

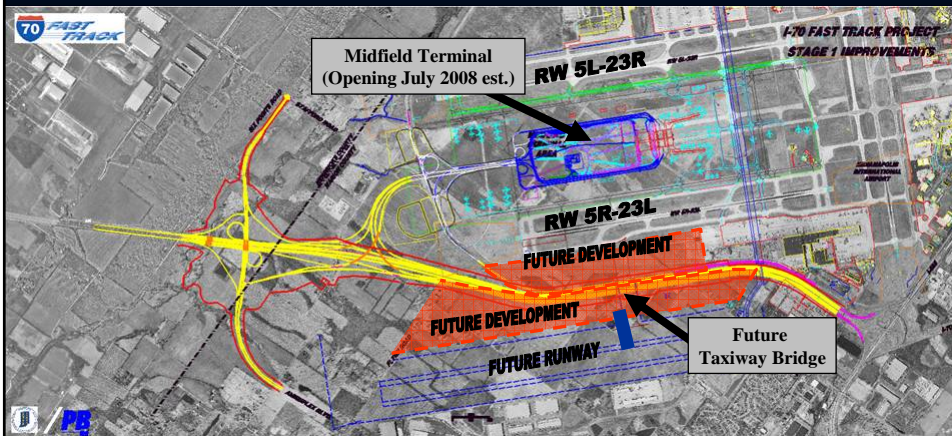


INDOT Design and Construction of Post-Tensioned Bridges

Presented to:
Indiana Road School
March 31, 2005



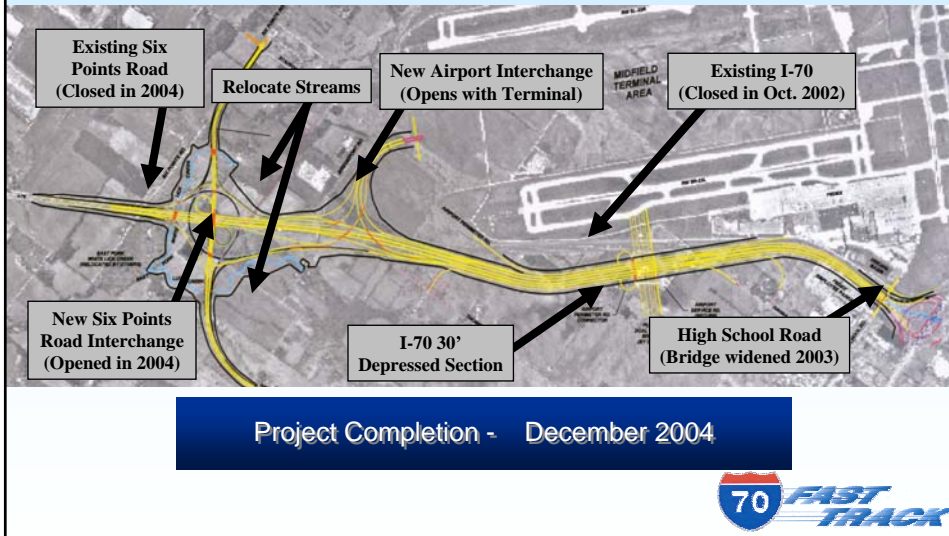
Purpose of Project



When I-70 Fast Track was conceived, the alignment of I-70 cut through airport property such that airport development along the existing south runway was hindered, and property south of the interstate was inaccessible for future runways.



Project Overview



Construction Schedule

1. *Early Grading Contract* - \$26.9m
Letting Date: Oct. 8, 2002
2. *Critical Structures Contract* - \$26.9m
Letting Date: May 20, 2003
3. *I-70 Paving Contract (Part 1)* - \$29.7m
Letting Date: June 17, 2003
4. *Non-Critical Structures Contract* - \$8.7m
Letting Date: June 17, 2003
5. *Six Points Road & Intch. Contract* - \$13.8m
Letting Date: July 15, 2003
6. *High School Road Contract* - \$4.6m
Letting Date: July 15, 2003
7. *I-70 Paving Contract (Part 2)* - \$31.9m
Letting Date: Sept. 16, 2003



Contract #2

Critical Structures Contract

Awarded May 20, 2003 to Walsh Construction
completed Sept. 2004

Indiana Dept. of Transportation
Innovative Contracting

Indianapolis, Indiana

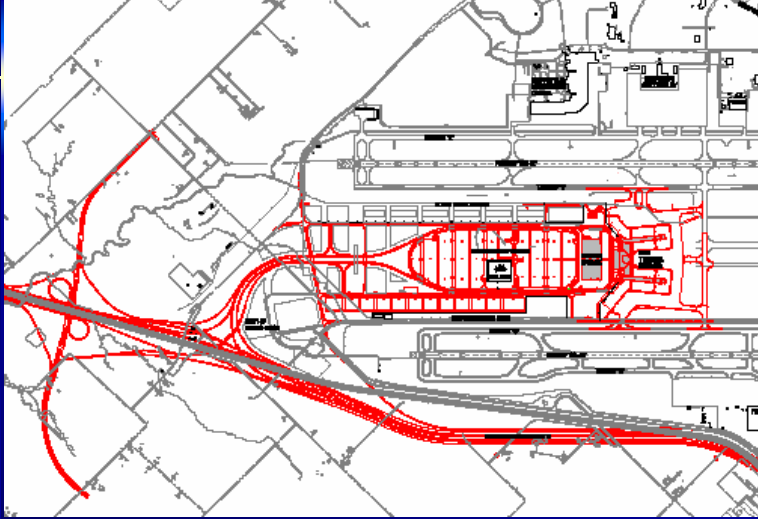
*Aesthetically pleasing structures
compliment the new terminal.*

*Re-use of forms in post-tensioned
structures reduced project cost.*

*Innovative approach featured concurrent
design and construction.*

Parsons Brinckerhoff, Inc.
Indianapolis, Indiana

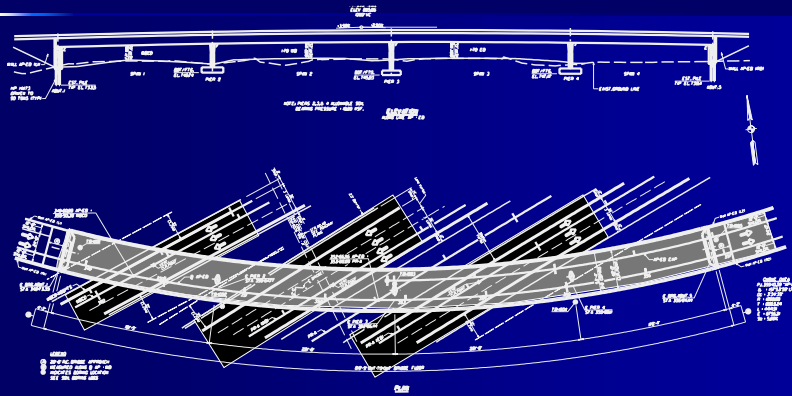
New Airport Terminal Project



I-70 Interchange



Interchange Bridge Layout



Interchange Bridge Aesthetic Requirements

- Interchange structures need to announce entrance to airport = landmark
- Bridge needs to be compatible with new terminal building = element of overall composition
- Bridges are a platform to view Indiana landscape / new terminal entrance axis = de-emphasize barriers
- Arc of alignment is dynamic = suggestion of movement, flight
- High skew from alignment results in long spans. Emphasize span and bridge lengths = horizontal nature of landscape

Landmark Bridges



Columbus Gateway Arch Bridge - Columbus, Indiana
J Muller International

Runway Clear Zone



Bridge Types



Baseline: Steel Plate Girders



Variable Depth Steel Plate Girders



Steel Plate Girders With Integral Pier Caps



Precast Concrete Arches

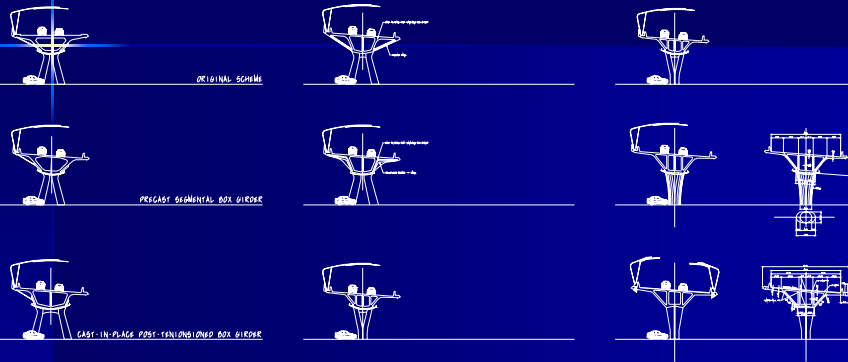
Concrete Box Girders



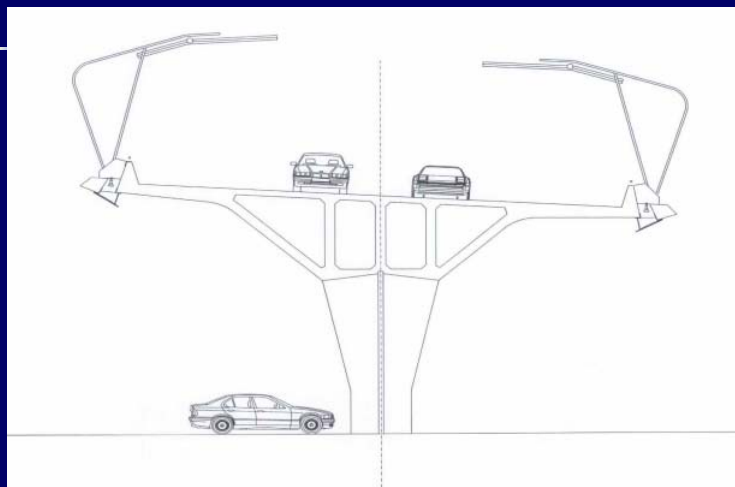
Selected by Owner's
Architect



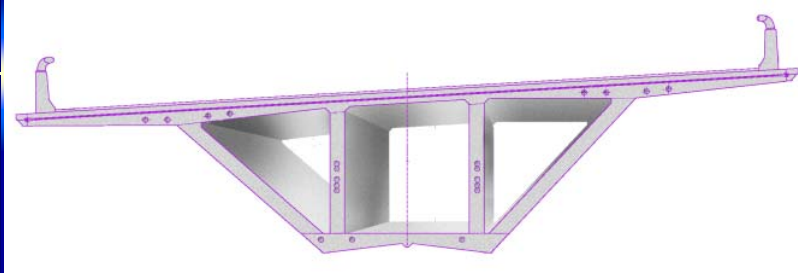
Collaboration With Architect



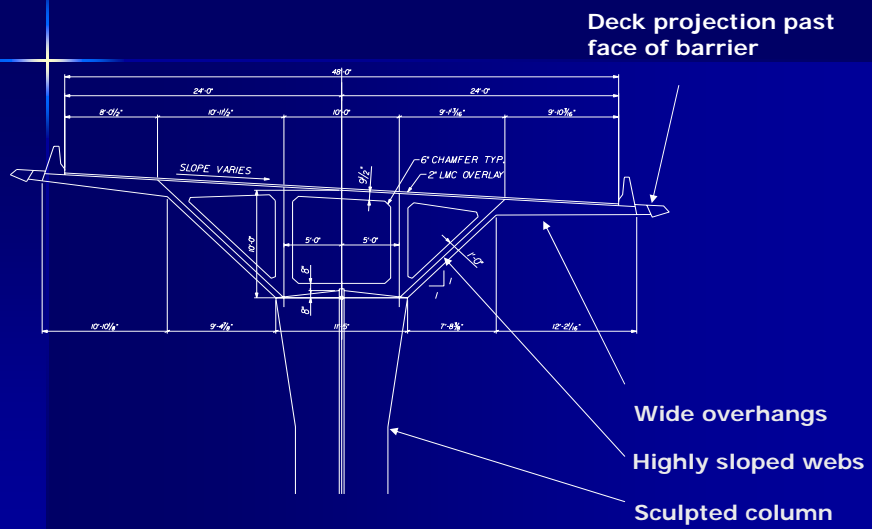
Collaboration With Architect



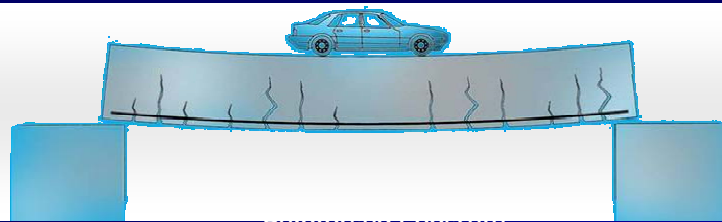
Context Sensitive Design



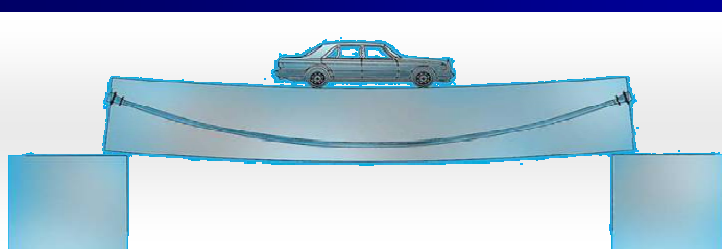
Superstructure Cross Section



Post Tensioning Versus Reinforced Concrete

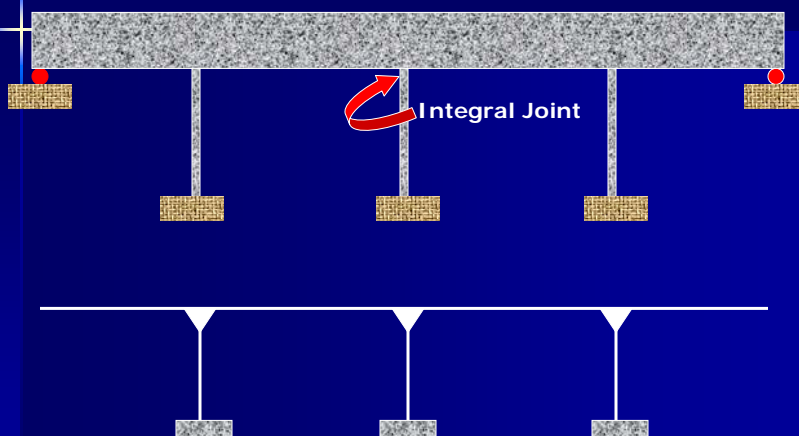


Reinforced Concrete



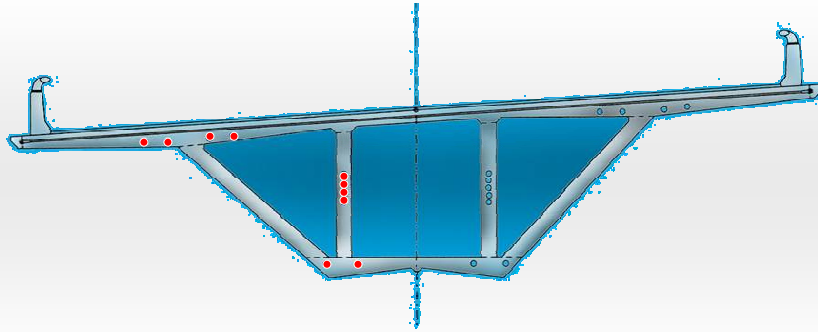
Prestressed Concrete

Continuous Frames



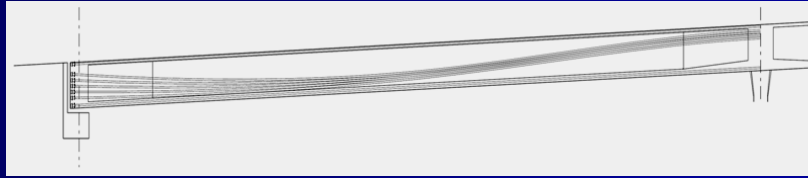
Continuous Frame

Post Tensioning Layout

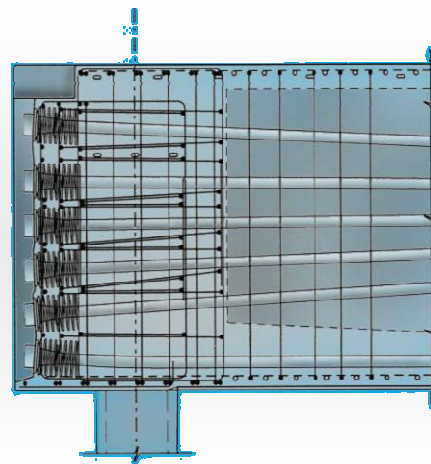


Post Tensioning Layout

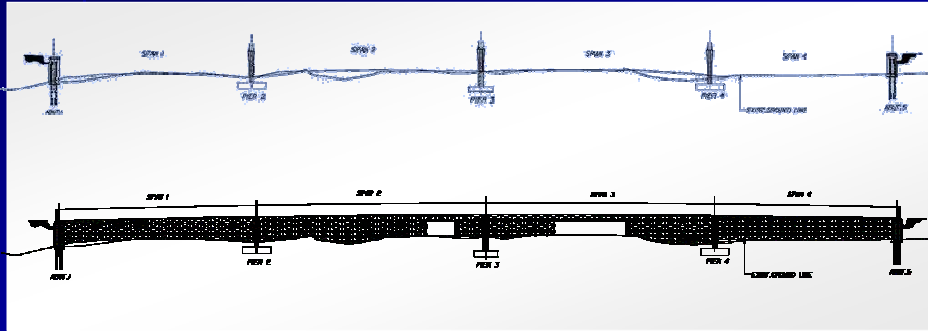
Longitudinal Tendon Layout



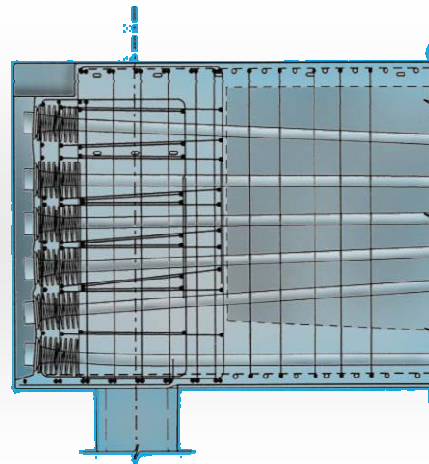
Anchorage Areas



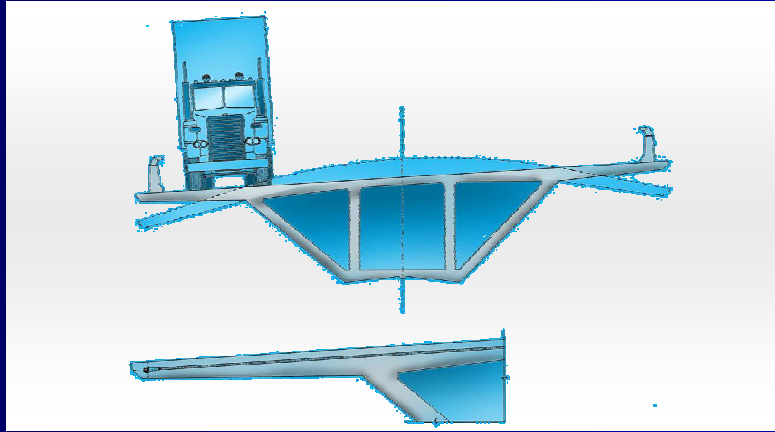
Support of Bridge During Construction



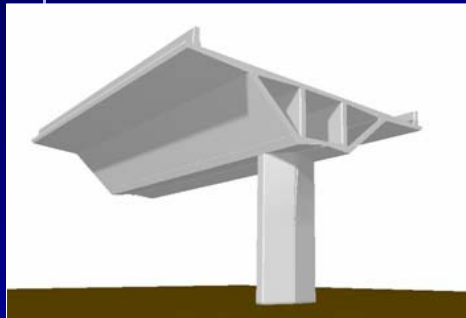
Anchorage Areas



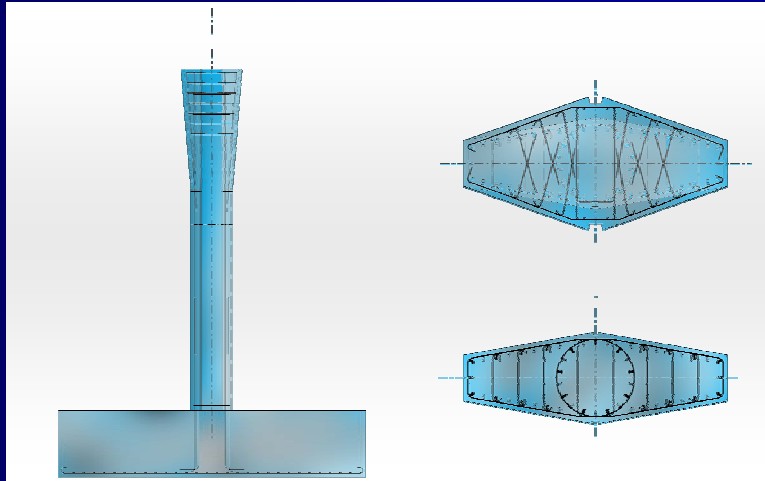
Transverse Tendon Layout



Frame Articulation



Standard Column Form

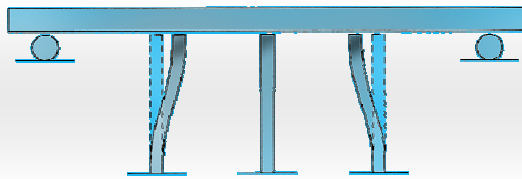


Standard Column Form



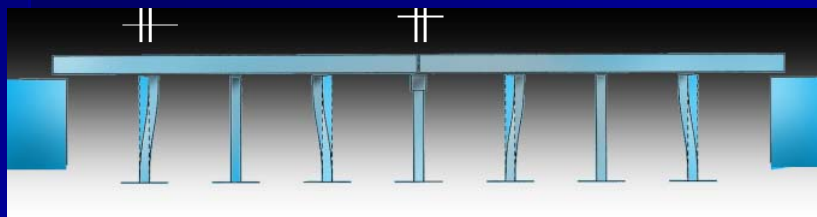
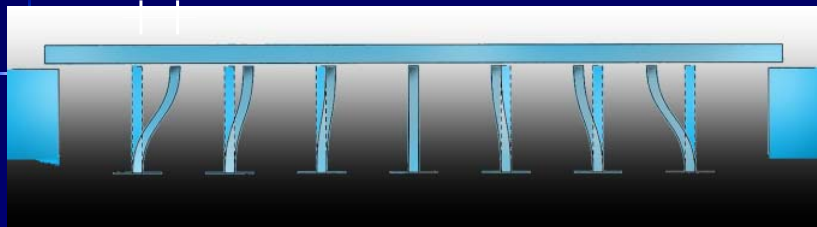
Frame Shortening

Elastic Shortening,
Creep + Shrinkage,
Temperature Drop

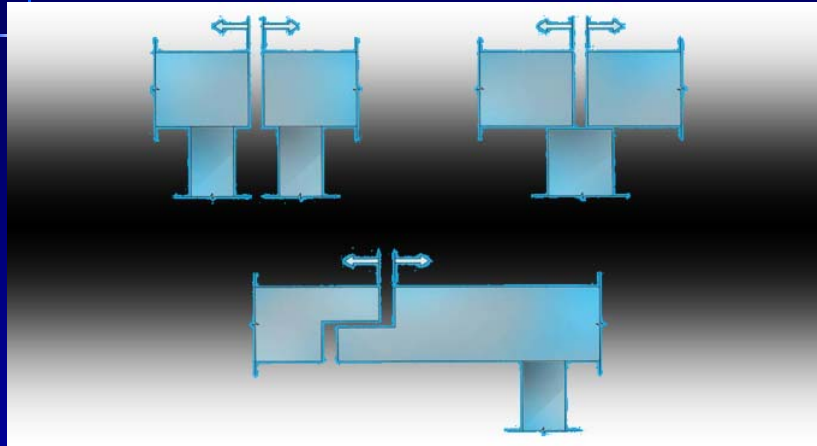


Longitudinal Movements on Short Frame

Frame Shortening



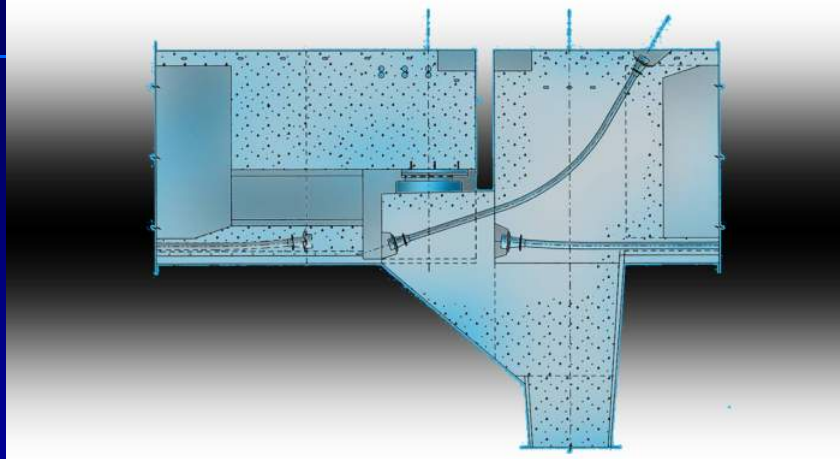
Expansion Joints



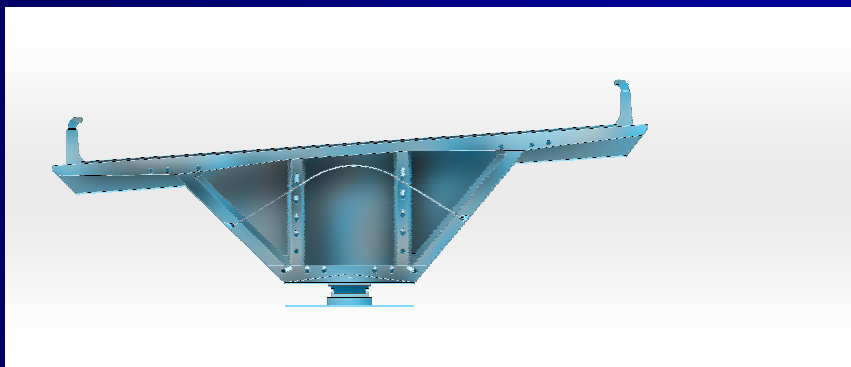
Intermediate Hinge



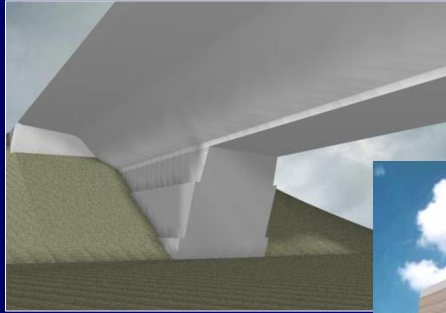
Intermediate Hinge Details



Abutment Bearings



Abutment Concepts



Final Abutment Scheme



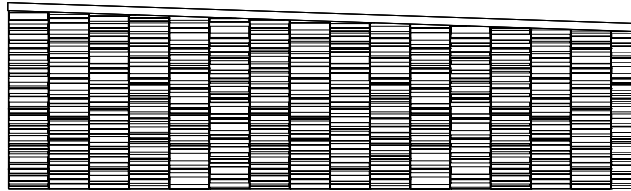
Abutment Detail



Abutment Elevation



MSE Wall Panels



TYPICAL WALL ELEVATION – FRONT VIEW

PATTERN NOTE:
REPRESENTATIVE RANDOM PANEL PATTERN SHOWN
USING COMBINATION OF STANDARD A, B, C, AND
UPSIDE-DOWN PATTERN OF A, B, AND C LINERS

THE REINFORCED EARTH COMPANY
RE 10374 12-18-02 BY HKT

Bridge Rail



Design Team

- Owner: Indianapolis Airport Authority
- Owner's Architect: HOK
- Client: Indiana Dept. of Transportation
- Bridge Engineer: Parsons Brinckerhoff