D3 Primary and Secondary Line Labels



- **Centerline labels** *shall* be normal to the line itself approximately an eighth inch from the end of the line as shown in Figure 11.1.1-D4.

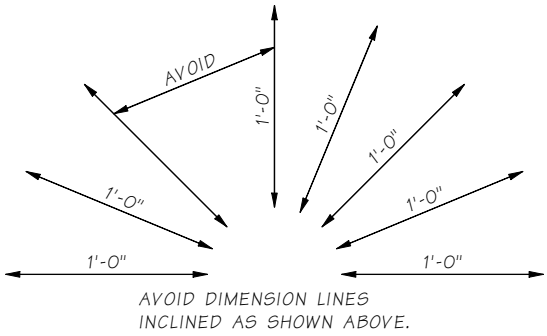
Figure 11.1.1–D4 Centerline Labels



11.1.1.D.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 Figure 11.1.1-D5.

Figure 11.1.1-D5 Inclined Dimensions



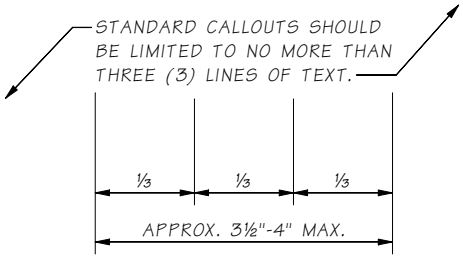
- When details or structural elements are complex, utilize two drawings, one for dimensions and the other for reinforcing bar details.
- Dimensions 12 inches or more *shall* be given in feet and inches unless the item dimensioned is conventionally designated in inches (for example, 16″ pipe).
- Dimensions 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.

11.1.1.D.3 *Callouts (See Figure 11.1.1-D6 below)*

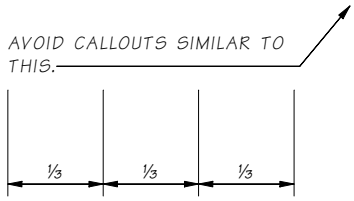
- Callouts *should* be specific, brief, and limited to not more than one sentence. The intent is to make the purpose clear, while reducing superfluous information that could both cloud the meaning of the content and clutter the drawing sheet.
- All callout text *shall* be left justified regardless of the position of the leader.
- When creating a callout, the detailer and the design engineer *should* attempt to limit the callout to not more than 3 lines of text and ensure the text is formatted in a way that each line is a similar length and forms a rectangular appearance. Additionally, a callout *should* be limited to not more than about 3 ½” to 4” in width.
- **Leaders** *shall* be attached to either the beginning or end of the sentence. This means the top line of text for leaders coming off the left of the callout or the bottom line of text for leaders pointing right.

Figure 11.1.1-D6 Callouts

A standard callout **shall** be left justified and **should** contain no more than 3 lines of text. It should also be relatively rectangular in format with the bottom line of text typically being not less than 2/3 the length of the line above.



Avoid callouts with a right side leader where the bottom line is less than approximately 2/3 the length of the line above.

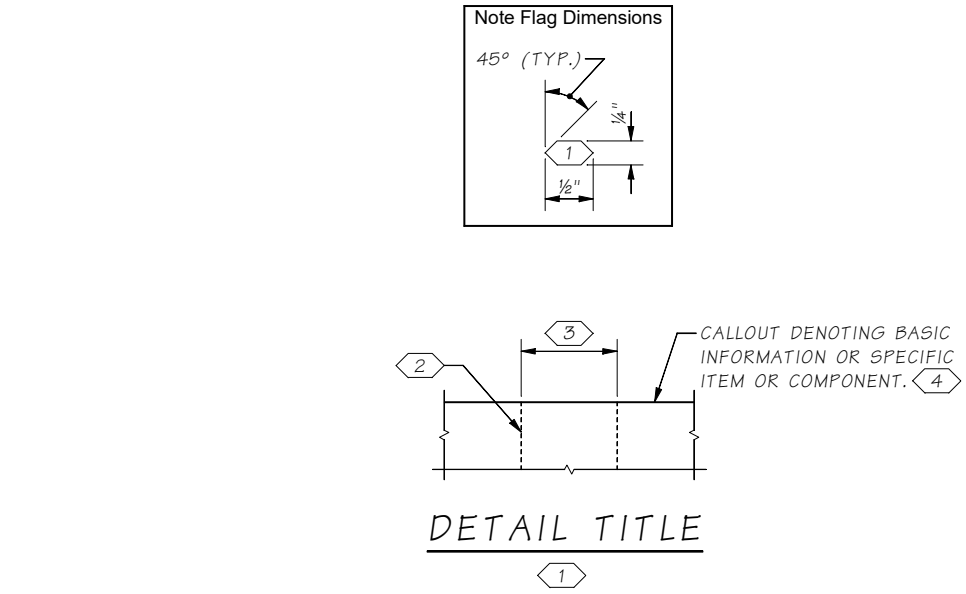


Dimensions shown in the above illustrations are for reference only.

11.1.1.D.4 *Key Notes (See Figure 11.1.1-D7 below)*

- Key notes are defined as **specific** notes pertaining to information or conditions within the plan sheet on which they reside. They are not to be confused with general notes, which are **non-specifi**c, or general in nature, and typically can be applied globally to the sheet or the whole plan set. Key notes *should* **not** be used to cover non-specific, or general information that would be typically specified in a general note.
- Key notes *should* be used in situations where a callout may become too large (more than 3 lines or more than 1-2 sentences), a callout would clutter the sheet or detail, or in situations where that same callout would need to be shown in multiple locations (3 or more) on the same view or detail.
- Key notes may be used to reference a standard plan, a note on another sheet, or even another sheet within the contract plan set that is separate from the bridge plans (i.e. roadway or illumination plans).
- The same key note may be referenced in multiple views or details so long as they are on the same plan sheet.
- Key notes will be referenced on the sheet as **"KEY NOTES":** and *should* be placed on the lower right side of the sheet whenever possible. Key notes *should* be placed below any general notes on the sheet (if applicable). They *should* be placed numerically and *shall* have a flag placed around the number.
- Key note flags shall be used to reference key notes within the drawing area. Each note flag will use the same symbol and corresponding number as found in the key notes.
- Note flags may be used with or without a leader as the situation dictates.
- Note flags *shall* be an elongated hexagon that is ¼" in height and ½" in length with each corner chamfered at 45° tapering to a single point at each end. The number *shall* be centered horizontally and vertically within.
- A note flag legend symbol *shall* be placed as part of the primary legend found typically on the first sheet of a plan set as this is a continuous standard found throughout the set in the same way a section or detail callout is. (see Figure 11.1.1-D1)

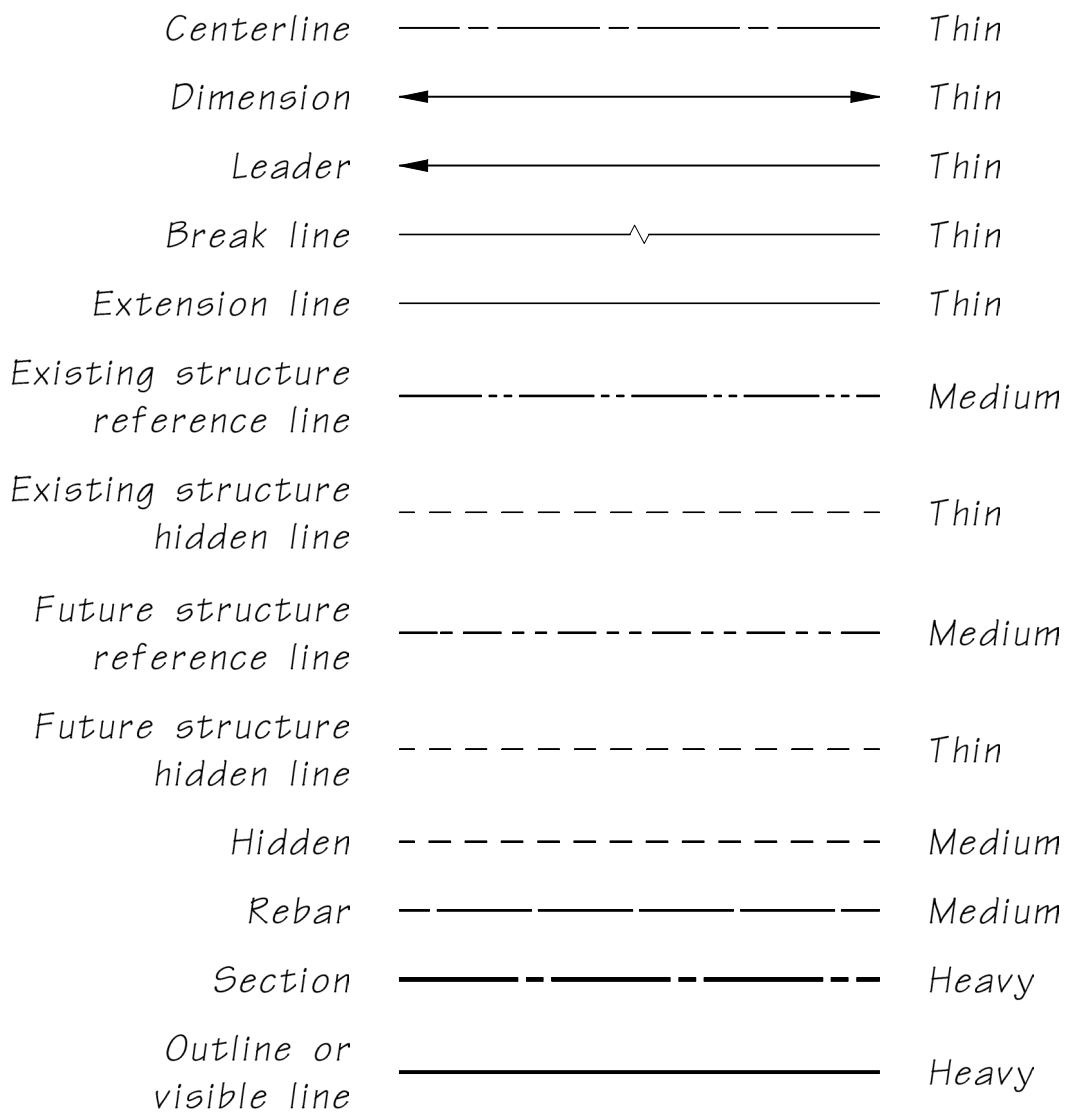
Figure 11.1.1-D7 Key Notes



11.1.1.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.

Figure 11.1.1-E1 Line Styles



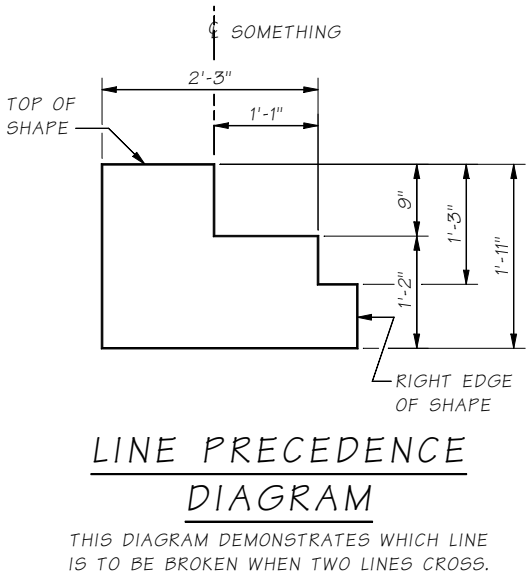
- When drawing structural sections showing reinforcing steel, the **outline** of the sections *shall* be a **heavier** line weight than the **rebar**.
- The order of **line precedence** (which of a pair of crossing lines is broken) is as follows:

  A. Dimension lines are never broken.

  B. Leader line from a callout.

  C. Extension line.

Figure 11.1.1-E2 Line Precedence



11.1.1.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.

11.1.1.G Graphic Symbols

1. Graphic symbols *shall* be in accordance with the following:

   A. Structural steel shapes: See also AISC *Manual of Steel Construction*.

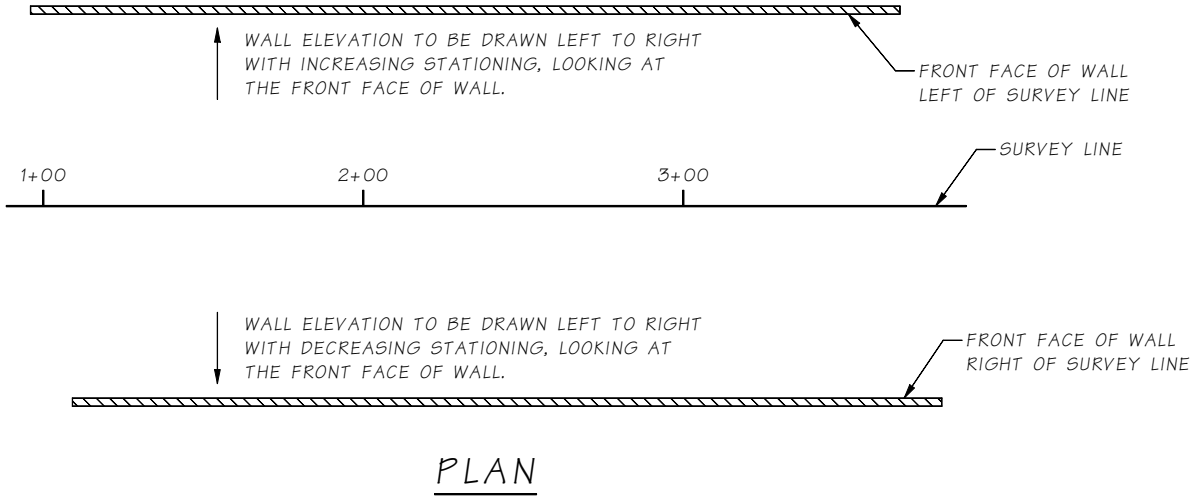
   B. Welding symbols: See Lincoln Welding Chart.

   C. Symbols for hatching different materials are shown on Appendix 11.2-A2.

11.1.1.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 *should* 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.
- **Wall elevations** shown on the same sheet as the plan view *shall* be oriented with stationing increasing from left to right. **Wall elevations** shown on a sheet separate from the plan view *shall* be oriented to show the exposed face (view in the field as the wall is being built) regardless of direction of stationing. See Figure 11.1.1-H1 below.
- 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 11.2-A3.
- Breaks in lines are allowable provided that their intent is clear.

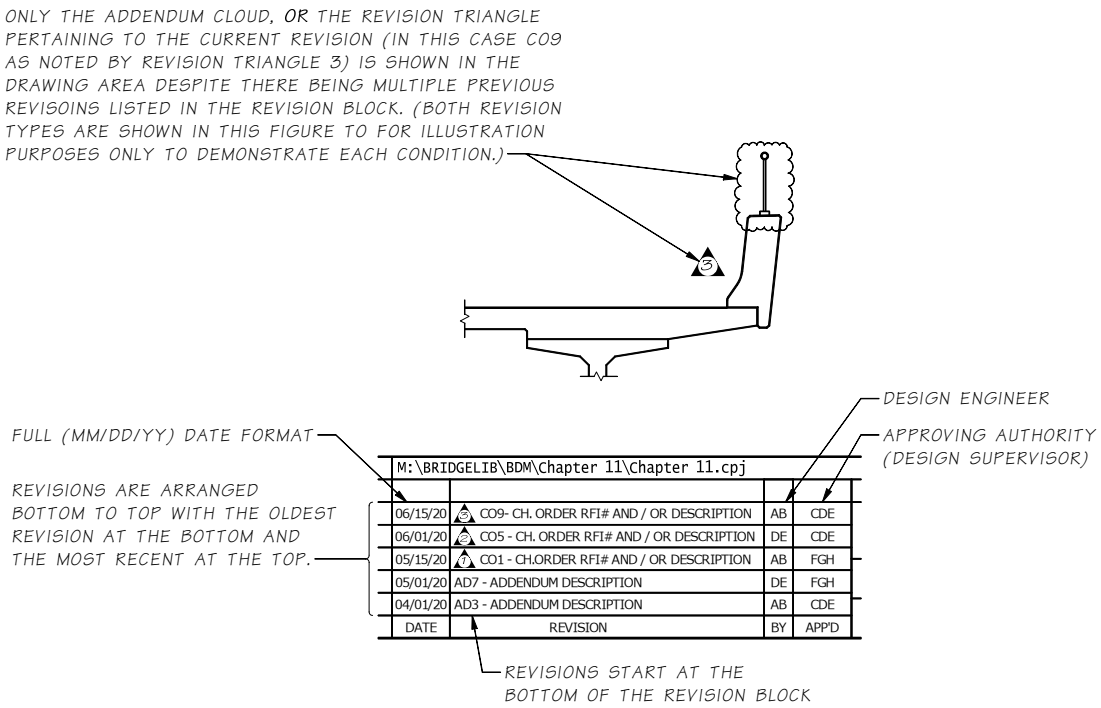
Figure 11.1.1-H1 Wall Elevation Orientation



11.1.1.I Revisions

- All addendums and change orders will be noted in the **revision block** at the bottom of the sheet using font Sheet12. For the purpose of this section, change orders and addendums will be referred to collectively as **revisions** unless otherwise necessary.
- **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. **Additionally** addenda *shall* be noted in the revision block as "AD#" followed by a dash and the addendum description. For example "AD1 – CHANGE TB F-SHAPE TO SINGLE SLOPE 42 TB" denotes addendum number 1 and describes the main purpose of the revision on the particular sheet. Addenda will be numbered according to the assigned addendum number from the region office and may skip numbers on the bridge plans, as certain addenda may only pertain to other contract documents, such as roadway plans or special provisions. For example, it would not be uncommon to see addenda listed in the revision block numbered in a fashion such as "AD1, AD3, AD7, etc." See Figure 11.1.1-I Below.
- **Change orders** are made after the contract has been awarded. Changes will be marked with a revision number inside a circle within a **triangle**, commonly referred to as a **revision triangle**. Revision triangles *shall* appear in a standard numerical sequence (1, 2, 3 etc.) within the revision block. Immediately following the revision triangle *should* be the official change order number provided by the regional PEO in accordance with the WSDOT *Construction Manual* Section SS 1-04.4. Directly after the change order number will be a dash separating the number and the description, followed by the revision RFI number and/or the revision description. For example: "  CO9 – AA123 WIDEN BRIDGE FOR NEW LANE". Note that the plan revision triangle number and the change order won't always match, as shown in the above example. For additional examples, see Figure 11.1.1-I below.
- The **date** block of the revision table *should* contain the date of the revision request, but if not provided by the regional office, may be substituted by the date the revision design work was completed.
- The last two fields in the revision block are the "BY" and "APP'D" (approved by) blocks. The "BY" field should contain the designer's initials whereas the "APP'D" field should contain the approving authority's initials, which in most cases will be the design team supervisor.
- In the event there are **multiple** revisions on a given sheet, the previous revision information *shall* remain in the revision block. Revisions *shall* appear **chronologically** in the order received, starting with the oldest revision at the bottom. The revision *shall* be placed on the next available line above the revisions, however, only the **current iteration** *should* be shaded, clouded, or referenced in the drawing area. See Figure 11.1.1-I below.
- **Best practice** dictates that any time a revision occurs, a **new sheet** *should* be generated by copying the desired sheet to be modified and making the revisions on the copied sheet. This ensures the original sheet and associated data exists in an unmodified state that can be referred back to at a later time as necessary.

Figure 11.1.1-I Plan Revisions



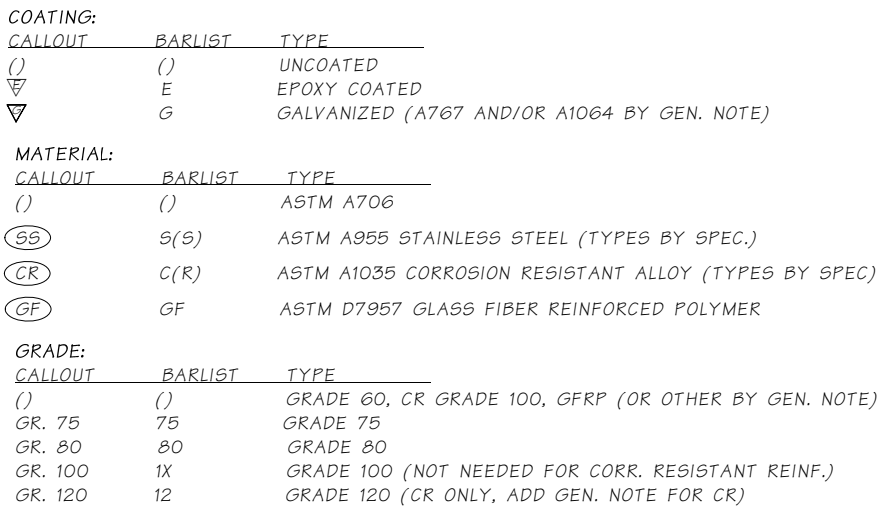
11.1.1.J Title Block

- 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.

11.1.1.K Reinforcement Detailing

- This section is intended to define how reinforcement is to be detailed and called out on plan sheets. Reinforcement design and specification is to be conducted in accordance with this Section 5.1.2 by the design engineer. Graphical representation and notation shall be done in accordance with this Section 11.1.1-K.
- 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.
- Typical 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. Typical reinforcement is defined as the predominant type and grade of reinforcement used throughout the contract plan set.
- Any reinforcement that differs from the typical reinforcement *shall* include the type and grade as part of the callout within the contract plan set.
- 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). See Appendix 11.1-A4 for reinforcement callout examples.
- Coating or treatment for reinforcement *shall* be shown in the plans by noting the letter designator inside of an inverted triangle. The coating designator *shall* be placed within a callout or dimension directly after the mark number. See Figure 11.1.1-K1 below.
- Material for reinforcement, when required, *shall* be shown using the corresponding two (2) letter designator inside of an ellipse measuring ½" wide by ¼" in height. The material designator *shall* be placed within a callout or dimension directly preceding the bar size. See Figure 11.1.1-K1 below.
- Bar size is to be shown on all reinforcement callouts and *shall* be shown using a pound (#) preceding the numeric size designator (i.e. #4). Bar size *shall* be placed within a callout or dimension after any coating and material designator, but prior to grade designator.
- Grade for reinforcement, when required, *shall* be shown using "GR." And the numeric grade designator (i.e. GR. 80). The grade designator *shall* be placed within a callout or dimension directly after the bar size designator. See Figure 11.1.1-K1 below.
- Reinforcement component type (stirrup, tie, etc.) *shall* be placed within a callout or dimension at the end of the callout after all other reinforcement designators. Component type is *NOT* required on reinforcement bars that are considered primary bars, regardless of hook or straight ends. **Primary reinforcement** bars are those whose purpose is to provide the main shape and reinforcement for the associated structure and are typically straight bars but may also have a hook at one or both ends. These are typically laid out in either the longitudinal or transverse orientation relating to the structure and aren't intended to connect additional reinforcement together such as a stirrup or a tie.

Figure 11.1.1-K1 Reinforcement Callout Symbology



- 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 Section 5.10.2.1 need not be dimensioned or called out, but *shall* be drawn with the proper angle (90°, 135° or 180°). Seismic hooks per AASHTO LRFD Section 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 Section 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".

11.1.2 Bridge Office Standard Drawings and Office Examples

11.1.2.A General

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

11.1.2.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.

11.1.2.C Maintenance of Standard Drawings

Ownership and maintenance of Bridge Standard Drawings is the responsibility of the drawing owner. Drawings are owned by the engineer responsible for the corresponding BDM chapter or section within the chapter in which they appear. The CAD Applications Engineer role is to ensure CAD standards are followed in accordance with this chapter as well as the WSDOT Electronic Engineering Data Standards (EEDS) Division 3-S5 PS&E Standards for any standard symbology not defined in a Bridge and Structures Office Standard library or the *Bridge Design Manual*. The CAD Applications Engineer will also ensure the folders containing the Standard Drawings are properly updated and that the Standard Drawings are published to the WSDOT Website.

The procedure for updating existing Bridge Standard Drawings or developing new Standards is:

1. Drawing owner will mark up drawings.
2. The drawing owner will first work within their assigned design team to have an available detailer revise the drawings. Assistance can be provided by the CAD Applications Engineer as needed.

3. Modifications shall be made to a copy of the Standard Drawing. The current standard shall not be altered.
4. The completed Standard Drawing will be reviewed by the drawing owner to ensure changes have been made correctly and CAD Applications Engineer for conformance with the CAD Standards.
5. The drawing owner will send the updated Standard Drawing to the Bridge Design Engineer in accordance with Section 11.1.2C.
6. Once the completed drawing is approved for use, the CAD Applications Engineer will update the standard drawing library, publish the drawing to the Bridge Office website, and notify the Bridge Design Office of the updates.

11.1.3 Typical Plan Set and Sheets

11.1.3.A Plan Sheet Organization

- Plan sheets *should* be assembled in the **order of construction** and be clear and logical when moving from one sheet to the next.
- Bridge and other structural plans can be broken into **Plan Groups**. A Plan Group is a grouping of all the corresponding plan sheets for one particular bridge or structure within a project, to include all primary and auxiliary structures and structural components.
- **Sheet numbering** *shall* start with the letter designator for the discipline followed by the letter designator for the plan group location within the project (i.e. A is the first structure, or plan group, in the project, B is the second structure, and so on). Plan group designators follow alphabetical order and are to be assigned to each bridge as it appears in the project along stationing. See Table 11.1.3-A1 below
  - An example would look like “BA1”. “B” represents the **Bridge** discipline, “A” denotes this is the first bridge in the project and “1” denotes the plan group sheet number, in this case, the first sheet in the plan group.
  - As a general rule, plan group designators *shall* avoid using the letters “I” and “O” as they may become confused with a one “1” or zero “0”
  - If there is only one bridge or structure plan group in the project plan set, the plan group letter designator *shall* be “A” (i.e. “BA”)

Table 11.1.3-A1 Structural Plan Discipline Designators

Designator	Definition
B	Bridge
S	Sign Structures
W	Wall

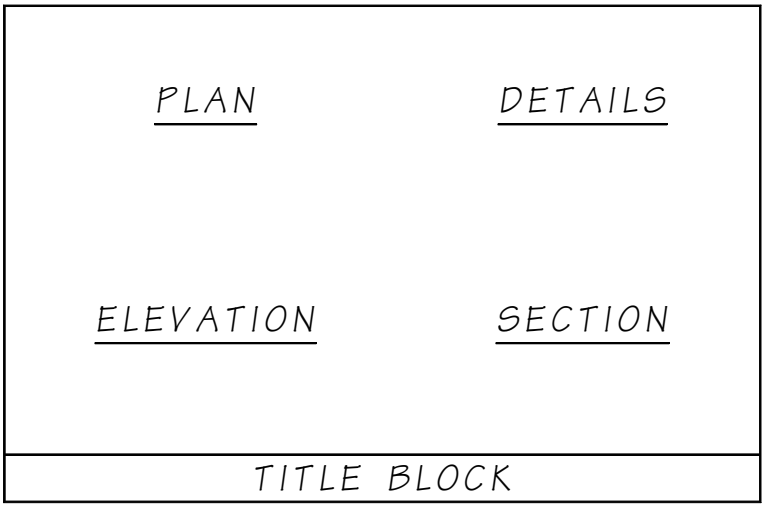
- If one of the listed disciplines in Table 11.1.3-A1 are part of a bridge plan group (i.e. a sign structure attached to a bridge in conjunction with other rehab or retrofit plans occurring on that bridge, or wingwalls on a bridge abutment) their associated sheets would fall under the Bridge discipline and would not fall under their stand-alone discipline such as “S” or “W”

11.1.3.B Sheet Types

- Drawing sheets make up the plan set for each bridge. These sheets are grouped into sub component groups (i.e. Abutment, girders, traffic barriers, etc.) 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 (First Pier)
  - Wingwalls (First Pier)
  - Intermediate Piers/Bents
  - Abutment (Final Pier)
  - Wingwalls (Final Pier)
  - Bearing Details
  - Framing Plan
  - Typical Section
  - Girders
  - End Diaphragms
  - Intermediate Diaphragms
  - Bridge Deck Reinforcement (Plan and transverse section)
  - Expansion Joints (if needed)
  - Traffic Barrier
  - Railing/Fence (if applicable)
  - Bridge Approach Slab
  - Sign Structure/Sign Support (if applicable)
  - Architectural Treatment
  - Barlist

Figure 11.1.3-B1 below is a standard sheet configuration when plan, elevation, and sectional views are required.

Figure 11.1.3-B1 Typical Sheet Setup



11.1.3.C Sheet Contents

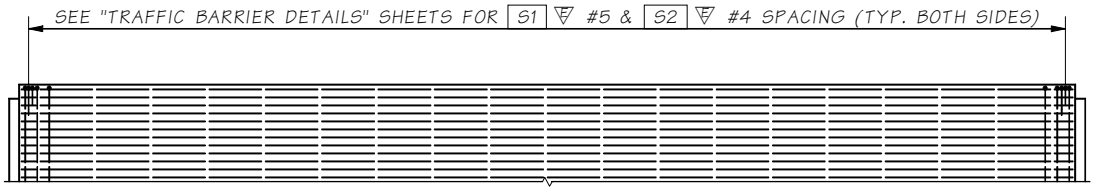
- **Layout**
  - The Layout sheet *shall* contain, but is not limited to:
    - Plan View with ascending stations from left to right
    - Elevation View shown as an outside view of the bridge and *shall* be visually aligned with the plan view.
  - The original preliminary plan will be copied to create 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.
- **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
  - Additionally, if possible, the construction sequence *should* be placed on this sheet. If there is not room on the General Notes sheet, the construction sequence *shall* be its own sheet immediately following the General Notes sheet.

- **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. Seal depth and elevations *should* be shown on abutment and pier sheets as required. The Footing Layout should have references to the pertinent information on those sheets as necessary.
  - 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.
- **Piles/Shafts**
  - Pile and shaft details will be associated with a **Foundation Layout** or a **Footing Layout** (if the footing is to have piles below, acting as a pile cap more so than a spread footing).
  - These detail sheets will come immediately after the Foundation Layout or Footing Layout if they are to be used to support an **Abutment** or directly after the abutment sheets if used to support **Intermediate Piers**.
  - **Best practice** is to have a set of shaft or pile details **for each pier**, however, the design engineer may choose to use one set of details for the whole bridge plan set, as long as all variables and conditions are addressed and would be clear to the contractor reading the plans.
  - Typically, when showing items below ground, they would be detailed using a hidden line style. **However**, because the shaft "elevation" is detailed more like a section, it is not necessary, and in fact, discouraged to show the below ground portions as hidden.
  - Bridge elements that have not yet been built *should* **not** be shown, unless it is to add clarification to the condition being detailed. For example, a shaft cap may be shown to highlight the penetration depth of the shaft into the cap. Any future element (those that have **not** been built yet) *shall* be shown using a **DDASH** line style in accordance with Figure 11.1.1-E1.

- **Abutment**
  - Abutment piers *shall* be detailed separately due to the elevation views being opposite directions in relation to stationing. This will mitigate any chance for confusion in the field due to asymmetrical profiles or grades, and any differences in skew.
  - 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. Seal depth and elevations may be shown on abutment or pier elevation views and may also be shown on section views only if required for additional clarification.
  - Seals should be shown on Abutment or Pier sheets as necessary but *should* not include dimensions already specified on the Footing Layout
  - 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".
- **Wingwall Details**
  - Wingwall detail sheets *shall* be placed directly after each set of Abutment detail sheets.
  - These sheets are permitted to show superstructure components, even though they would not be built at the time the wingwalls are being built. This is to show relational data, such as open joint dimensions and top slope of wall in relation to deck haunch. The future substructure components shown *shall* be detailed in a **DDASH** line style in accordance with Figure 11.1.1-E1 to represent a future component to be built.
  - Each abutment *should* have its own set of wingwall detail sheets, however, each wingwall for that particular abutment pier may be represented concurrently by a single set of details using elevation tables and other multi-data representations to differentiate between each wall. Additionally, the design engineer may permit the use of a single set of wingwall sheets for all wingwalls within the project so long as all the information requirements are met and would be clear to the contractor.
- **Intermediate Piers/Bents**
  - Each pier *should* be detailed separately as a general rule or best practice.
  - If the intermediate piers are identical except for height, then they may be shown together at the discretion of the design engineer, so long as the design intent and the information pertaining to **each** pier is clear and easily understood.
- **Bearing Details**
  - Typically shown after all substructure details directly before the girder framing plan.
  - Only one bearing detail sheet is needed in the plan set. If multiple are required, they *should* be directly placed after all detail sheets for each abutment pier and their attached structures (i.e. wingwall sheets)

- **Framing Plan**
  - Girder Lines must be identified in the plan view (Gir. A, Gir. B, etc.).
  - For adjacent deck girder bridges, such as slab girders and wide flange thin deck girders, the framing plan *shall* be based on the girder centerline or centerline work point rather than the gap width between adjacent girders.
- **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
- **Girders**
  - Prestressed girder sheets can be copied from the Bridge Office library but they must be modified to match the project requirements.
- **End Diaphragm**
  - End diaphragm sheets can be copied from the Bridge Office library but they must be modified to match the project requirements
  - Only one set of End Diaphragm details is required, however, specific conditions may warrant a separate set of details for each End Diaphragm. This will be at the discretion of the Design Engineer.
- **Intermediate Diaphragm**
  - Intermediate diaphragm sheets can be copied from the Bridge Office library but they must be modified to match the project requirements
  - Only one set of Intermediate Diaphragm details is required if there are multiple diaphragms, however, specific conditions may warrant a separate set of details for each Intermediate Diaphragm. This will be at the discretion of the Design Engineer.
- **Bridge Deck Reinforcement**
  - Plan and transverse section views
  - Traffic barrier reinforcing bars shall be called out on the Bridge Deck Reinforcement Plan sheet by using an overall dimension as shown in Figure 11.1.3-C1. The S1 and S2 bars are to be detailed, dimensioned, and their spacing shall be shown only on the Traffic Barrier Details 1 sheet.

Figure 11.1.3-C1 Traffic Barrier Reinf. Callout on Bridge Deck Reinf. Plan



- **Expansion Joints**
  - On a single span bridge, expansion joint details are typically part of the approach slab plan sheets
  - On a multi-span bridge, expansion joint details are typically on a stand-alone sheet group that comes after the superstructure deck sheets.
  - Expansion joint sheets can be copied from the Bridge Office Library but they must be modified to match the project requirements.
- **Traffic Barrier**
  - Traffic barrier sheets can be copied from the Bridge Office library but they must be modified to match the project requirements.
- **Railing/Fence**
  - Railing or Fence sheets can be copied from the Bridge Office library but they must be modified to match the project requirements.
- **Bridge Approach Slab**
  - Approach slab sheets can be copied from the Bridge Office library and modified as necessary for the project.
- **Signs/Sign Structures**
  - Sign and Sign Structure sheets can be copied from the Bridge Office library but they must be modified to match the project requirements.
  - These only pertain to signage that will be attached to the bridge or supporting bridge structure
- **Architectural Treatment**
  - The State Bridge and Structures Architect is responsible for designing and approving much of the architectural treatment to be used. Detailers will work with the State Bridge and Structures Architect to incorporate the treatment and associated details into the plan set.
  - If a standard drawing exists in the Bridge Office library, it is permissible to copy these and modify them as necessary.
  - If there are no standard drawings in the Bridge Office library, the State Bridge and Structures Architect may approve the use of a similar set of details from an existing plan set, as long as the details used are modified to meet the requirements of the current plan set.
  - If no standards or examples exist, the State Bridge and Structures Architect is responsible for the design and requirements of the Architectural Treatment.
  - Basic treatments that are commonly used (i.e. Fractured Fin finish) may be incorporated into the detail or plan sheets it pertains to, such as traffic barrier or wingwall sheets, and have standard details that already exist for use without the need of the Bridge Office Architect to design or approve the use of.
  - Some, more complex, instances require Architectural treatment to be its own set of plan sheets.
- **Barlist**
  - The barlist sheets do not require stamping because they are not officially part of the contract plan set.

11.1.3.D Wall Structure Sheets and Detailing Practices

Wall sheets within the contract plan set shall be determined and placed by the WSDOT region office responsible for the corridor project regardless of the design group responsible for drafting the wall plans. Any bridge plan sheet that includes wall geometry should do so only for reference and should only include minimal wall information as necessary to reduce redundant information.

Walls that directly support bridge loads or act as a bridge abutment, such as a geosynthetic retaining wall supporting a bridge footing, shall be laid out and detailed entirely in the bridge plan set as these will be treated as bridge structural components.

Unless the wall to be detailed meets specific criteria as mentioned previously, the wall sheets will stand alone in their own section of the plan set as determined by the WSDOT region office. Therefore, although it is important to show and reference the walls on the bridge layout sheet, the walls shall have their own separate layout sheet(s) as required. The following specifies general minimum requirements for each wall sheet detailed by the bridge design group.

11.1.3.D.1 *Layout*

- It is permissible for all of the walls within the plan set to be placed on a single wall layout sheet if the size and scaling permits, and only when deemed appropriate by the design engineer as a means to best convey overall design intent, otherwise each wall will have its own individual layout.
- If using a single layout sheet, the wall sheets should be organized by placing all walls in the same location within the Contract Plans.
- Each layout view shall include stationing and offset along the alignment for both the wall alignment and the main project construction alignment.
- Each layout view shall include all utilities that will be in place (existing) at the time of wall construction and are located within the vicinity of the wall.

11.1.3.D.2 *Developed Elevation*

- Each wall shall have a developed elevation view. This view may be placed on the layout sheet if size and scaling permits, otherwise will be placed on its own sheet.
- Each elevation view shall be detailed using the same vertical and horizontal scale. Exaggerated horizontal or vertical scales are not permitted.
- Each elevation view shall have an overall dimension of the wall along the wall alignment line.
- Each elevation view shall include additional horizontal dimension lines denoting the size and total number of each wall section panels if applicable and the locations of expansion joints and or contraction joints.
- The elevation view shall show the existing and proposed ground line at the top and bottom of the wall.
- Each elevation view shall show, at a minimum, the top elevation and bottom elevation at the beginning of the wall and the end of the wall, as well as the elevation at any profile transition.

- Each elevation view shall show all existing utilities that will intersect the face of the wall or wall alignment. New utilities intersecting the face of the wall or wall alignment that will need to be accommodated by the construction of the wall shall be shown as well.
- A reference elevation may be shown in a wall elevation view if deemed necessary by the design engineer to help clarify the design intent and improve plan readability. If shown, the elevation line shall be placed below the ground line as determined by the design engineer. The reference elevation should be determined based on 20-foot increments from 0 and should be set at the previous 20-foot incremented elevation prior to the lowest elevation of the ground line. For example, a low ground elevation of 163.35' would call for a minimum reference elevation of 160.00' but for plan clarity and readability could be set at any previous 20-foot incremented elevation such as 140.00.' or 100.00' but is recommended to keep it as close as possible to the low ground elevation to maintain visual association with the view.
- For wall height dimensioning standards refer to BDM Section 8.1.11.E.

11.1.3.D.3 *Details*

- All relevant details necessary to construct all aspects of the wall shall be included in the plan set. Standard Plan retaining wall details shall not be included unless modifications to such details have been made.
- For additional detailing requirements refer to BDM Section 8.1.11.E.
- If a design requires specific and unique architectural finishes, a detail sheet or sheets shall be included in the wall plan set as required.

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

11.1.5.A General

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

11.1.5.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.

11.1.5.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.

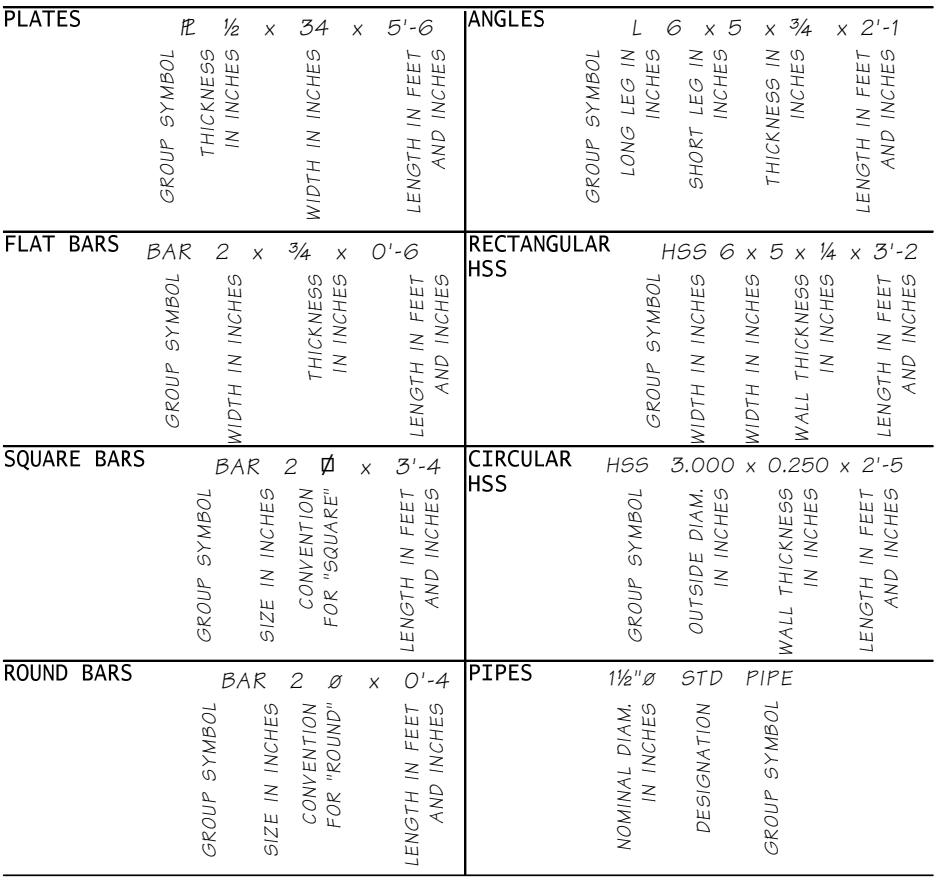
11.1.5.D Strips

- 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.

11.1.5.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.

Figure 11.1.5-E1 Steel Callout Symbology



11.1.6 Aluminum Section Designations

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

Table 11.1.6-1

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

11.1.7.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.

11.1.7.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	° 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

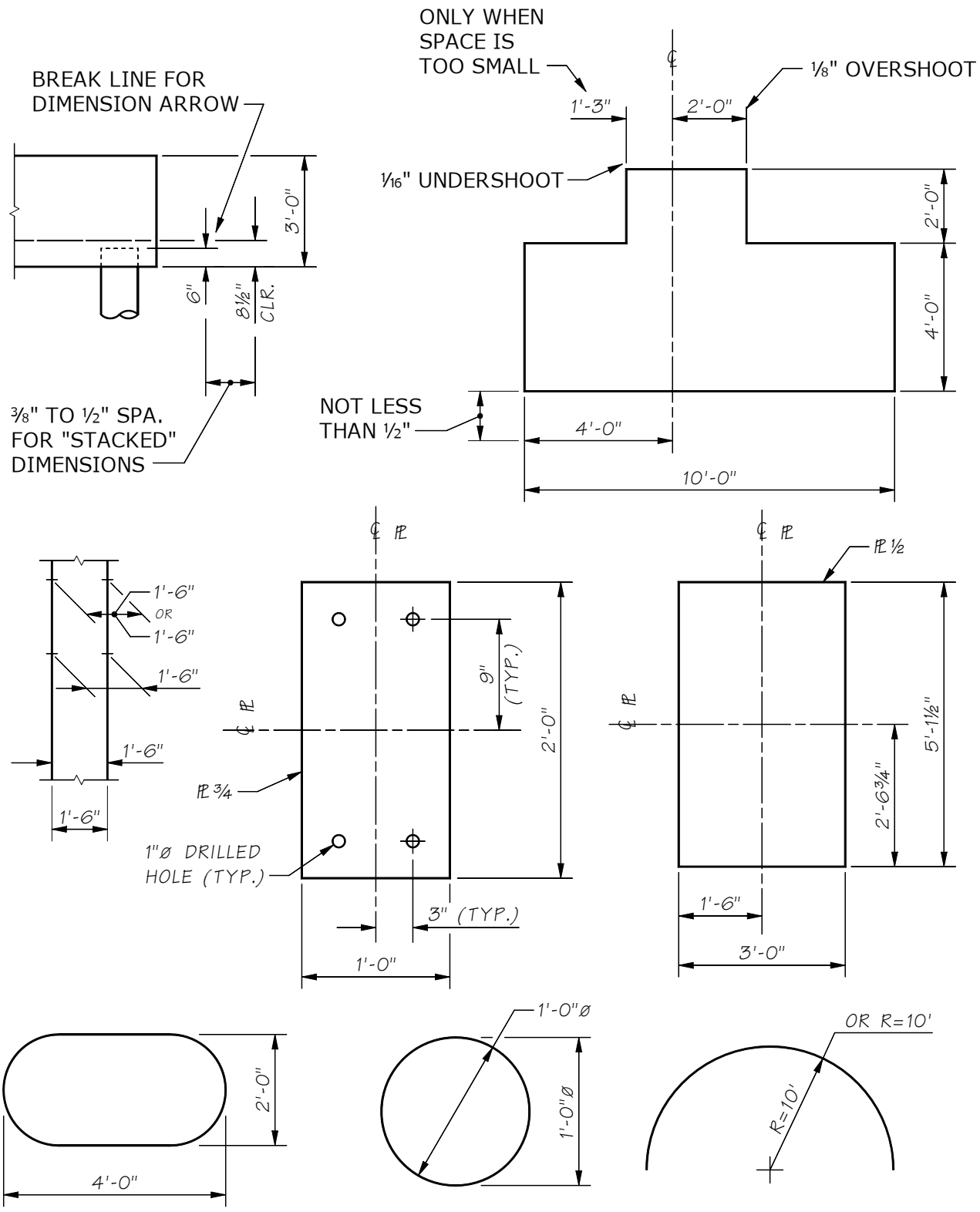
water surface	W.S.
weight(s)	WT.
welded steel pipe	WSP
welded wire fabric	W.W.F.
West	W.
Willamette Meridian	W.M.
wingwall	W.W.
with	W/
without	W/O

Y

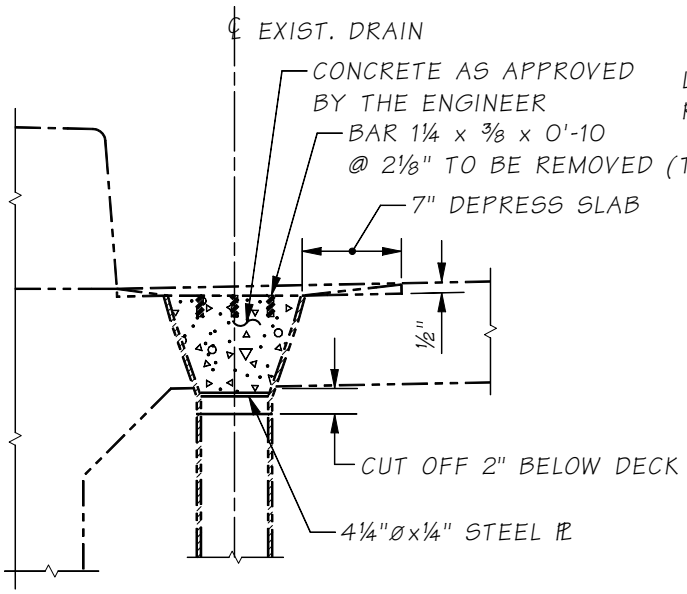
yard, yards	YD., YDS.
year(s)	YR.

11.2 Appendices

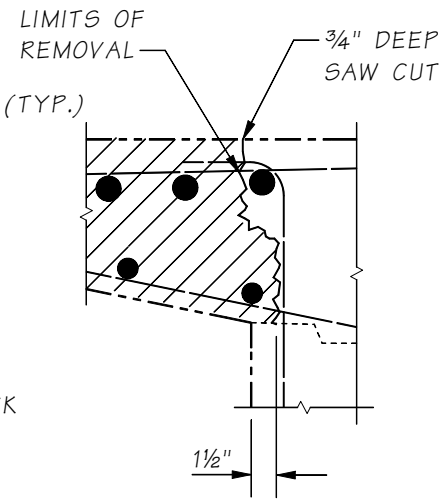
Appendix 11.2-A1 Dimensional Callout Example



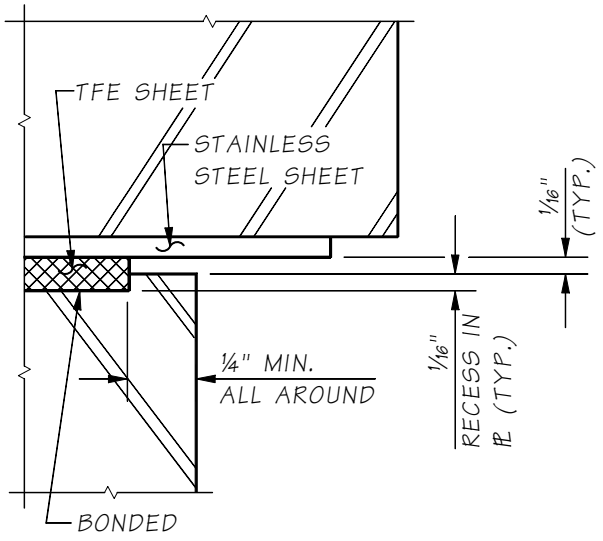
Appendix 11.2-A2 Typical Details



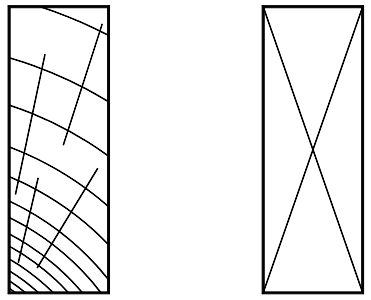
TYPICAL CONCRETE DETAIL



TYPICAL REMOVAL DETAIL

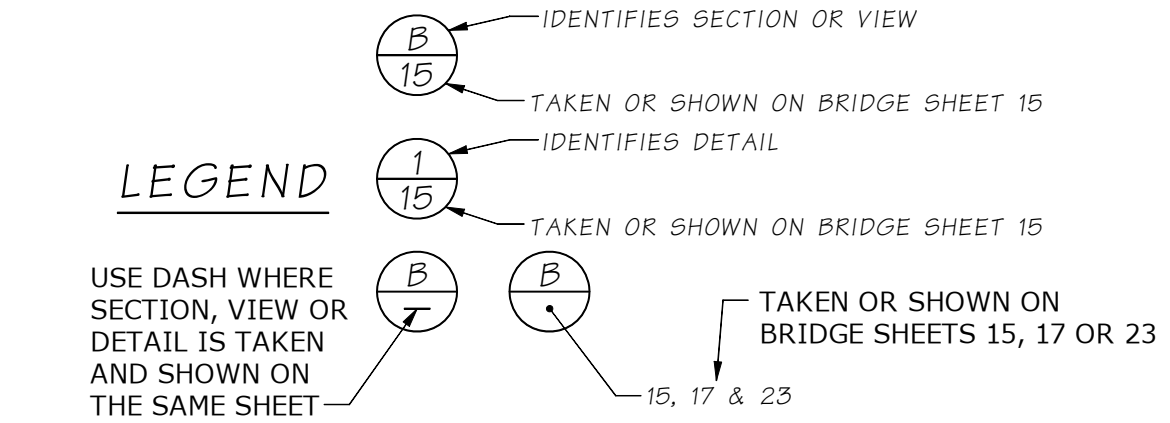


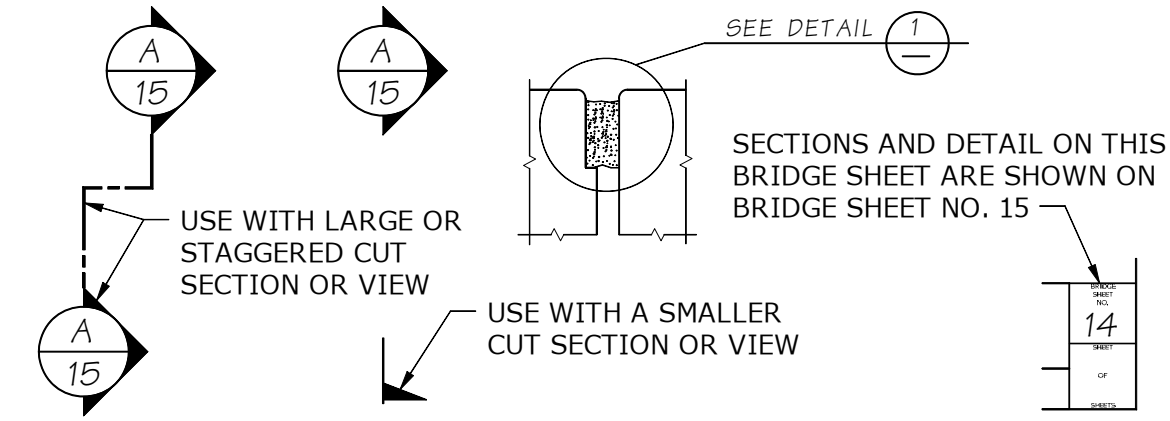
TYPICAL STEEL DETAIL

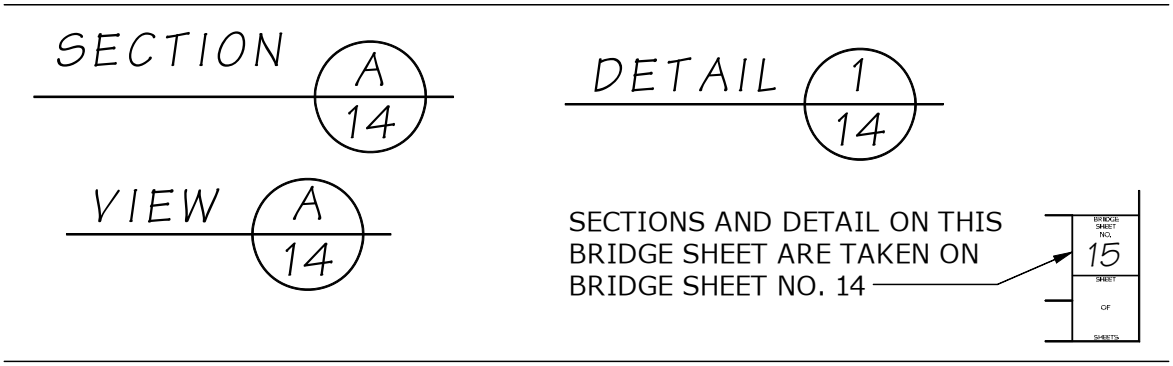


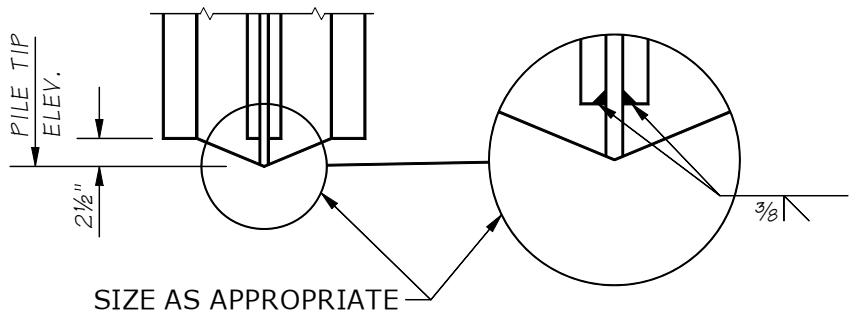
TYPICAL TIMBER DETAIL

Appendix 11.2-A3 Typical Section Callouts









Appendix 11.2-A4 Reinforcement Callout Examples