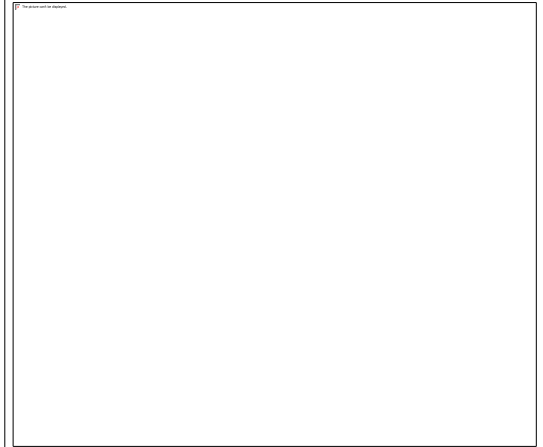
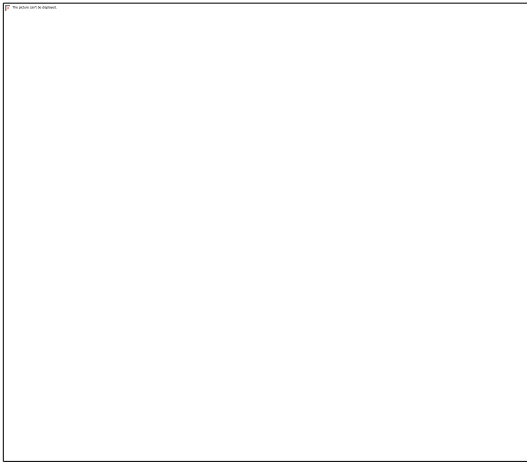


Accelerated Bridge Construction (ABC) Toolkit Workshop



Oklahoma Department of Transportation,
ABC Background



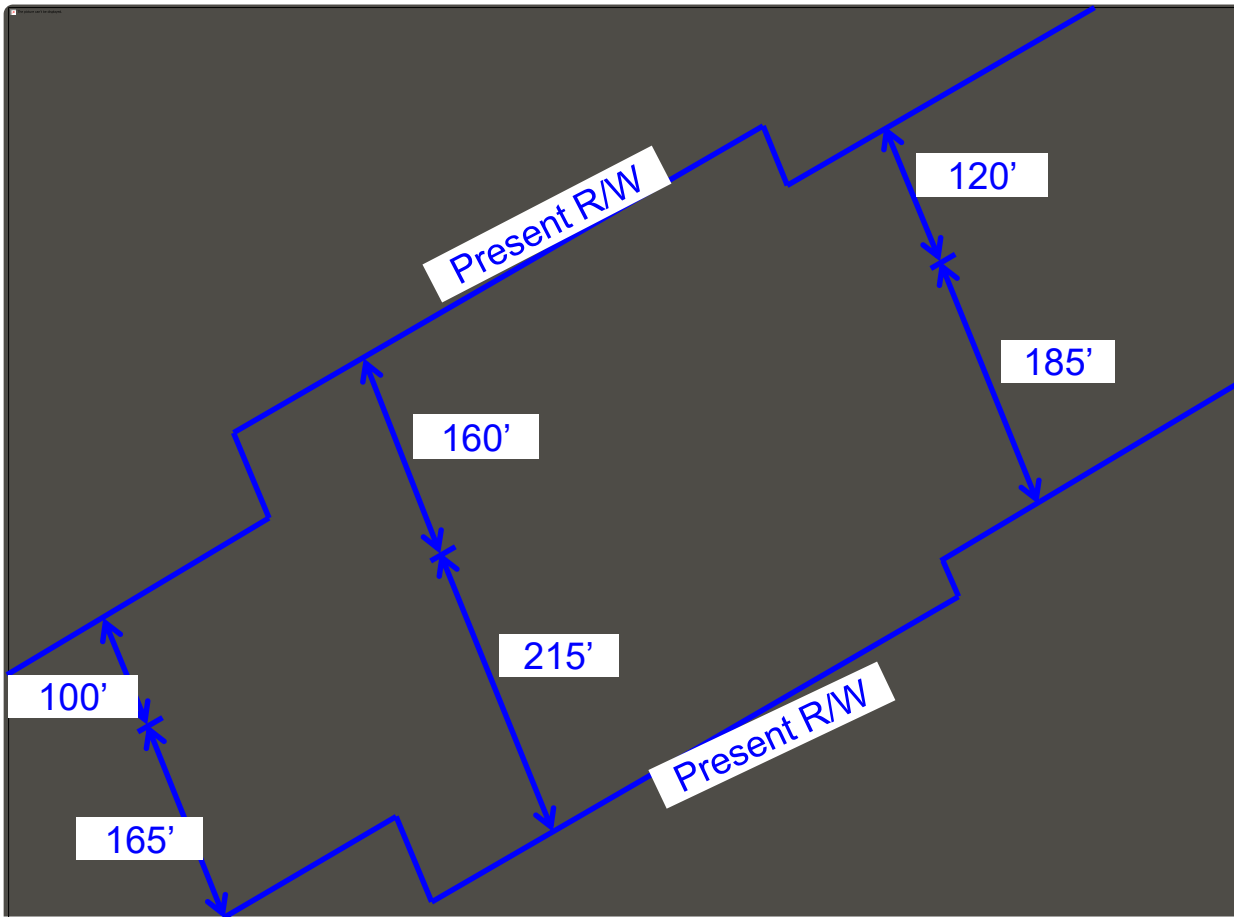
Concerns:

- Backwaters of Lake Keystone
- Compensatory Storage Issues
- 35 Mile Detour Route

Goals:

- Minimize Traffic Disruption
- Reduce Detour Duration
- Evaluate ABC

SH-51 at Cottonwood Creek,
Creek County



Concerns:

- Backwaters of Lake Keystone
- Compensatory Storage Issues
- 35 Mile Detour Route

Goals:

- Minimize Traffic Disruption
- Reduce Detour Duration
- Evaluate ABC

SH-51 at Cottonwood Creek,
Creek County



Alternatives:

- Conventional Construction
- Staged Construction
- ABC (Construction)

Evaluate:

- Methods
- Risks/Benefits
- Site Constraints
- Size, Type and Layout of Bridge

SH-51 at Cottonwood Creek,
Creek County

Structure Placement Methods:

- *Offsite Construction* – SPMT movement with longitudinal launch over creek.
- *Offsite Construction* – Truck and crane movement into place.
- *Adjacent Construction* – Transverse slide.

SH-51 at Cottonwood Creek,
Creek County

Structure Placement Methods:

Offsite Construction – SPMT movement with longitudinal launch over creek.

Pro:

- Reduced temporary support costs.
- Heavy movements and precise placement possible.

Con:

- Suitable construction area required nearby.
- Site not conducive to final placement by SPMT.
- Cost.

Applicability:

- Moderate. Not desired due to need for longitudinal launch.

SH-51 at Cottonwood Creek,
Creek County

Structure Placement Methods:

Offsite Construction – Truck and crane movement into place.

Pro:

- Construction can take place truly offsite.
- Reduced temporary support costs.

Con:

- Section or segment weight limited by capacity of crane.
- Requires additional joints.
- Cost

Applicability:

- Low. Crane placement locations limit pick weight making this option impractical.

SH-51 at Cottonwood Creek,
Creek County

Structure Placement Methods:

Adjacent Construction – Transverse slide.

Pro:

- Cost.
- Simplicity.

Con:

- Requires design and construction of temporary substructure.
- Construction in creek channel.

Applicability:

- High. Adequate R/W and adequate hydraulic capacity.

SH-51 at Cottonwood Creek,
Creek County

Summary:
Preferred Method =
Transverse Slide

- SPMT and Longitudinal launch are expensive.
- Adequate room for temporary construction.
- “Outrigger” substructures are suitable for location.
- Required Hydraulic capacity maintained.

SH-51 at Cottonwood Creek,
Creek County

Summary:
Preferred Method =
Transverse Slide

- SPMT and Longitudinal launch are expensive.
- Adequate room for temporary construction.
- "Outrigger" substructures are suitable for location.
- Required Hydraulic capacity maintained.

Elevation View

Plan View

SH-51 at Cottonwood Creek,
Creek County

**Construction
Sequence:**

- Existing Condition

SH-51 at Cottonwood Creek,
Creek County

**Construction
Sequence:**

- Existing Condition
- Soil Nail Walls and Piers under traffic

SH-51 at Cottonwood Creek,
Creek County

**Construction
Sequence:**

- Existing Condition
- Construct Soil Nail Walls and Piers
- Construct Abutments

SH-51 at Cottonwood Creek,
Creek County

**Construction
Sequence:**

- Existing Condition
- Construct Soil Nail Walls and Piers
- Construct Abutments
- Construct Temporary Substructure

SH-51 at Cottonwood Creek,
Creek County

**Construction
Sequence:**

- Existing Condition
- Construct Soil Nail Walls and Piers
- Construct Abutments
- Construct Temporary Substructure
- Construct Superstructure

SH-51 at Cottonwood Creek,
Creek County

Construction Sequence:

- Existing Condition
- Construct Soil Nail Walls and Piers
- Construct Abutments
- Construct Temporary Substructure
- Construct Superstructure
- Slide Superstructure

SH-51 at Cottonwood Creek,
Creek County

Lessons and Suggestions for Future:

Design and Plan Preparation:

- Utilize available site characteristics to establish preferred method.
- Balance innovation with feasibility (site characteristics, cost etc.).
- Provide a concept to establish intent.
- Provide clear guidance on payment.

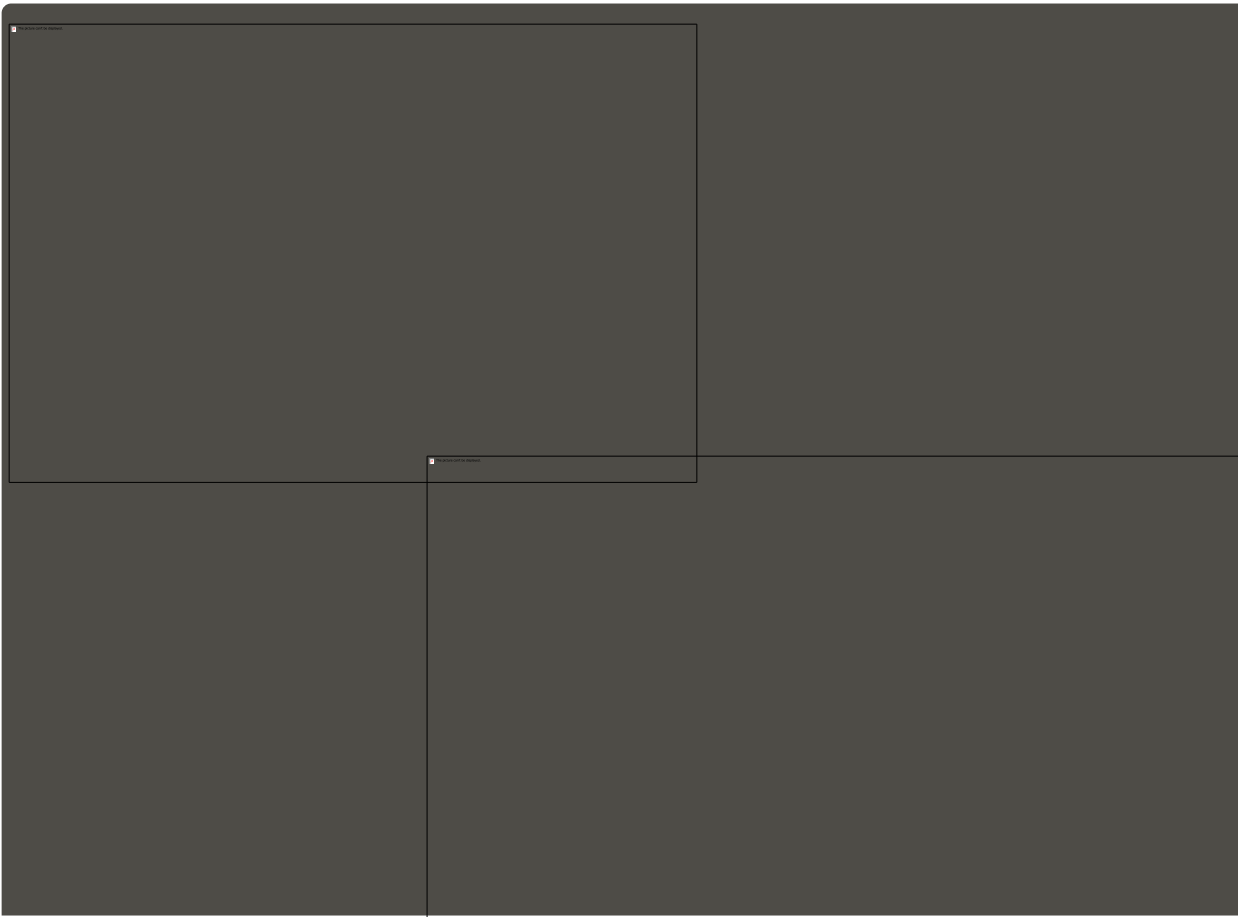
Specifications and Submittals:

- Provide design requirements for temporary works.
- Specialty equipment.
- Placement tolerances.
- Allow room for contractor innovation.

Bidding:

- Require qualifications and/or similar experience.
- Provide Incentive/Disincentive.

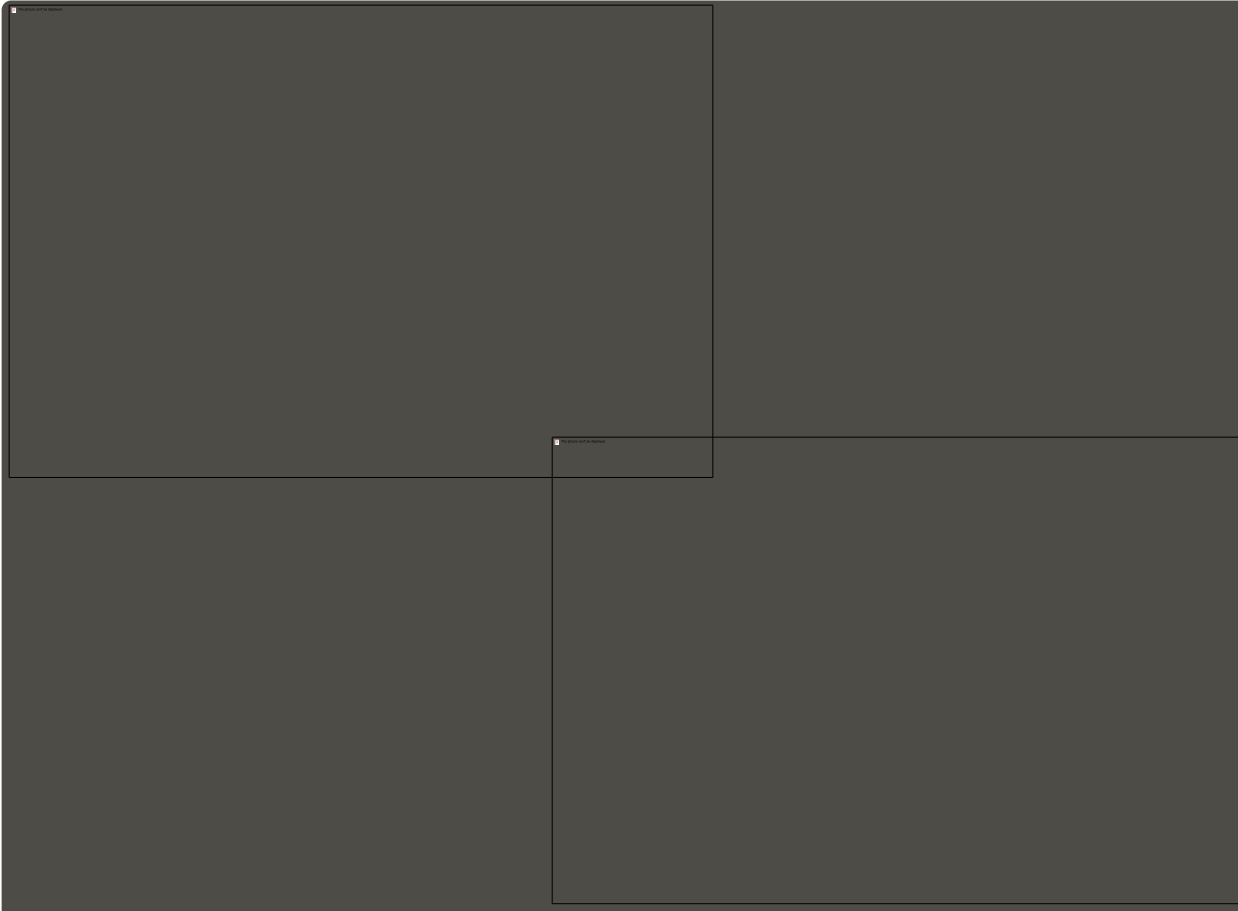
SH-51 at Cottonwood Creek,
Creek County



Construction
Photos:

- Construction of permanent Piers
- Completed Piers and Temporary Piers

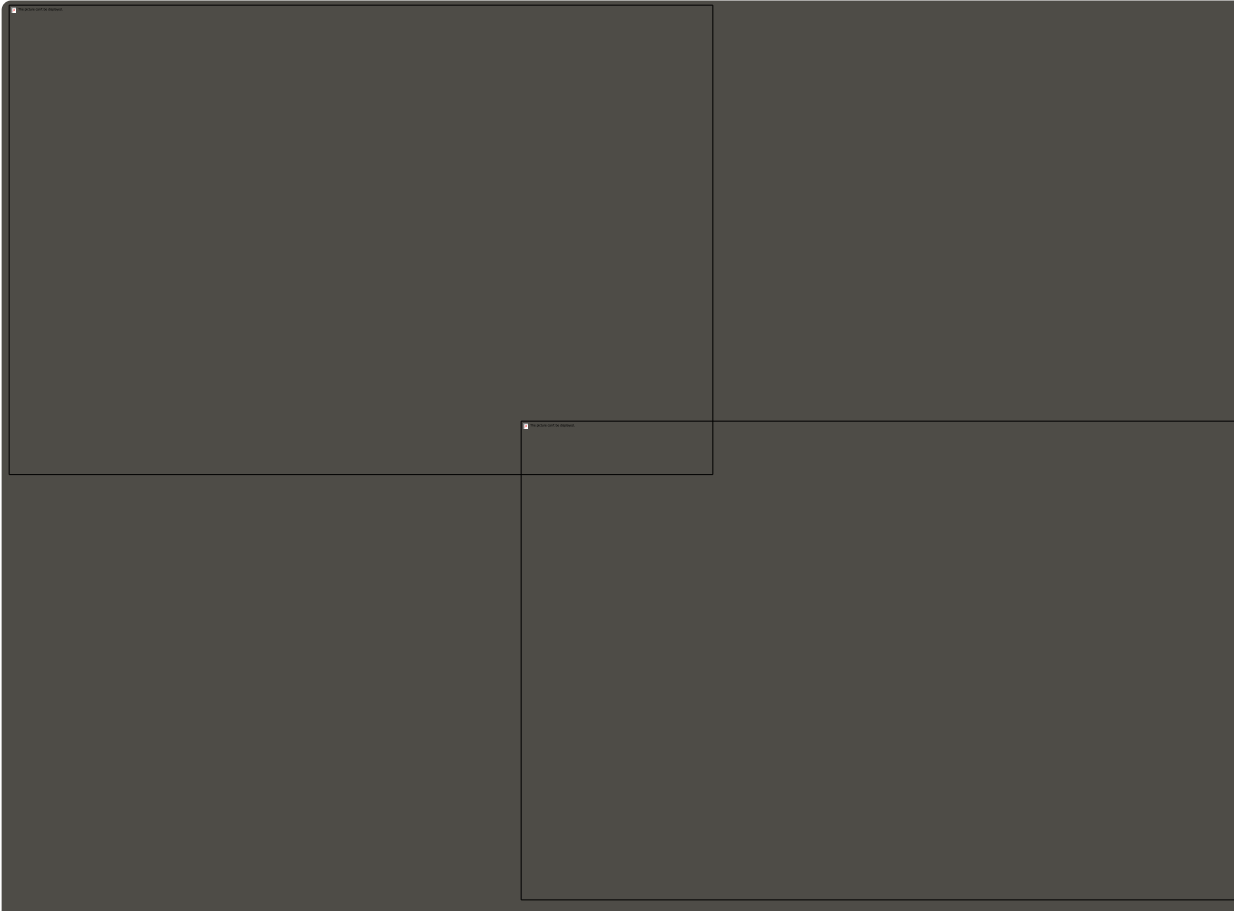
SH-51 at Cottonwood Creek,
Creek County



Construction
Photos:

- Construction of Superstructure

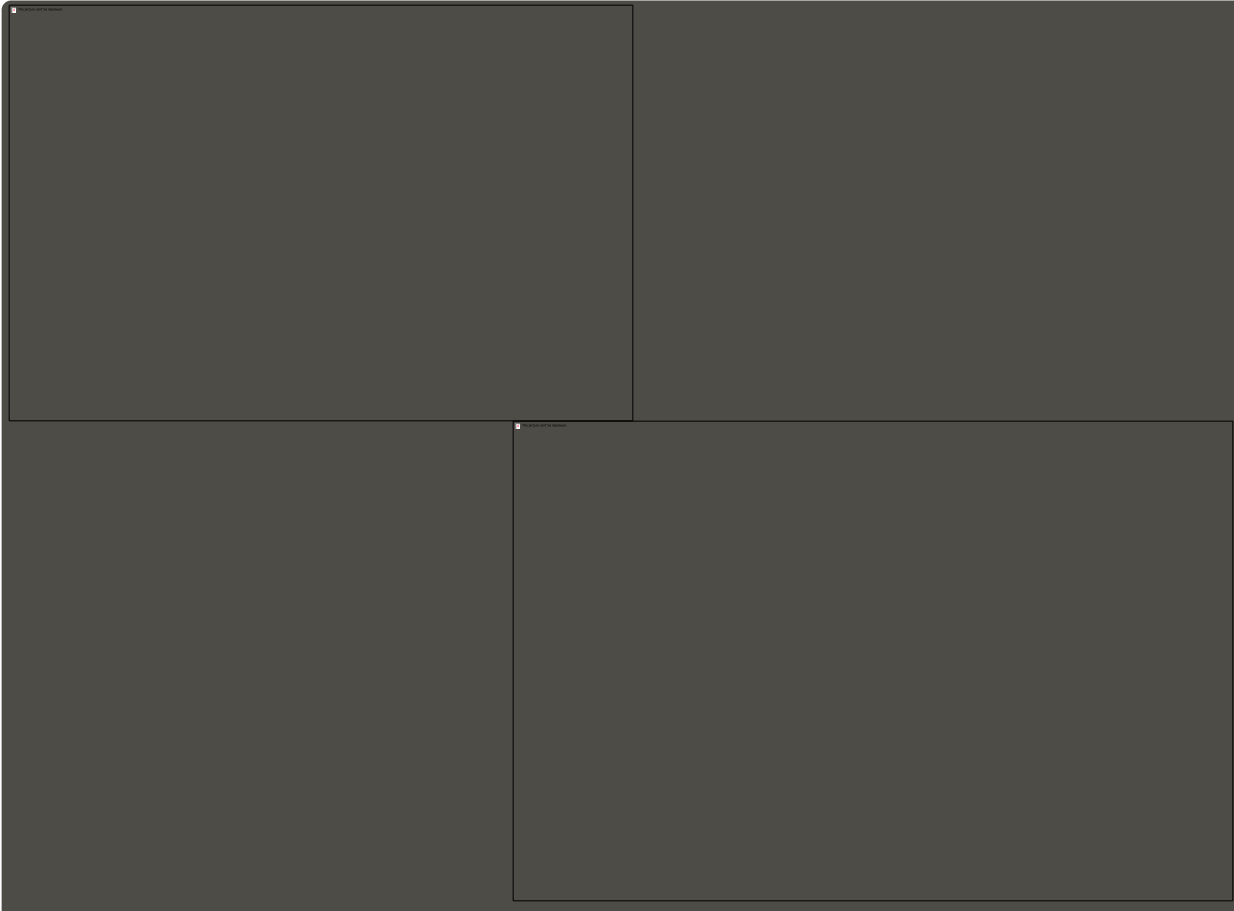
SH-51 at Cottonwood Creek,
Creek County



Construction
Photos:

- Removal of Existing Bridge

SH-51 at Cottonwood Creek,
Creek County



**Construction
Photos:**

- Slide

SH-51 at Cottonwood Creek,
Creek County

**Construction
Photos:**

- Slide

SH-51 at Cottonwood Creek,
Creek County

**Construction
Photos:**

- Slide

SH-51 at Cottonwood Creek,
Creek County

Construction
Photos:

- Completion

SH-51 at Cottonwood Creek,
Creek County

Construction Video:

SH-51 at Cottonwood Creek,
Creek County

Concerns:

- 100,000 ADT
- Commuter Traffic
- BNSF: 49 trains/day
- Narrow Roadway
- Severe Skew
- Limited Profile Differential
- 50th Street
- Sump Conditions
- Deep Fork Creek

BNSF at Interstate 235,
Oklahoma County

BNSF at Interstate 235, Oklahoma County

Goals:

- Achieve six through lanes
- Minimize Traffic Disruption
- Minimize Disruptions to Businesses
- Minimize R/W
- Maximize Available Vertical Clearance
- Safety

Solution:

- (2)-275' Spans



Solution:

- (2)-275' Spans
- Truss spans chosen for this location due to span length and superstructure depth below tracks.

BNSF at Interstate 235,
Oklahoma County

Structure Placement Methods:

- *In-Place Construction* – Stick build over I-235.
- *Offsite Construction (ABC)* – Assemble trusses offsite, transport and place by SPMT.

BNSF at Interstate 235,
Oklahoma County

Structure Placement Methods:

In-Place Construction – Stick build over I-235.

Pro:

- Minimized reliance on specialty moving equipment.
- Reduced need for specialized sub-contractors.

Con:

- Lengthy road closure(s) required on I-235.
- I-235 traffic detoured to adjacent (aging) facilities.
- Lengthy construction duration.
- Reduced safety to public and contractor.

Applicability:

- Minimal. No desire to close I-235 for lengthy periods of time and/or have heavy construction over traffic.

BNSF at Interstate 235,
Oklahoma County

Structure Placement Methods:

Offsite Construction – Assemble trusses offsite, transport and place by SPMT.

Pro:

- Reduced impacts to traffic.
- Work-zone safety for traffic and contractors.
- Drastically reduced on-site construction duration.
- Improved quality of construction.

Con:

- Potential increase in up front cost.
- New methods for local construction community.
- Potential durability impacts.

BNSF at Interstate 235,
Oklahoma County

Summary:

Preferred Method =
**Pre-assemble,
SPMT movement.**

- ADT Impacts reduced.
- Detour time/route impacts reduced.
- Worker and traffic safety increased.
- Economy of scale.
- Assembly/Staging area nearby.

BNSF at Interstate-235,
Oklahoma County



Goal:

- Minimize impact to highway traffic.

Solutions:

- Allow two weekend closures.
- Prohibit undesired structure placement methods.
- Require 4 lanes open at all times.

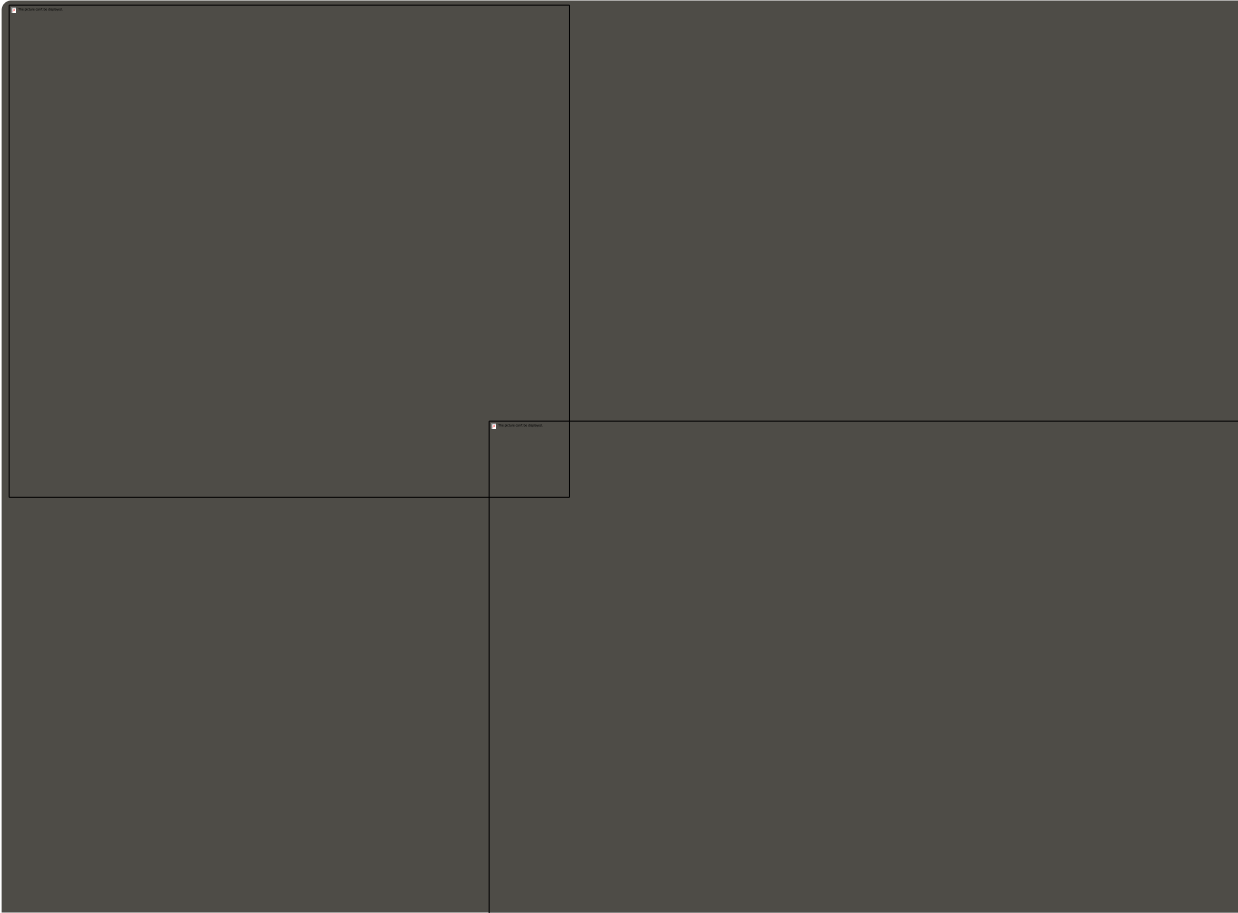
Goal:

- Minimize impact to RR traffic.

Solutions:

- Offset alignment.
- Allow 15 hours for cutover.

BNSF at Interstate-235,
Oklahoma County



Erection:

- Center -> outward assembly.
- Vertical assembly.
- Both panels, floor system and bracing.
- Blocked for camber.

BNSF at Interstate-235,
Oklahoma County



Move-In:

- Lifted 16 feet for transport.
- 18 inch vertical range hydraulic jacks.
- Lifted and supported near center span.
- Additional struts were added to support self weight and resist transportation forces.

BNSF at Interstate-235,
Oklahoma County

Lessons and Suggestions for Future:

Design and Plan Preparation:

- Utilize available site characteristics to establish preferred method.
- Balance innovation with feasibility (site characteristics, cost etc.).
- Provide a concept to establish intent (or prohibited).
- Provide clear guidance on payment.

Specifications and Submittals:

- Provide design requirements for temporary works.
- Specialty equipment.
- Placement tolerances.
- Allow room for contractor innovation.

Bidding:

- Require qualifications and/or similar experience(pre-qualification).
- Provide Incentive/Disincentive.

BNSF at Interstate-235,
Oklahoma County

Lessons and Suggestions for Future (cont.):

Design and Plan Preparation:

- Design team included an industry expert for design/review/inspection.

Specifications and Submittals:

- Electronic shop drawing process (submittals, reviews, stamps).

Fabrication:

- CNC machining of steel members.

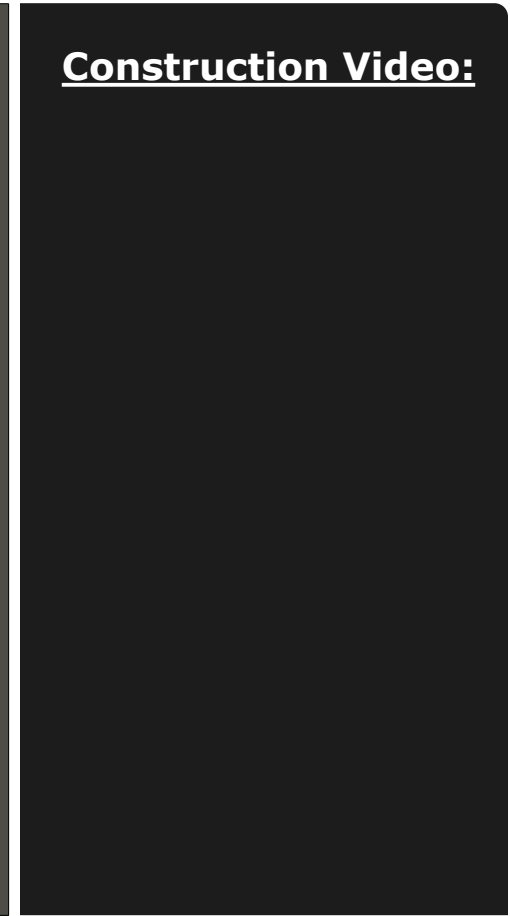
Construction:

- Contractor teamed with expert erection contractor.

BNSF at Interstate-235,
Oklahoma County



Construction Video:



BNSF at Interstate-235,
Oklahoma County



Concerns:

- 5462 foot long bridge
- Deep water
- Atypical construction methods for Oklahoma
- Barge construction required

SH-99/US-377 at Lake Texoma,
Marshall County



Goals:

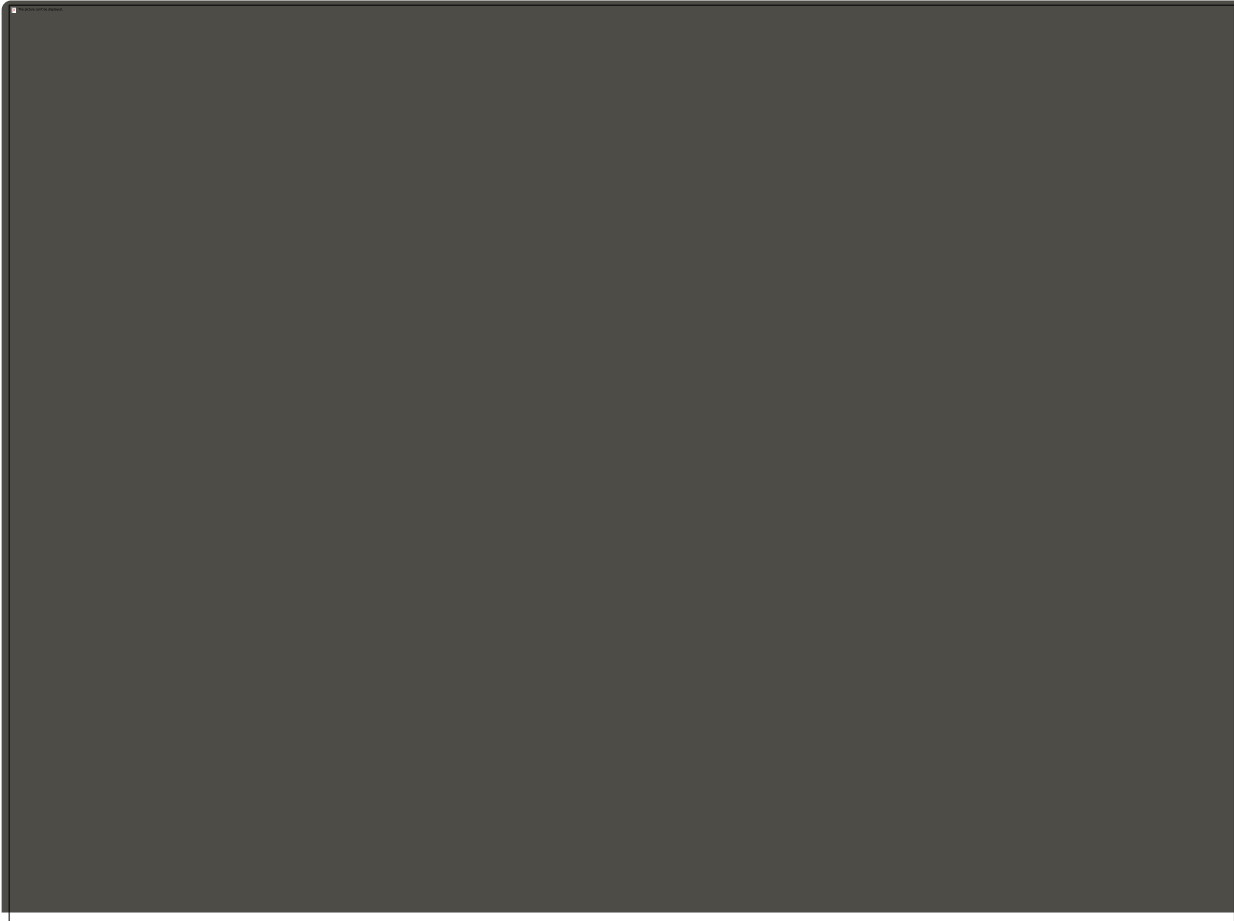
- Minimize construction duration.
- High quality, durable construction
- Simplified, repeatable construction processes/sequences
- Maintain placement/dimensional tolerances

SH-99/US-377 at Lake Texoma,
Marshall County

Goals:

- Minimize construction duration.
- High quality, durable construction
- Simplified, repeatable construction processes/sequences
- Maintain placement/dimensional tolerances

SH-99/US-377 at Lake Texoma,
Marshall County



Summary:

Allow Contractor to choose combination of precast elements.

- Intent for ABC is shown in the plans.
- ABC adds value to the project.
- Multiple precast options for various elements detailed and specified.
- Leaves room for contractor innovation.

SH-99/US-377 at Lake Texoma,
Marshall County

Thank
You!