2025 INDOT Bridge Design Conference

Blueprints to Nowhere: The untold stories of unbuilt bridges

February 25, 2025




Precast Prestressed Concrete I-Beam


Precast Prestressed Concrete I-Beam


Reinforced Concrete Slab


Precast Prestressed Concrete I-Beam


Reinforced Concrete Slab


Steel Beam


Precast Prestressed Concrete I-Beam


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Steel Beam


Signature – Deck Arch

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Best Superstructure Type?

ⓘ Start presenting to display the poll results on this slide.

Cost Reduction Incentive

Cost Reduction Incentive

CRI

- INDOT Standard Specifications §109.04
- INDOT General Instructions to Field Employees §2

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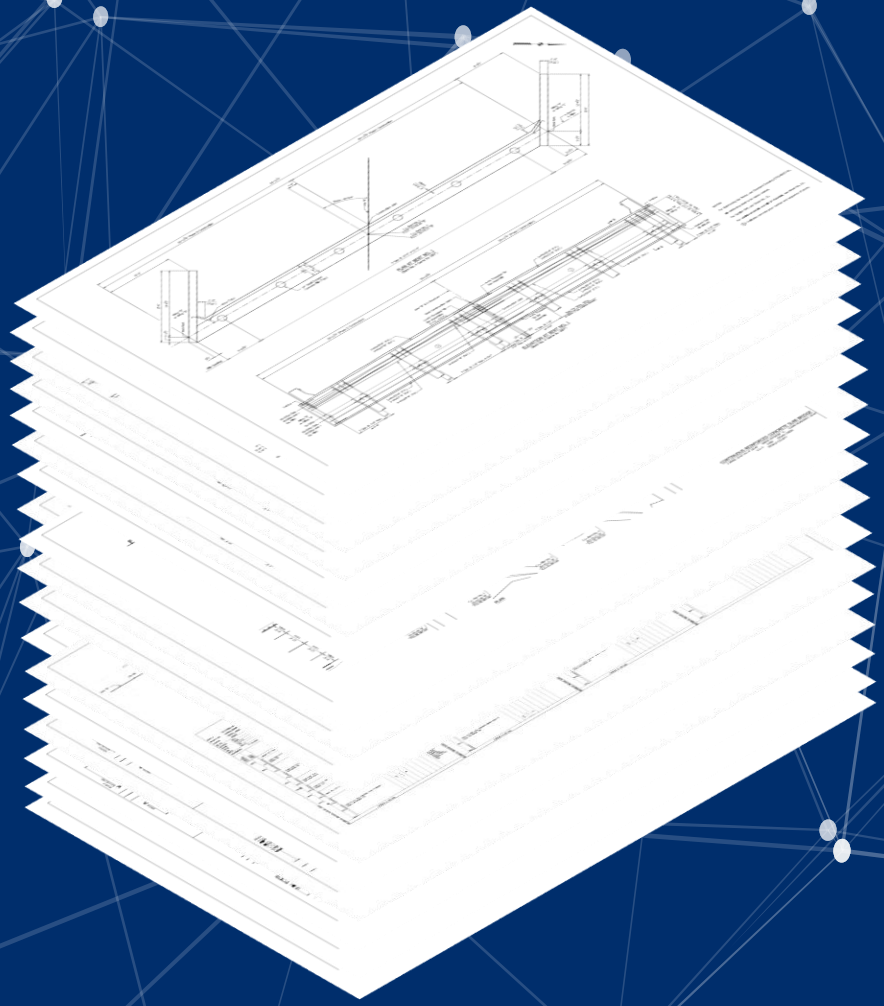

Indiana Design Manual (IDM) Chapter 402

Structure Size and Type

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Material	Superstructure Type	Typical Span Length (ft)
Precast Concrete	3-Sided Structure	12 – 48
Cast-in-Place Concrete	Continuous Reinforced Slab	20 – 45
Prestressed Concrete	Box Beams, Depth 12 in. through 27 in.	30 – 60
	Box Beams, Depth 27 in. through 42 in.	60 – 85
	I-Beams, AASHTO Type I	35 – 50
	I-Beams, AASHTO Type II	40 – 65
	I-Beams, AASHTO Type III	55 – 85
	* I-Beams, AASHTO Type IV	70 – 110
	Bulb-T Beams, Top-Flange Width 48 in. or 60 in.	80 – 140
	Bulb-T Beams, Top-Flange Width 49 in. or 61 in.	65 – 165
	Post-Tensioned Bulb-T Beams	140 – 200
	Post-Tensioned Slab	50 – 80
Structural Steel	Steel Rolled Beams	< 100
	Steel Built-Up Plate Girders	> 70

* These are generally used only in rehabilitating a structure. Bulb-T beams are preferred for a new or replacement structure.

ECONOMICAL STRUCTURE-TYPE SELECTION

Figure 402-5A

Type	Structure Description	Subgroup	Range (ft) < 30	30 ≤ L < 100	100 ≤ L < 150	150 ≤ L < 300	≥ 300
A	Reinforced, Cast-in-Place Concrete Slab	Straight	X				
		Haunched		X			
B	Longitudinally Post-Tensioned, Cast-in-Place Concrete Slab	Straight	X	X			
		Haunched		X	X		
C	Longitudinally Post-Tensioned, Cast-in-Place Concrete Box Girder	n/a			X	X	
D	Two-Way Post-Tensioned, Cast-in-Place Concrete Spine-Beams with Cantilevers	1. Solid		X			
		2. Voided		X	X		
E	Prestressed, Precast Concrete Beams	1. I-Beams		X			
		2. Bulb-Tee Beams			X		
		3. Boxes		X			
F	Post-Tensioned, Bulb-Tee Beams	Straight			X		
		Haunched				X	
G	Jointed Prestressed Precast Longitudinal Concrete Elements	1. Single Tees		X			
		2. Double Tees		X			
		3. Boxes		X			
		4. Solid Slabs	X				
H	Segmental Concrete Box Girders	n/a			X	X	X
I	Composite Steel Rolled Beams	n/a		X	X		
J	Composite Steel Plate Girders	n/a			X	X	X
K	Composite Steel Box Girders	n/a		X	X	X	X
L	Wood Structure	1. Panel Deck	X	X			
		2. Stressed Deck	X				
		3. Stringers	X				
		4. Glulam Beams		X			
M	Structure Under Fill	n/a	X				

SPAN LENGTHS

Figure 402-8B

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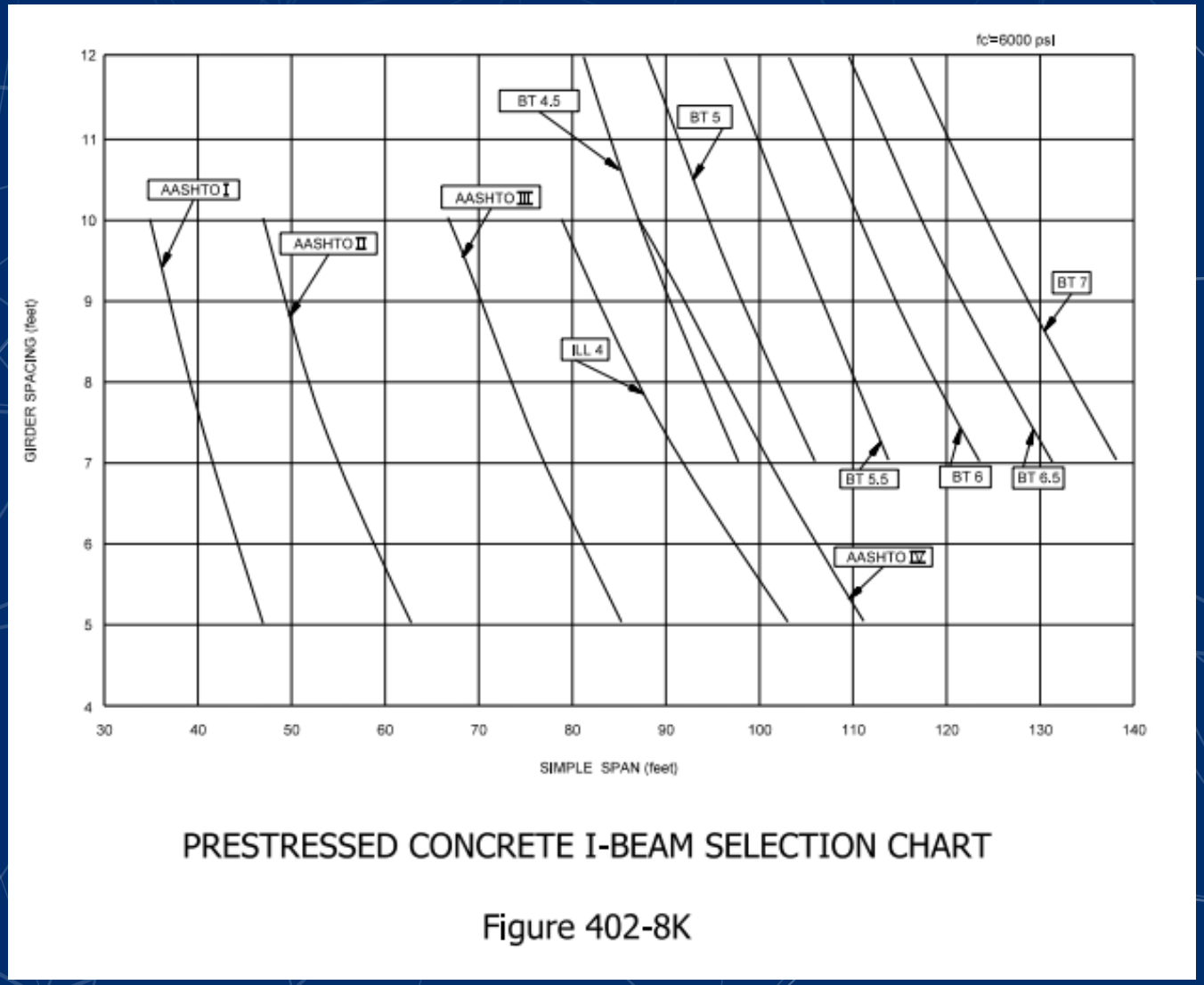
Structure Size and Type



PRESTRESSED CONCRETE I-BEAM SELECTION CHART

Figure 402-8K

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Structure Size and Type

402-4.02 Economic Analysis

An economic analysis shall be performed as part of the structure size and type analysis in order to determine the initial construction cost, the life cycle cost, and other costs associated with each alternate investigated. This economic analysis shall be included as part of the structure size and type analysis within the Stage 1 submission.

The purpose of this section is to provide the process to be used in evaluating the economics of various structural alternatives with the goal of selecting the most suitable alternative to proceed to the final design phase. Cost comparisons required at the Structure Size and Type phase shall not be completed with only the initial capital cost considerations. The lowest initial capital cost does not always lead to lowest cost for the owner. Cost comparisons for structural alternatives shall, in addition to initial capital costs, include costs associated with long-range considerations. Cost comparisons for each alternative shall consider all aspects that can impact initial and future costs such as;

1. the cost associated with the complexity of future inspections;
2. future maintenance and life cycle costs;
3. operating costs;
4. the availability and familiarity of the structure type with local contractors, fabricators and suppliers;
5. the impacts of the structure alternative to the roadway approaches and retaining walls;
6. the impacts to utilities;
7. costs associated with right-of-way requirements;
8. the costs required for additional environmental mitigation for a specific alternate; and
9. the costs associated with unusual site conditions or constraints.

All of these factors shall be calculated and included in the cost estimate for each structure alternative in order to properly identify the correct alternative to be chosen for the final design phase.

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Indiana Design Manual (IDM) Chapter 402
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402-4.0 SUBMISSION REQUIREMENTS

The structure size and type analysis is performed as part of the Stage 1 design phase. The Stage 1 design phase shall be concurrent with or following the design phase for the roadway. It is critical for the structure design to coordinate with the roadway design during the structure size and type process.

The Stage 1 design phase is described in Chapter 14. A brief overview of the specific requirements of the Stage 1 Submission as it relates to the structure size and type analysis is described below.

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Structure Size and Type

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Structure Size and Type

2013 Indiana Design Manual, Ch. 14

4. Economic Analysis. Include a copy of structural economic analyses that may have been conducted to determine the most economic structural alternative. Guidelines for this analysis are listed in Section 59-5.0. A cost estimate should be provided for the selected alternative.

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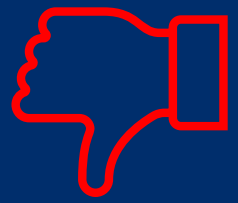

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Structure Size and Type

SST

SSTRpt

DgnCompsSST

EngRpt SST

AbbEngRpt

SST EngRpt

StrSizeTypRpt

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Category	IDM Ch.	EdDoc/ Figure	Document Title
Design Submittal	14	103-02-03	Field Check Notification Letter (in house or consultant) Notification for Bridge Field Checks (added 06/27/19)
Design Submittal	14	103-02-01	Final Tracings Checklist (Rev. Oct. 2021, Jul. 2022, Apr. 2024, Aug. 2024, Nov. 2024) Final Tracings Additional Instructions (Rev. Jul. 2022, Apr. 2024, Aug. 2024, Nov. 2024) Final Tracings Checklist (Excel format) (Rev. Oct. 2021, Jul. 2022, Apr. 2024, Aug. 2024, Nov. 2024)
Design Submittal	14	N/A	ERMS Information ERMS File Naming Convention (Rev. Oct. 2021, Jan.2022, Jul. 2022, Aug. 2024) Example Notification Email

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