Section 1—BRIDGE SUPERSTRUCTURE

PC/PRETENSIONED WIDE FLANGE GIRDER (HARPED STRANDS)

XS Sheet Number:

xs1-122-2

Description of Component:

Precast Pretensioned Wide Flange Girder with Harped Strands -this sheet shall be used in conjunction with xs1-122-3.

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. Caltrans study has shown that #5@3 inches from the end of the girder to the distance “D” (girder depth) satisfies girder web splitting force and local strut & tie analysis.
   - The “Y” dimension shall be provided in the Girder Design Table. Manufacturers prefer “Y” dimension to be 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 of “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 leveled.
2. Typical Section:
   - Girder Depth “D” shall be provided and may be shown in the Girder Design Table.
   - The spacing for #3 bottom flange confinement reinforcement shall not exceed 6 inches per AASHTO-CA LRFD BDS Article 5.9.4.4.2 within 1.5D from girder ends. This sheet provides #3@3 inches within 1.5D (in Section A-A) and #3@12 inches at the rest of the area.
3. Section A-A:

   The stirrups for splitting resistance should be verified based on AASHTO-CA LRFD BDS Article 5.9.4.4 - Pretensioned Anchorage Zone. Other standard confinement details are provided for this area to develop the strands (see note of Typical Section). End blocks are normally not needed unless the design requires them.

4. Clearances for Pretension Strands:

   This detail shows strands at the mid-span range.

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 as specified in AASHTO LRFD BDS. With the additional top reinforcement designed, the temporary tensile stress limits could be increased per AASHTO-CA LRFD BDS Table 5.9.2.3.1b-1. If the project has different girder configurations, use Girder A, B, or C, etc., to identify each. 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 extra area of total 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 Notes:

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

One of the design options the designer could choose is to add temporary top prestressing strands to reduce girder concrete strength at release.

Additional Drawings Needed to Complete PS&E:

This sheet must be accompanied by xs1-122-3

Contract Specifications:

Standard Specifications 2024

Restrictions on Use of Standard Drawings:

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

Special Considerations:

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