Section 1 - BRIDGE SUPERSTRUCTURE

PC/Pretensioned I Girder (Harped Strands)

XS Sheet Numbers:

xs1-120-2

Description of Component:

Precast Pretensioned I Girder with Harped Strands. This sheet shall be used in conjunction with xs1-120-3.

Standard Drawing Features:

1) Elevation:

- Provide girder length “L”. If different girder lengths are specified, fill out the Girder Design Table.
- Shear stirrup spacing shall be provided. #5 Stirrups are preferred. Three types of stirrup shapes are allowed.
- The “Y” dimension shall be provided in the girder design table. Manufacturers prefer “Y” dimension as small as possible. However, the designer needs to calculate the tensile stress at the girder top to meet the allowable stress requirements. Variation of 3 inches for “Y” should be considered in the calculations.
- The number of Intermediate diaphragms should be designed based on BDM 5.3 and detailed accordingly.
- Special details shall be provided if girder ends are not level.

2) Typical Girder Section:

- Girder Depth “D” shall be provided and may be shown on the Girder Design Table.
- The spacing for bottom confinement reinforcement is the same as the stirrup spacing, but shall not exceed 6 inches per AASHTO-CA LRFD BDS Article 5.9.4.4.2 within 1.5D from girder ends.

3) Section A-A:

The stirrups for splitting resistance should be verified based on AASHTO LRFD BDS Article 5.9.4.4 - Pretensioned Anchorage Zones. Other standard confinement details are provided. End blocks are usually not needed unless the design requires them.

4) Clearances for Pretension Strands:

This detail shows bundled strands at the mid-span location.

5) Girder Design Table:

This table shall be used for specifying girder lengths, girder depths, jacking forces at 4 inches and 6 inches of “X”, areas of strands, “Y”, concrete strengths, mid-span deflections due to deck dead load, additional load, such as barrier railing, and the total number of extended strands. Additional top reinforcement at girder ends may be needed if temporary tensile stress exceeds the allowable stress specified in AASHTO-CA LRFD BDS. With the additional top reinforcement designed, the temporary tensile stress limits could be increased per AASHTO LRFD BDS Table 5.9.2.3.1b-1. If the project has different girder configurations, identify each as Girder A, B, C, etc. In some cases, especially for long span girders, prestress force may be controlled by strength limit state. In order to reduce initial concrete strength, the designer could reduce the initial jacking force from a maximum of 75% to a lower percentage (such as 72%) to meet the requirements of the service limit state while, at the same time, using the extra numbers of strands to meet the requirements of the strength limit state.

6) Strand Extension Hook Detail for Continuity Diaphragm (at Bent):

Per Caltrans Earthquake Committee’s request and the latest SDC, the details have been added, and the designer shall determine the number of hooked strands to satisfy the seismic design requirements of precast concrete bridge systems. The total number of extended strands shall be provided in the girder design table.

Design/General Note:

Several notes have been moved to standard specifications, including the maximum tensile stress limit (75%) and the maximum temporary tensile stress limit (80%).

One design option is to add temporary top prestressing strands, which allows the concrete strength at release to be reduced.

Additional Drawings Needed to Complete PS&E:

This sheet must be accompanied by xs1-120-3

Contract Specifications:

Standard Specifications 2024

Restrictions on Use of Standard Drawings:

The project engineer is responsible for designing and stamping this sheet.

Special Considerations:

The project engineer may modify this sheet based on project needs.