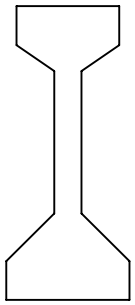
The benefit/cost analysis was performed in 1999

JTRP/INDOT RESEARCH PROGRAM

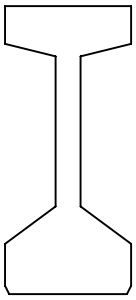
Research Pays Off

Alternative to the Current AASHTO Standard Bridge Sections

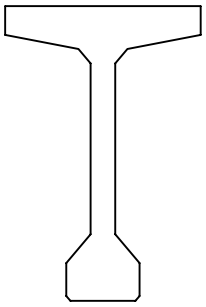
The objective of this research project was to evaluate the feasible alternatives to the current standard AASHTO bridge sections for spans ranging from 30-130 feet and concrete strengths up to 7000 psi. Approximately 100 alternate sections were submitted as alternatives from other state DOTs. The girder cross-sections were evaluated through computer analysis for structural efficiencies and cost effectiveness. The following figures show the main sections evaluated in this study.



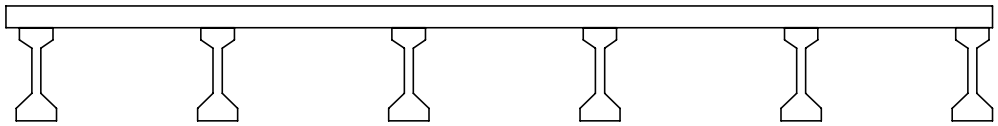
Indiana Type III & IV Sections



Illinois Section

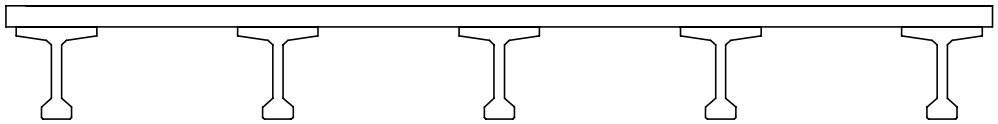


Indiana Bulb-Tee Section



6 -Type III Sections

OR



5 Bulb Tees

Research Findings and Implementation

The findings of this project include the following:

1. Bulb Tees were generally found to be more structurally efficient than standard I-Shaped girders.
2. Sections requiring end blocks were not recommended as they were found to be uneconomical by precasters.
3. Girder forms with variable webs and depths were preferred by precasters.
4. The AASHTO I, II, and III girders were the most economical for spans from 30-70 feet. No alternate sections were therefore recommended in this span range.

Research Findings...

5. The Illinois 54-inch I-beam was found to be economical for spans from 70-90 feet.
6. Alternate sections were found to be more economical than standard AASHTO girders for spans over 90 feet.
7. The Kentucky 66-inch Bulb Tee was recommended for spans between 90-110 feet to provide considerable savings over the standard AASHTO girders.
8. The Kentucky 78-inch Bulb Tee was recommended for spans between 110-130 feet to provide considerable savings over the standard AASHTO girders.

Implementation in the form of the following design recommendations is being considered for INDOT's new Design Manual:

1. Contract plans will continue to show INDOT's standard Modified Bulb-Tee Beams for spans over 90 feet. Special provisions will be included explaining the contractor's option to use Kentucky Bulb-Tee alternate sections.
2. Contract plans will continue to include details of the Illinois 54-inch I-beam as an alternate section to the AASHTO Type IV I-beam.
3. The new Design Manual will include design aids created in this study.

Benefits

This study resulted in improved efficiency and economy of bridges composed of precast prestressed concrete beams. Design aids were also created in this study to simplify design of the existing sections and implement design of the proposed alternate sections. The estimated annual saving from implementing the research results is $200,000.

Cost of Research
$69,000

Estimated Economic Value Over 20 Years At 5% Discount Rate

Annual Savings	Discounted Savings (20 years)	Benefit/Cost Ratio
$200,000	$2,492,442	36.1

Contacts

- Hydro-Conduit, Lafayette, IN, Bill Yoder, Plant Manager.
- Prestress Services, Decauter, IN, Jack McDonald, Chief Estimator.
- Beaty Construction Co., Boggstown, IN, Dan Beaty.

References

1. Meir, J., Cicciarelli, M., Ramirez, J., and Lee, R., “Alternatives to the Current AASHTO Standard Bridge Sections,” PCI JOURNAL, January-February 1997, pp. 56-66.
2. Meir, J., Cicciarelli, M., Ramirez, J., Lee, R., “Alternatives to the Current AASHTO Standard Bridge Sections, “ JHRP-94/7 Final Report, FHWA/INDOT, February 1995.