

Suggested Reinforcement Detailing Practices

Based on comments from R&D and ES/SES Committees

General

1. When detailing substructures, it is preferable not to use series bars unless necessary. The first choice is to use “slack” in the bar laps to accommodate a variety of heights.
2. When a series of bars is required, a minimum of 2” difference between each bar in the series is required. If the difference from the shortest to the longest is not sufficient to maintain that minimum, different bar marks should be used for each bar or group of bars.
3. When a bar extends from one concrete pour to the next, dimension the minimum lap length, the embedment length, or the projection length. (See Figure 1.) If the bar is bent, show the minimum lap length. If the bar is straight, show the embedment or projection length.

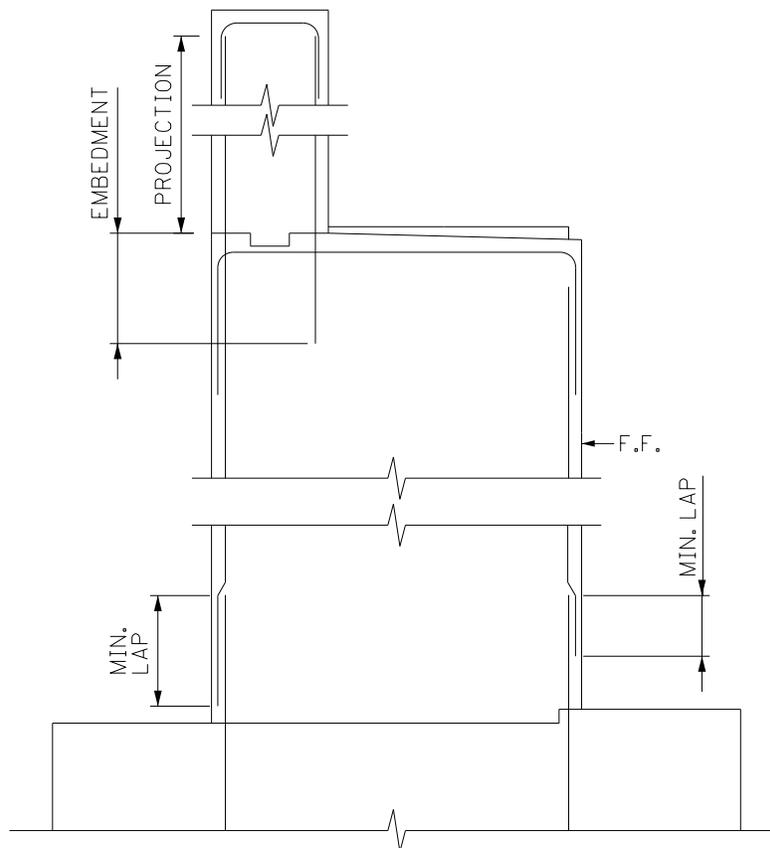


Figure 1

4. Bar lengths, splice lengths, and cover dimensions do not need to be adjusted to accommodate potential fabrication or construction tolerances unless specifically mentioned in this document or the LRFD Manual.
5. When detailing clear dimensions, only put the distance required (i.e., 2” clear, not 2” clear (min)). When dimensioning deck thicknesses, include minimum with the dimension (i.e., 9” (min), not 9”).

Dowels and Vertical Reinforcement

1. Dowel bar lengths should be computed assuming the design lap plus an additional 2 inches. The dowels should also be sized to accommodate any variation in wall height.
2. Laps between dowel bars and vertical bars should be shown on the plans rather than the projection from the top of the footing. The lap should be shown from the end of the vertical bar rather than the top of the concrete. (See Figure 2.)
3. Vertical bars in abutments, wingwalls, retaining walls, and other similar situations should be drafted to show the bars ending above the top of the footing. (See Figure 2.) This provides visual clarity for the drawing, but does not necessarily reflect how the bar will be placed during construction.

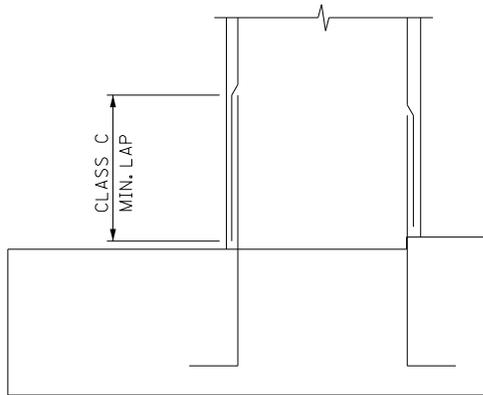


Figure 2

4. Vertical bar lengths should be computed assuming the bar will be placed directly on the footing.

5. For wingwalls that do not have a barrier mounted on top, use a U-shaped tie at the top of the wall. (See Figure 3.) Ties are not needed at the ends of wingwalls or at the bottoms of wingwalls that cantilever past the end of a footing. Additionally, ties are not necessary on the tops of wingwalls with a barrier mounted on top, as long as the barrier dowel is adequately lapped to the wingwall vertical bars. The bar mark for the ties should correspond to the concrete pour that is associated with them: if the concrete around them is abutment concrete, the bars should be A bars; if the concrete is superstructure concrete, they should be S bars.

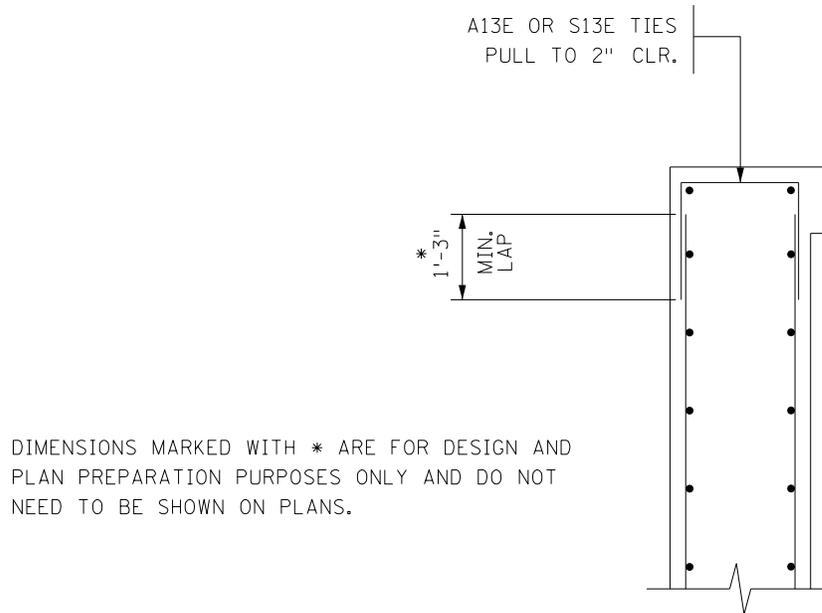


Figure 3

6. Leave vertical bar 4" short of top of wall (or seat) or more as required to account for a sloped top surface. Extend length of A16E abutment seat tie to ensure proper lap length. These tie bars must be spaced with the verticals. A series may be used if the slope is extreme. Otherwise, keep verticals to a single length. Some laps will exceed the minimum. (See Figure 4.)

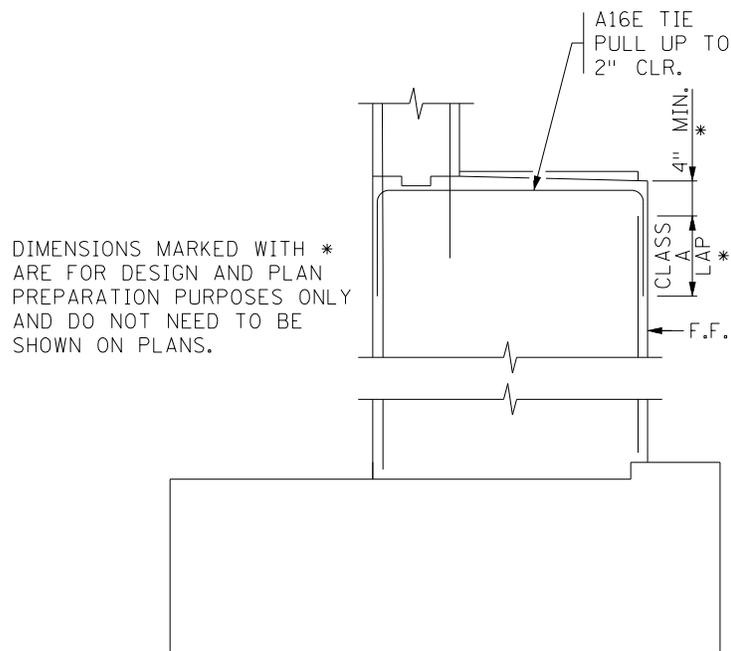


Figure 4

Abutment Reinforcement

1. For semi-integral abutments, the bars labeled A__E in Figure 5 are designed bars. They must be designed to resist the force from the shear lug when the end diaphragm is engaged. They should be spaced all along the length of the abutment, even under the pedestals. They are not replacements for pedestal tie bars.

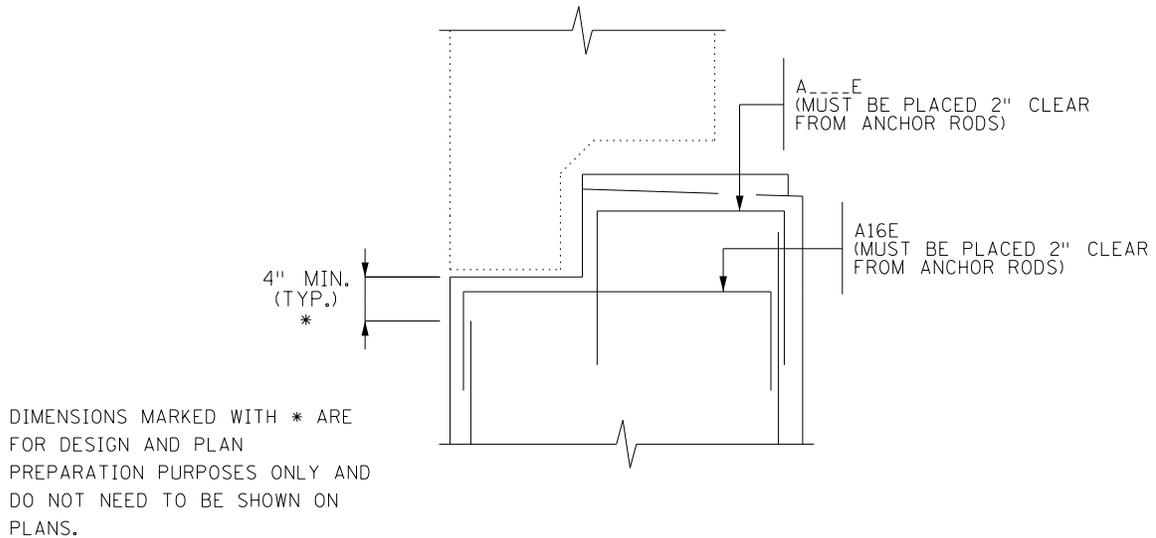


Figure 5

Pier Cap Reinforcement

1. Splice all longitudinal top bars to allow for adjustment in overall length at the ends of the pier cap (especially important for pier caps that do not have square ends). (See Figure 6.)
2. All top longitudinal bars in pier cap should be the same two bar marks with alternating lap locations. The amount of lap may exceed the minimum, where the total length is shorter. (See Figure 6.)

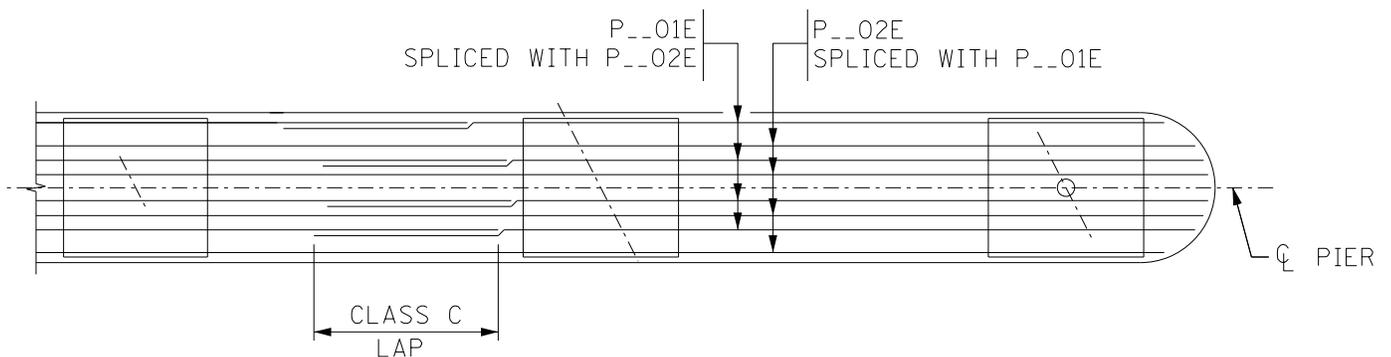


Figure 6

- Do not place splices at locations of maximum moment. For cap top bars, do not splice over columns. If cap bottom bars are spliced, do not splice at the midpoint between columns or in columns; place splice adjacent to column. Avoid placing splices where bearing anchor rods are located. (See Figure 7.)

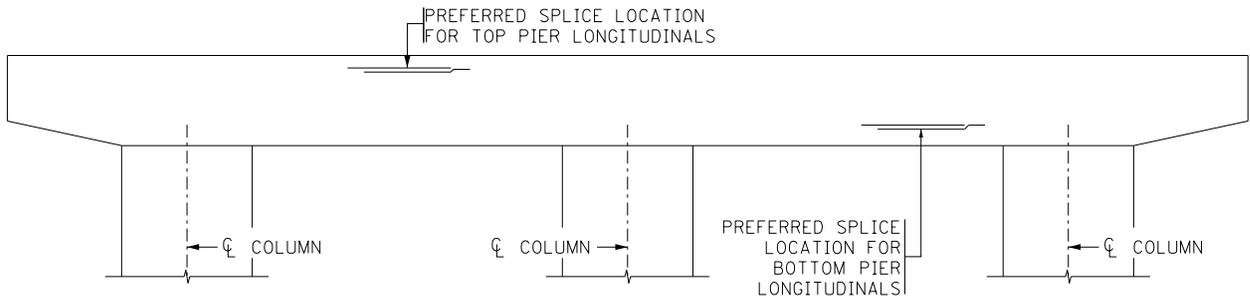


Figure 7

- When detailing ends of pier caps, actual bar bend radii and locations must be considered to avoid conflicts. Figure 8 shows an example of good detailing of bent bars at the end of the pier cap.

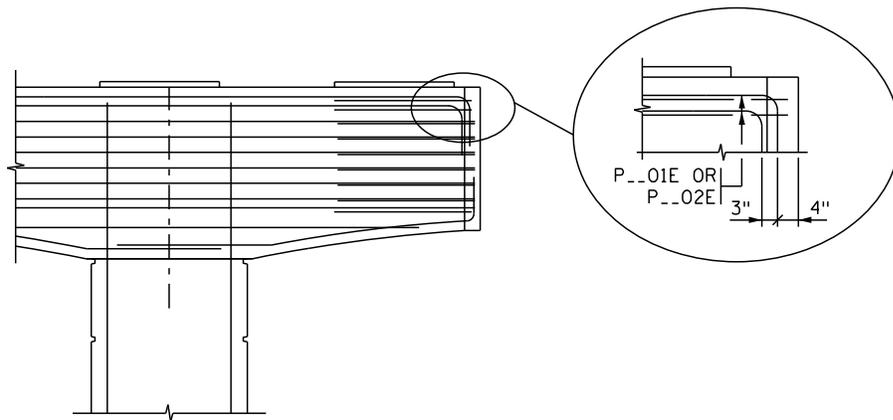
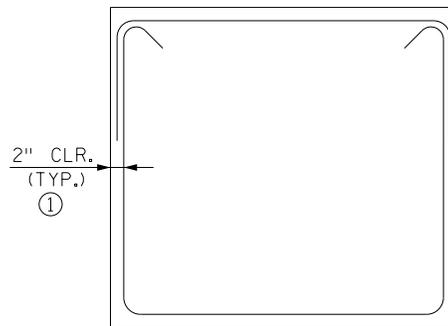


Figure 8

- When single stirrups are used in a pier cap, include the note shown in Figure 9.



① 1/2" IS PERMITTED TO ALLOW FOR BAR TOLERANCE ONLY WHEN SINGLE STIRRUPS ARE USED. CENTER STIRRUP IN PIER CAP. CAP WIDTH SHOWN ON PLANS CANNOT BE REDUCED IN CONSIDERATION OF THIS CLEARANCE.

Figure 9

Deck Reinforcement

1. Two options are available for top transverse deck bars:
 - a. When the total length of the top transverse bar exceeds 60 feet, splice the top transverse bars to allow for adjustment in overall length at the outside edge of the bridge deck.
 - b. When the total length of the transverse bar is less than 60 feet, detail the top transverse bar to be placed with 2½" clear to the edge of the deck rather than 2" clear. This will require the top transverse bars to be dimensioned at 5" shorter than the total deck width. Detail the bottom transverse bars with 4" clear from the edge of the deck. Inspectors will need to be reminded that the clearance requirements have tolerances.
2. When detailing concrete end diaphragms for integral, semi-integral, or parapet abutments, the bars that are transverse to the diaphragm should be placed parallel to the beams. (See Figure 10.)

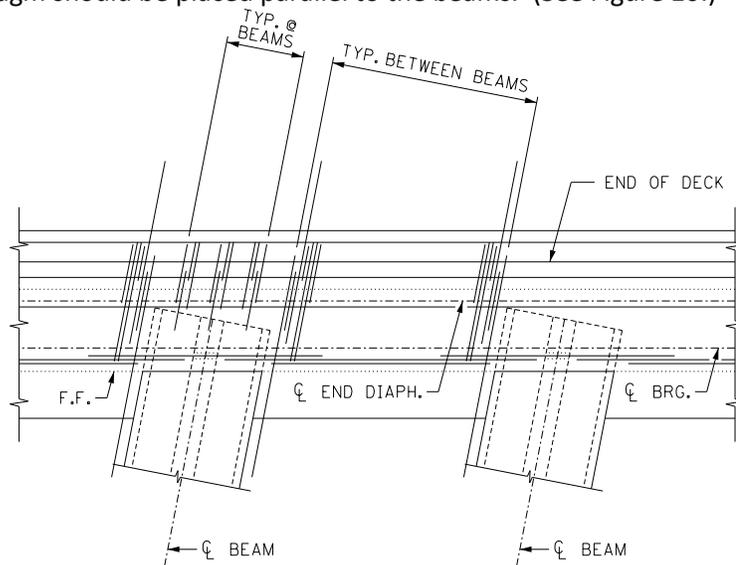


Figure 10