

COLORADO DEPARTMENT OF TRANSPORTATION STAFF BRIDGE BRIDGE DETAIL MANUAL	Chapter: 12 Effective: October 8, 1986 Supersedes: New
Pier Details	

12.1 Purpose

These drawings are to present graphically all pertinent information necessary in the field construction of this segment of the structure.

12.2 Responsibility

These drawings shall be prepared and checked in the Design Unit. The graphic presentation of information on these drawings shall be the responsibility of the individual preparing the drawings.

12.3 Scales

Scales shall be used that are suitable to make the details legible when the drawing is reduced. Suggested scales for presenting the details of the piers are as follows:

- (a) Plan and Elevations - $1/4" = 1'-0"$ and $3/8" = 1'-0"$.
- (b) Sections - $1/4" = 1'-0"$, $3/8" = 1'0"$, $1/2" = 1' - 0"$, and $3/4" = 1'-0"$.
- (c) The Elevation of an opposite hand detail may be drawn to a smaller scale.

12.4 Orientation of Details

The PLAN of the pier shall be placed, if possible, at upper left of the drawing.

The ELEVATION of the pier shall be projected below the PLAN. When possible, the END ELEVATION and/or Sections shall be placed to the right of the PLAN and ELEVATION. If space is limited, the sections or secondary views may be shown on another sheet.

Generally, sections should be taken from the PLAN and ELEVATION rather than from secondary views or other sections.

12.5 Opposite Hand Details

The reference to "opposite hand" details shall be avoided. Two preferred methods are as follows:

- (a) Redetail opposite hand pier.
- (b) Detail the ELEVATION of the opposite hand pier to a smaller scale.

12.6 Horizontal Control Line

The horizontal control line shall be shown on the PLAN and labeled consistently with the plans. Example: "Survey Line", "Project Line", etc.

12.7 Layout Line

For structures located on a curve, the Layout Line shall be shown on the PLAN and labeled consistently with the plans. Example: "Tangent from T.S. Sta. 31+48.00", "Chord from P.O.C. Sta. 38+41.08 to P.T. Sta. 39+78.00", "Tangent from P.O.C. Sta. 382+10.00", etc. For structures on tangent, the Layout Line shall coincide with the horizontal control line.

12.8 Stationing

A station shall be placed at the intersection of the horizontal control line with the Centerline Pier.

All stations on the "Pier Details" shall be given to two decimal places.

The direction of stationing shall be indicated on the plan view as "Station Ahead".

12.9 Centerlines

Centerlines shall be identified and shown as discussed in the following subsections:

(a) Location - Centerlines shall be shown at the following locations, when applicable.

1. Plan View

- a) Centerline of pier
- b) Centerline of all girders
- c) Centerline of all bearings
- d) Centerline of roadway
- e) Centerline of columns and footings
- f) Typical centerline of anchor bolts or bearing pads.

2. Elevation View

- a) Centerline of caissons
- b) Centerline of columns and footings

3. Section Through Pier

- a) Centerline of bearings
- b) Centerline of caissons
- c) Centerline of columns and footings

(b) Identification - The centerlines shown on the pier details shall be identified in the following ways:

1. Centerline of Girder - A circle containing the capital letter G and girder number is placed at the end of each outside girder centerline, as shown in the PLAN views of the piers in the graphic examples.

These girder number shall correspond to those shown on the "Construction Layout".

12.9 Centerlines (Continued)

2. Other Centerlines - When it is applicable to identify some of the other centerlines, it should be done by using their particular names. Examples: Centerline Bearing, Centerline Anchor Bolts, Centerline Columns, Centerline Footings, etc.

12.10 Elevations

All elevations shown on the "Pier Details" shall be to two decimal places; except bottom of footings, which shall be to one decimal place. Elev. 5280.3.

The elevations given at the bottom of footings shall consist of all the significant figures preceding the decimal point. The other elevations on the drawing shall display only two digits preceding the decimal point. Example: Elev. 80.28

- (a) Location - Elevations shall be shown on the ELEVATION view of the pier at the following locations, when applicable;

1. Top of bearing seats
2. End of pier cap on the bottom face
3. Top of columns at the centerline of column
4. Bottom of footings or wall

The basic footing elevation are provided on the design notes. The detailer shall make sure that the footing elevations correspond to the information described in the design notes. The top of the footing should be kept 2 feet minimum below ground line.

The bottom of footings shall be held as close to 6 feet below the stream bed as possible.

In order that pier columns may have the same height, it is permissible to vary the bottom footing elevations where

12.10 Elevations (Continued)

possible, as long as these elevation do not differ by more than 1'-0".

12.11 Pier Cap Slopes

The top of the pier cap should be sloped between bearing seats to maintain, as nearly as possible, the 2-inch clearance to pier cap reinforcing steel.

12.12 Dimensions

A sufficient number of dimensions shall be shown on the details to provide adequate information necessary in the checking of the plans and the construction of the pier.

The following list of common dimension, in feet and inches, shall be shown on the details (except as noted).

(a) Plan View of Pier

1. Outside of pier cap to outside of pier cap, along centerline of pier.
2. Layout line to outside of pier cap, along centerline of pier.
3. Typical girder spacing (given in decimals to a thousandth of a foot).
4. Layout line to nearest girder, along centerline of bearings (given in decimals to a thousandth of a foot).
5. Horizontal control line to layout line, along centerline of pier, for structures on a horizontal curve (given in decimals to hundredth of a foot).
6. Centerline of pier to centerline of bearing.
7. Outside of pier footing to outside of pier footing, along centerline of pier.
8. Outside of pier footing to layout line.

12.12 Dimensions (continued)

9. Bearing seats.

(b) Section Through Pier

1. Cap width, tie to centerline of pier.
2. Minimum cap height.
3. Wall or column width or diameter.
4. Wall or column height, if constant height.
5. Footing width and height, when applicable, tie to centerline pier.
6. Pile projection into footing
7. Top of footing to bottom layer of reinforcing.

12.13 Angles

The following angles shall be shown in the PLAN view of the pier, when applicable.

(a) Skew angle

(b) Angles that the girders generate with the centerline of pier or centerline of bearings, if they are different than the skew angle.

12.14 Anchor Bolts

When applicable, anchor bolts or bearing pads shall be shown in the PLAN of the pier or in a separate detail. See anchor bolt note.

12.15 Piling

When applicable, piling shall be shown but not dimensioned in the PLAN, ELEVATION, and SECTION THROUGH PIER.

12.16 Pier Nose Angle

The following statements pertain to pier nose angles, and are to be used when applicable:

(a) Nose angles shall be shown in the ELEVATION and SECTION.

12.16 Pier Nose Angle (continued)

- (b) The size and length of the angle shall be shown in a separate detail, as described in the designer's notes.
- (c) Angles are to be placed on the upstream side of the bridge only.
See typical pier nose angle note.

12.17 Reinforced Concrete Details

The reinforced concrete details shall be made in accordance with the design notes and current standard practice. The statements listed below are to be followed when applicable.

- (a) The footings shall be shown in the PLAN, ELEVATION, and SECTION views of the pier.
- (b) All construction keys shall be raised.
- (c) On parabolic T-girders, with a hinge action at the piers, the concrete key shall be placed up on the top or bottom of the column or wall and dimensioned.
- (d) When detailing columns, the following notation shall be added to the column ties: "Rotate Splices".
- (e) Pier walls should have tie bars spaced at a maximum of 2'-0".

The clearance on intersecting planes of steel shall be checked. It is important to make sure that the vertical column bars that are projected into the pier cap will clear the horizontal bars in the bottom of the cap.

Due to the problem of incorporating the necessary reinforcing in pier caps for continuous parabolic T-girder and concrete box girder bridges, special attention shall be given to the amount of reinforcing steel in the cap. This amount should be reviewed to insure that there is ample clearance. Allowance should be made for the deformations (ridges) on the reinforcing steel.

12.17 Reinforced Concrete Details (continued)

Do not show any of the superstructure on the pier detail drawings. The pier diaphragm and superstructure should be shown on the superstructure drawings.

- (f) When cutting off bars in cantilever pier caps, the reinforcing steel shall extend into the cap, shown in Figure 12-1.

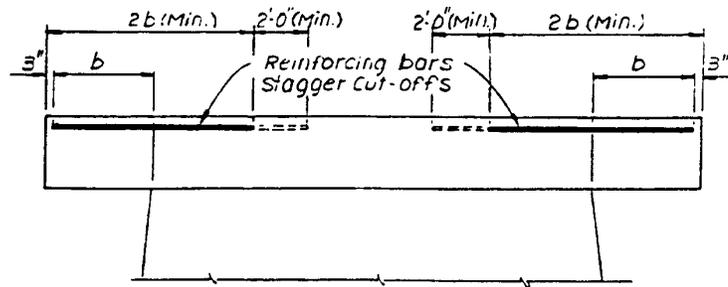


Fig. 12-1 DETAIL SHOWING REINFORCING BAR CUT-OFFS IN CANTILEVER PIER CAP

10/08/86

- (g) All reinforcing steel in the pier shall be epoxy coated, with the exception of the steel entirely encased in the spread footing. This steel may be non epoxy-coated and so indicated with the symbol (N).

Refer to the appropriate section of Chapter 4 for additional information concerning bar clearances, spacing, splicing, embedment, projections, etc.

12.18 Check Items

Listed below is a summary of items that shall be checked and appear on the drawing, when applicable. Additional information shall appear, as required.

- (a) Project number in proper location.
- (b) Label Horizontal Control Line in the PLAN view.
- (c) Layout Line, in the PLAN view.
- (d) Stationing.
- (e) Location and identification of centerlines.
- (f) Elevations.
- (g) All necessary dimensions.
- (h) Skew angle of bridge and other pertinent angles.
- (i) Anchor Bolts and note.
- (j) Show footings in the PLAN view as well as in the SECTION and ELEVATION.
- (k) Pier nose angle.
- (l) Check all intersecting planes of reinforcing steel for the proper clearances.
- (m) Check bearing plates to insure that they fit properly at the piers.
See Figure 11-2
- (n) Bearing pads.
- (o) Title PLAN, ELEVATION, and SECTION in accordance with their particular conditions.
- (p) Check for typical notes.
- (q) Check title block for information.

12.19 Title Block

This drawing is entitled "PIER DETAILS" and shall be so indicated in the title block. The pier numbers may be included in the title, such as "PIER 2 AND 3 DETAILS".

If other details are combined on this drawing, they shall be indicated in the title. Example: If the "Abutment Details" are placed on this drawing with the "Pier Details", the title shall be "ABUTMENT DETAILS - PIER DETAILS".

The structure number and the first initial and last name of the designer and detailer shall be filled in on each sheet.

12.20 Typical Notes

The following notes shall appear on the drawing when applicable:

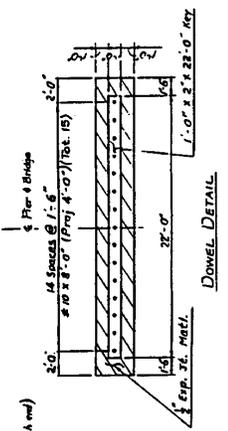
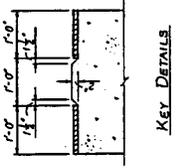
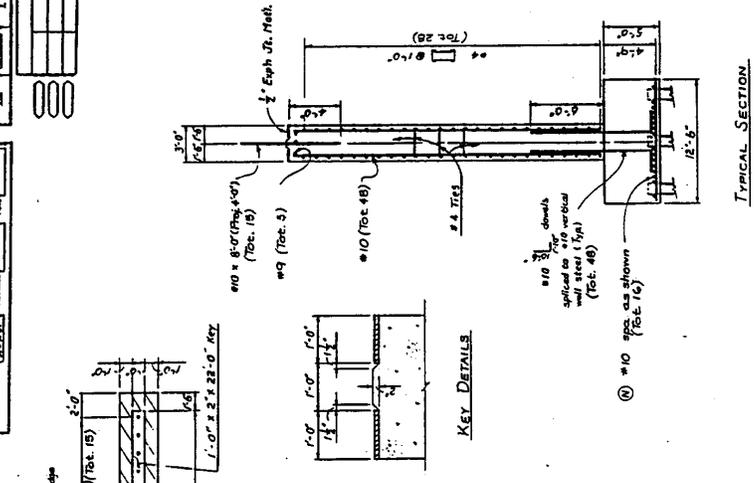
- (a) Anchor Bolt Note - "Anchor Bolt _____" Φ X _____ Long.
(Project _____)"
- (b) Column Tie Bar Note - "Rotate Splices"
- (c) Pier Nose Angle Note - "Pier nose angle on upstream end only."
- (d) Pour crash wall monolithically with pier wall.

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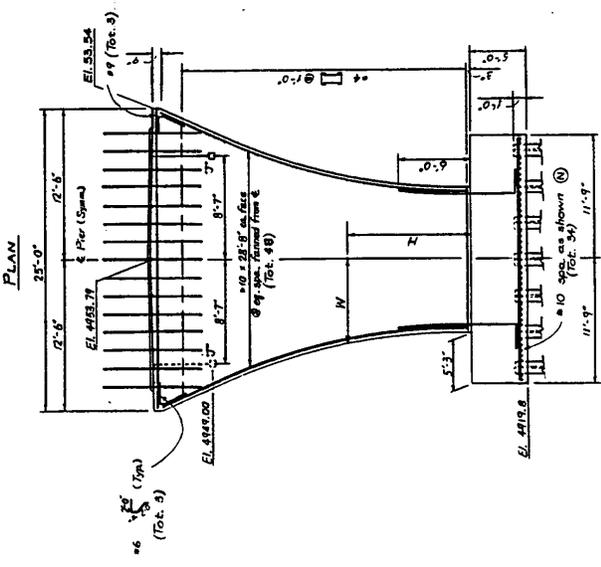
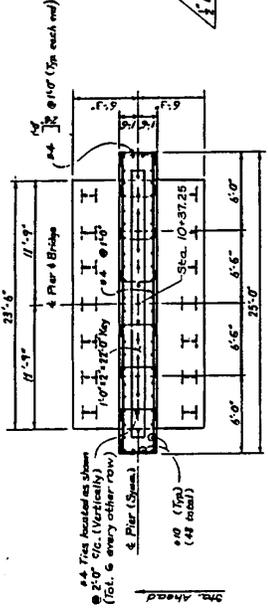
NO. CONTRACTOR	NO. DIVISION	NO. SHEET	NO. OF SHEETS
		170-1687	27
DATE: 10/1/86			

NO. DIVISION	NO. SHEET	NO. OF SHEETS



H(FT)	K(FT)
28.00	18.50
26.00	11.67
24.00	10.91
22.00	10.20
20.00	9.56
18.00	8.98
16.00	8.46
14.00	8.00
12.00	7.60
10.00	7.26
8.00	6.99
6.00	6.77
4.00	6.62
2.00	6.53
0.00	6.50

PARABOLIC OFFSETS



ELEVATION
Pier 2 looking up station
3+84.48 Junction 6a

DIVISION OF HIGHWAYS

PIER 2 DETAILS

Drawn	L. S. J. / S. J.	Checked	G. O. / A. E.
Design	W. S. J. / N.	Reviewed	
Working	10/1/86	Scale	1/8" = 1'-0"