Section 1 – Bridge Superstructure
PC/Pretensioned Wide Flange Girder (Harped Strands)

XS Sheet Numbers
XS1-124-1

Description of Component
Precast Pretensioned Wide Flange Girders with Harped Strands.

Standard Drawing Features

1. Elevation:
   - Girder Length “L” needs to be provided. If different girder lengths are used, fill out the table.
   - Shear stirrups spacing in regions A, B, C, etc, shall be provided and the table may be used. #5 stirrups are preferred. Caltrans studies have shown that #5@3 inches at “D” distance from girder ends satisfies girder web splitting force and the results of girder end strut & tie analysis.
   - “Y” dimension shall be provided in the table. Manufacturers prefer “Y” to be as small as possible. But designer needs to calculate the tensile stress at girder top to meet the allowable stress requirements. Variation of 3 inches of “Y” should be considered in the calculations.
   - Number of Intermediate diaphragms should be designed based on MTD 11-8 and detailed accordingly.
   - Special details shall be provided if girder ends are not leveled (and remove plan note requiring ends to be leveled).

2. Typical Girder Section:
   - Girder Depth “D” shall be provided and may be shown on the table.
   - The spacing for #3 confinement reinforcement normally matches the stirrup spacing. Designer could relax the spacing requirements based on AASHTO LRFD Article 5.10.10.2 if the stirrup spacing is very small such as 3 inches. In such case, it will relax the congested area and allow for concrete flow to avoid pockets.

3. Section A-A:
   - The stirrup design for splitting resistance should be verified based on AASHTO LRFD 5.10.10 - Pretensioned Anchorage Zones. Other standard confinement details are provided for this area to develop the strands. End blocks are normally not needed unless design requires.

4. Clearances for Pretension Strands:
   - This detail shows strands at mid-span range based on AASHTO LRFD Bridge Specifications.
Section 1 – Bridge Superstructure  
PC/Pretensioned Wide Flange Girder (Harped Strands)

5. Table:
   • Table shall be used for specifying girder length, girder depth, Jacking Forces at 4 inches and 6 inches of “X”, areas of strands, “Y”, concrete strength, mid-span deflections due to deck dead load and additional load such as rail. Additional top reinforcement at girder ends may be needed if temporary tensile stress exceeds the allowable stress as specified in AASHTO LRFD Bridge Specifications. If different girders exist, Girder A, B, C, symbols may be used to identify each of them. In some special cases, especially for long span bridges, prestress force may be controlled by strength limit state. In order to reduce initial concrete strength, designer could reduce the initial jacking force from a maximum of 75% to a lower percentage (such as 72%) to meet the requirements of service limit state. At the same time, using extra areas of strands to meet the requirements of strength limit state.

6. Strand Extension Hook Detail (At Bent):
   • Per Earthquake Committee’s request, the detail has been added and the designer shall determine numbers of required strands hooked according to the requirements of seismic design of precast bridge systems.

Design/General Notes
Several notes, including the maximum tensile stress limit (75%) and the maximum temporary tensile stress limit (80%), have been moved to standard specifications. A note of adding temporary top prestressing strands is recommended by Independent Quality Assurance to move to the User Guide. The note is “Temporary top prestressing strands may be added to reduce girder end stress and initial concrete strength. Debond top strands in center portion of the girder and bond strands 15 feet at girder ends. Must provide access holes for cutting strands after diaphragms are cast and cured, but before the deck slab is placed.”

Additional Drawings Needed to Complete PS&E
This sheet works with XS 1-124-2

Contract Specifications
Standard Specifications 2015

Restrictions on Use of Standard Drawings
The project designer and project engineer are responsible for designing this sheet and stamping this sheet.
Section 1 – Bridge Superstructure
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Special Considerations
The project designer and project engineer may modify this sheet based on project needs. Any dimension change to the typical section (related to the precast form) should be consulted with both the Precast Concrete Committee and the precast industry (PCI West).