

The HYBRID Section

Proper Applications from a Producer's Perspective

Presented By: Celeste Spaans, P.E.
Chief Engineer





Prestress Services Industries

- Produce precast, prestressed concrete products
- Help KY designers use hybrids successfully
- Minimize opportunity for value engineering



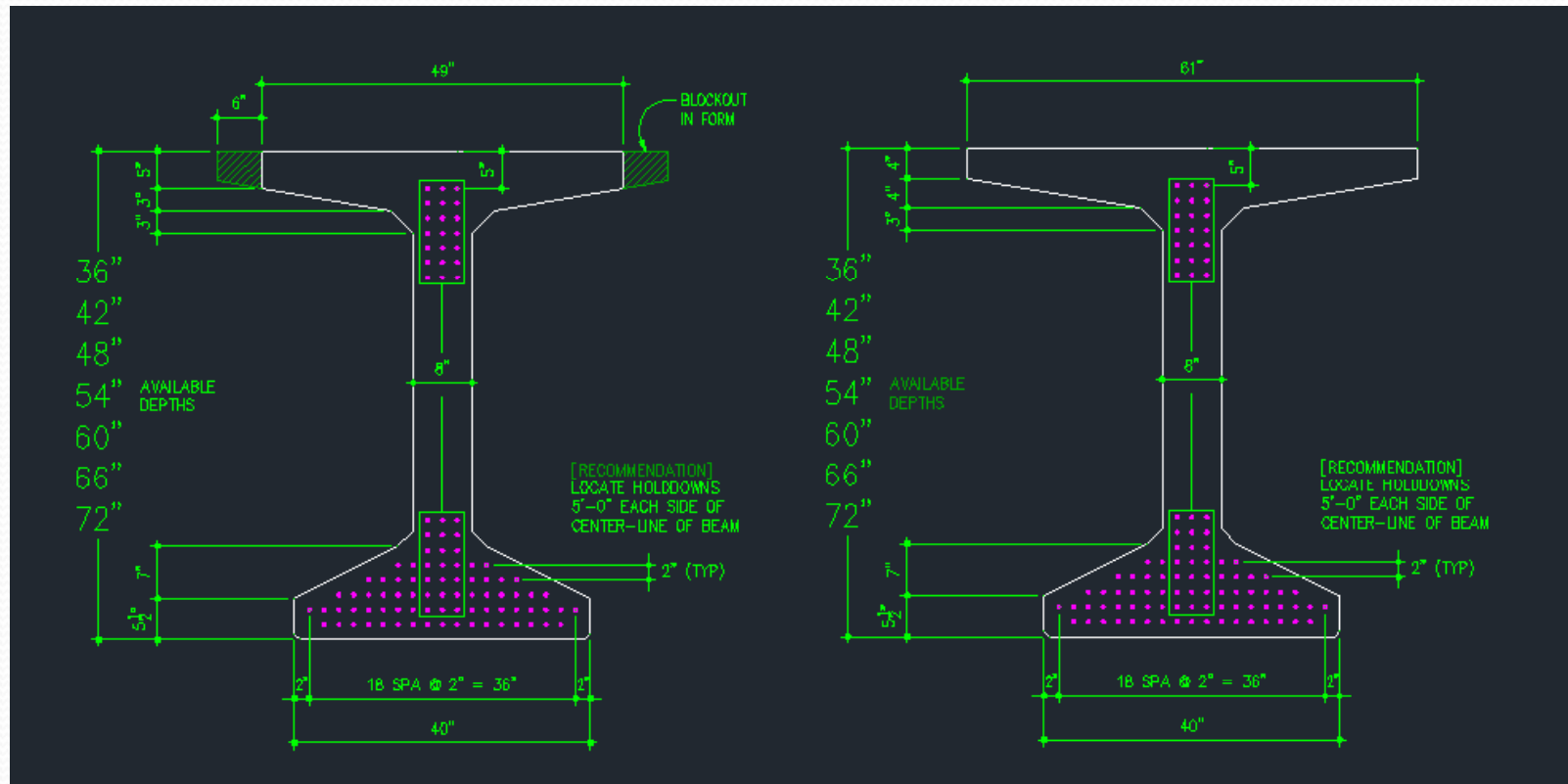
Outline

- The Hybrid Section
- Properties
- Comparison to Bulb Tee
- Things to Watch For
- Design Approach
- Summary

The Hybrid Section

- 49" Top Flange

- 61" Top Flange





Section Properties

- Hybrid section has:
 - Increased area
 - Increased bending properties
- These differences can yield longer, shallower spans
- Higher section weight
 - Substructure Sizing & Loading
 - Producer Handling & Transportation
 - Contractor Handling

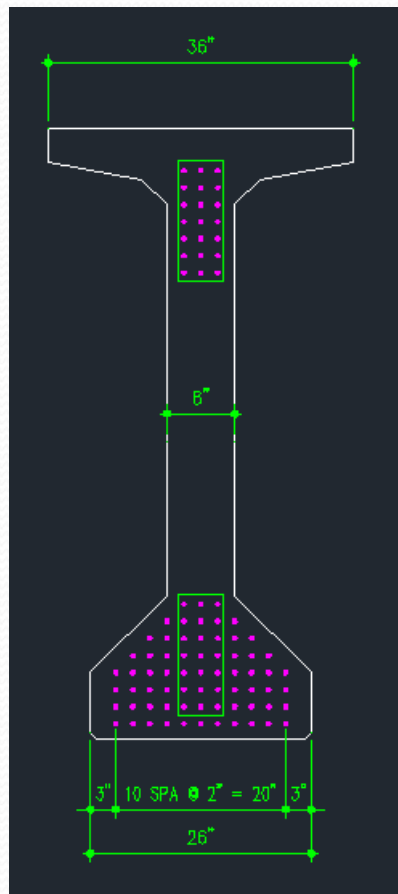


Stability

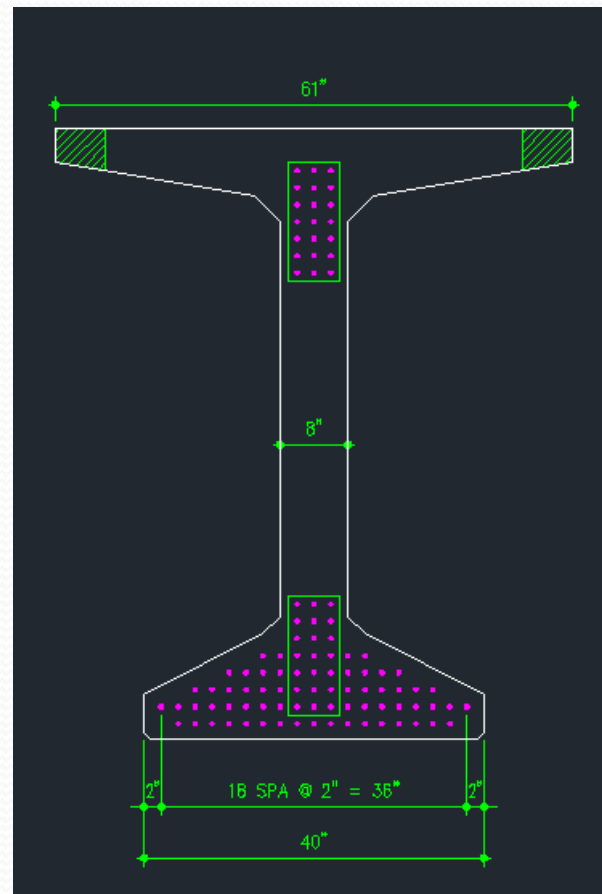
- Excellent lateral stability
 - Handling, transportation
 - Erection
- Beneficial as depth increases
- Remember that larger bearing assembly is needed

Comparison with Bulb Tee

- Mod. Type 4



- Hybrid



Comparison with Bulb Tee

60" Deep	Mod. Type 4	61" Hybrid	Compare
Area =	955.4 in ²	1124.4 in ²	18%
I _{xx} =	615,361 in ⁴	903,667 in ⁴	46%
I _{yy} =	37,324 in ⁴	144,995 in ⁴	388%
Wt. / LF =	996 plf	1222 plf	23%



Things to Watch For

- Increased amount of strand
 - Holddown limits
 - Space for splitting resistance rebar – AASHTO 5.10.10.1
- Transportation constraints
 - Permits
 - Equipment
- Job site constraints
 - Site access
 - Contractor's crane limits



Cost

- Hybrid is ~ 10% more expensive per LF
- Beam for beam swap usually not cost effective
- Designer determines if beam cost is offset elsewhere
 - # of beams
 - Beam depth
 - Longer span length



Pros & Cons

- Pros:

- Increased section properties yield longer, shallower spans
- Increased lateral stability
- More strand positions

- Cons:

- Higher cost per LF
- Heavier beams



Design Approach

- There is no “design table”
- Start a design with familiar section
- Introduce hybrid as an option
- Refine as needed



Summary

- Hybrids can be an excellent alternative to traditional bulb tee sections and steel designs.
- Consider them an option, not a requirement.
- Think of the project as a whole.
- Every project is unique, it is up to the designer to determine the appropriateness for each project.



Resources

- All PSI Bridge Product Sheets:
 - www.prestressservices.com/products_bridge.asp
- Contact PSI Directly:
 - Estimates, Fabrication & General Inquiries, Plant Tours
 - Celeste Spaans, Chief Engineer
 - 859-312-5637
 - cspaans@prestressservices.com

Questions?

www.prestressservices.com

