

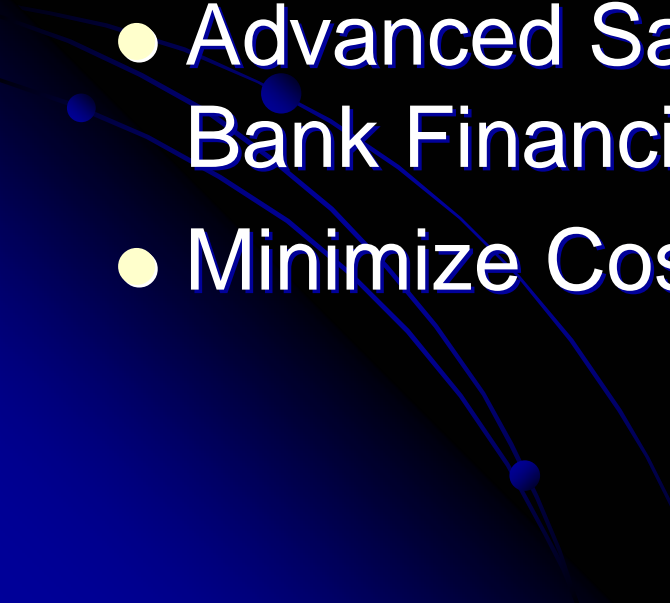
# Dixon Mill Road Design-Build Bridge Replacement

Moderated by:

Mary Ellen Kimberlin, P.E., P.S.



# Innovative Project Development

- Design Build
  - Local Let
  - County Engineers Association of Ohio,  
LBR Federal Funding
  - Advanced Sale with State Infrastructure  
Bank Financing
  - Minimize Cost to County
- 

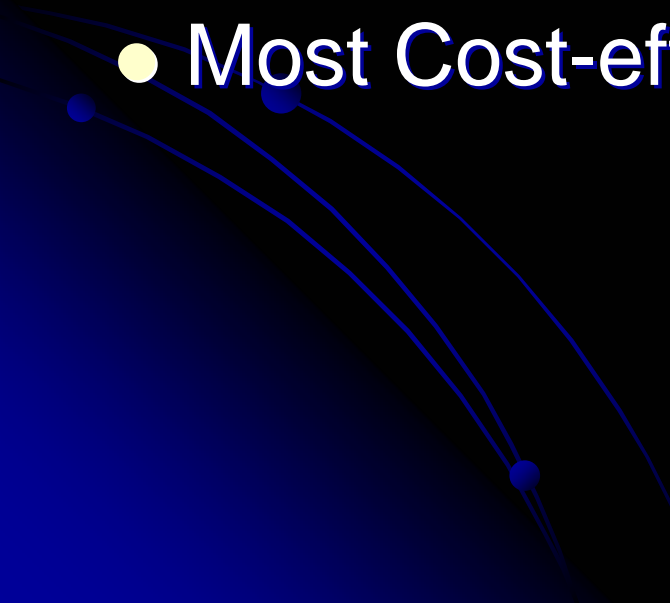
# Existing Structure



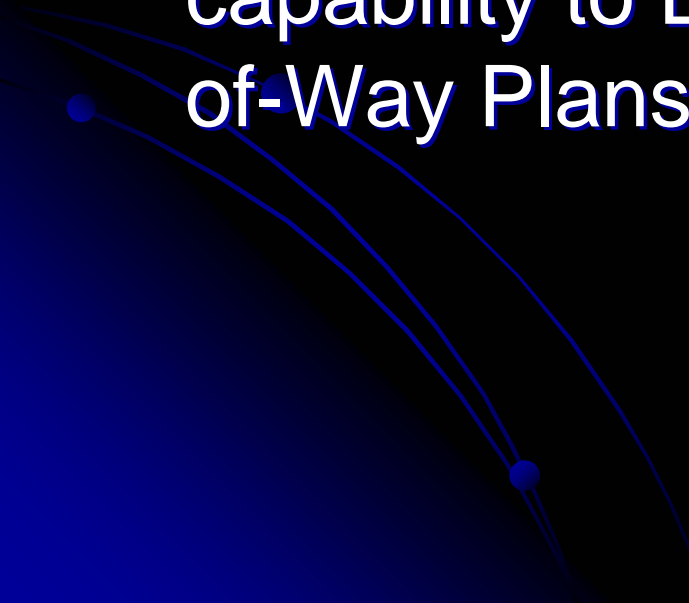
# Background

- Scioto County Engineer's Bridge
- Structurally deficient truss
- Sufficiency rating of 1.0 SD
- When new, 15 ton capacity
- \$1.3 million - too expensive for Issue 2
- Traditional project development engineering too expensive


# Design Build

- Straightforward bridge replacement project
  - Accelerated Schedule
  - Design fees eligible for federal funding
  - Lump Sum
  - Most Cost-effective Design
- 

# Local Let

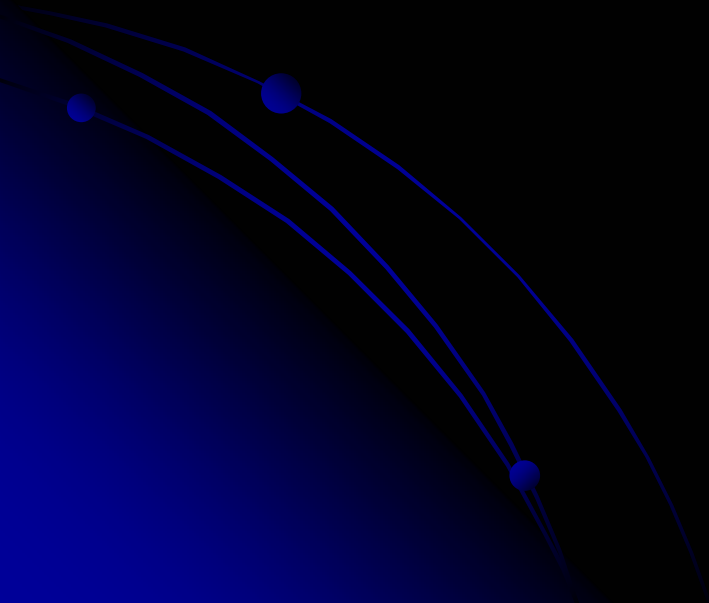
- Scioto County Engineer, Clyde S. Willis, experienced in Construction Project Management
  - Scioto County Engineer has In-House capability to Design Roadway and Right-of-Way Plans
- 

# CEAO LBR Funds

- County Engineers Association of Ohio administers the Federal Local Bridge Program
  - Programmed projects often slip back from anticipated sale date
  - “Soft Match” available for Scioto County
- 

# State Infrastructure Bank

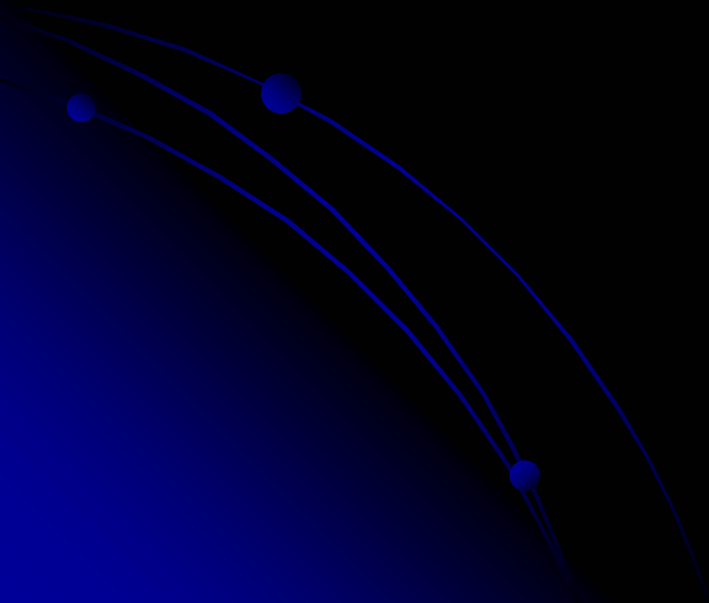
- Plan to advance sale of project and re-pay SIB loan with federal funds
  - CEAO previously had not been permitted to do this






# Schedule

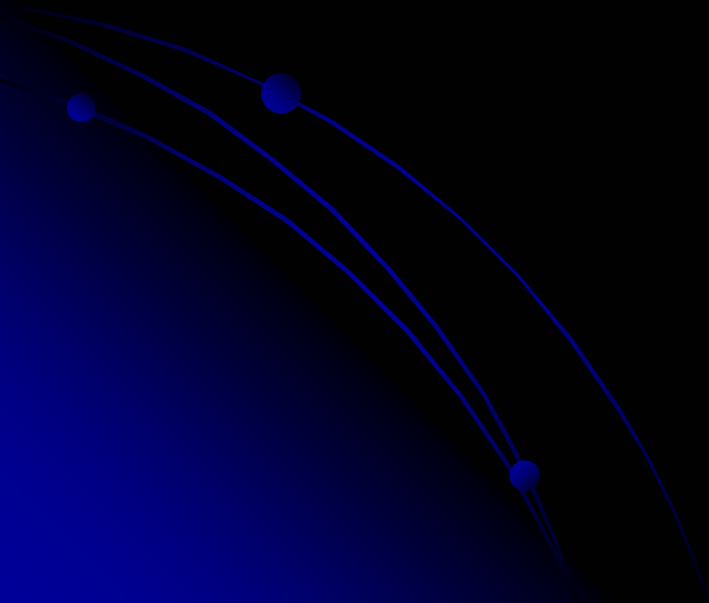
- May 2003
  - Scioto County and ODOT officials met at site to preview the scope of work
  - No significant complications identified



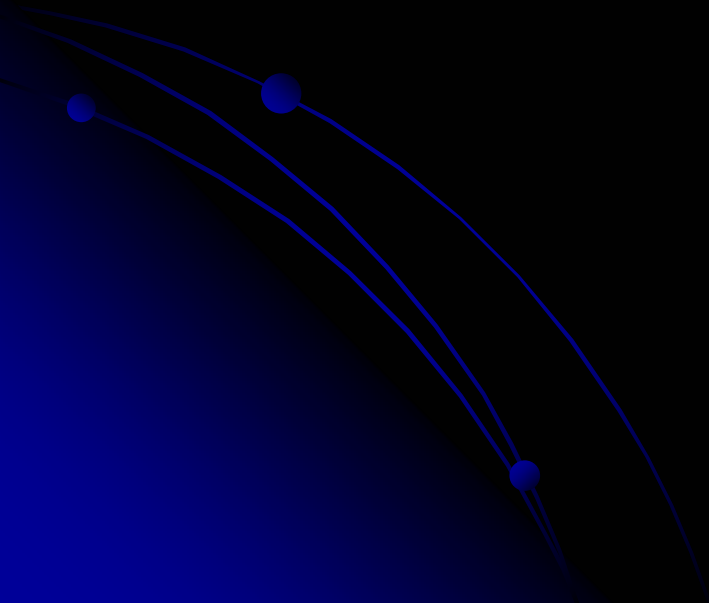
# Schedule

- Summer 2003
    - Project programmed
    - Funding application CEAO LBR accepted
      - 95% federal funds, 5% County
    - Site plan and right-of-way plan prepared by Scioto County Engineer
- 

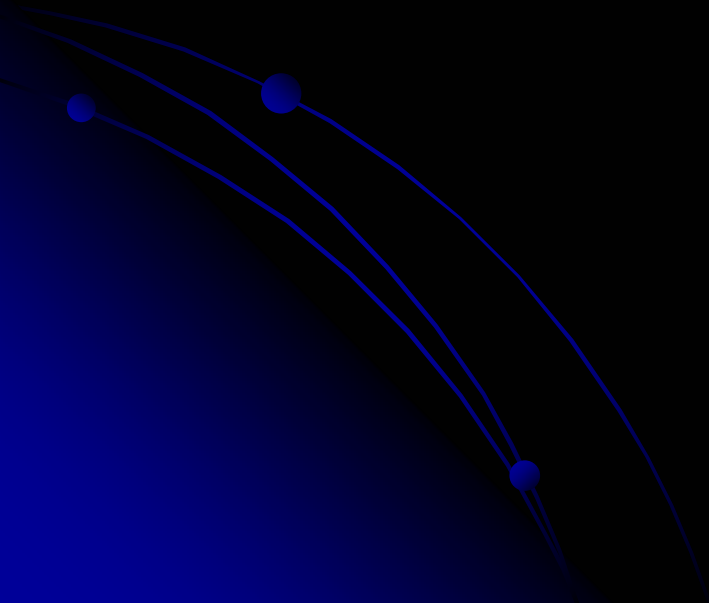
# Schedule

- Fall 2003
    - Environmental screening completed by ODOT District 9
    - Right-of-way plans approved
- 

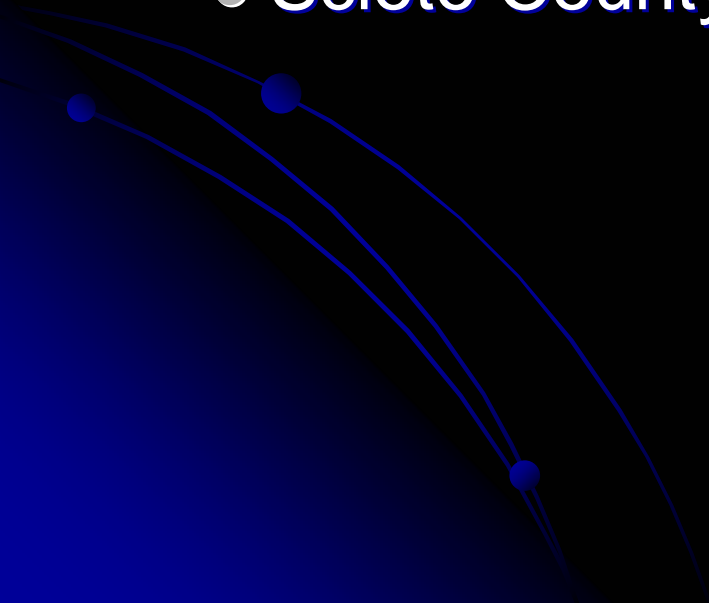
# Schedule

- Winter 2003/2004
    - Right-of-way acquisition by M-E Companies using task order agreement
    - First SIB Loan Application
- 

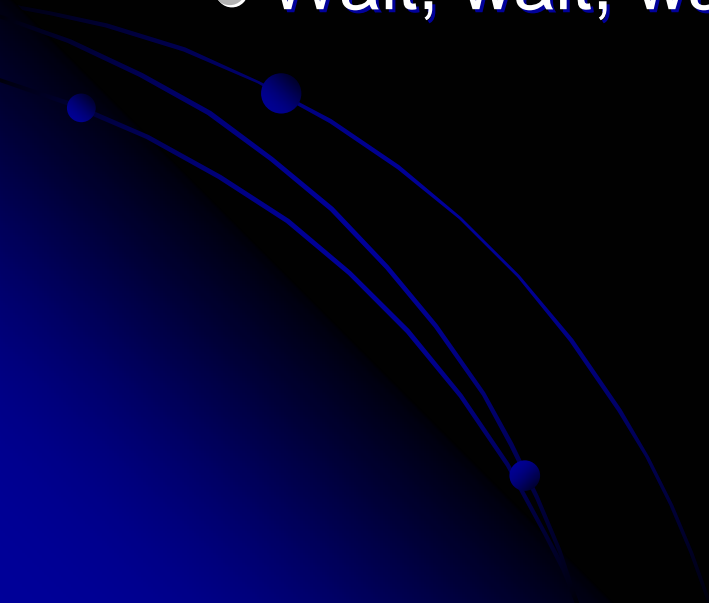
# Schedule

- Spring 2004
    - SIB Loan Terms: Rejected by Scioto County
      - No repayment of loan with federal funds
      - No early pay-off of loan without penalty
      - Rate schedule not competitive
- 


# Schedule

- Spring 2004
    - Scioto County passes emergency resolution
    - Scioto County begs ODOT to reconsider SIB terms
    - Scioto County begs CEAO to advance project
- 

# Schedule

- Summer 2004 - One year after Scoping
    - Right-of-way cleared
    - PS&E Package prepared and submitted to ODOT District 9
    - Wait, wait, wait
- 

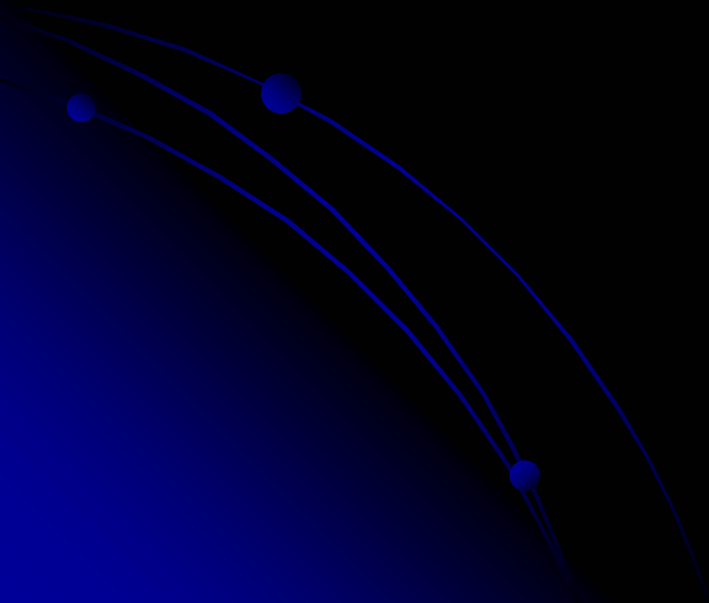
# Schedule

- Fall 2004
    - Andrew Gall returns to ODOT as Chief-of-Staff
    - Scioto County Engineer meets with ODOT Officials to try SIB Loan approach to advance sale of project and re-pay with federal funds
    - **SUCCESS!!!**
- 



# Schedule

- Winter 2004/2005
  - Second SIB Loan Application
  - CEO signs loan agreement

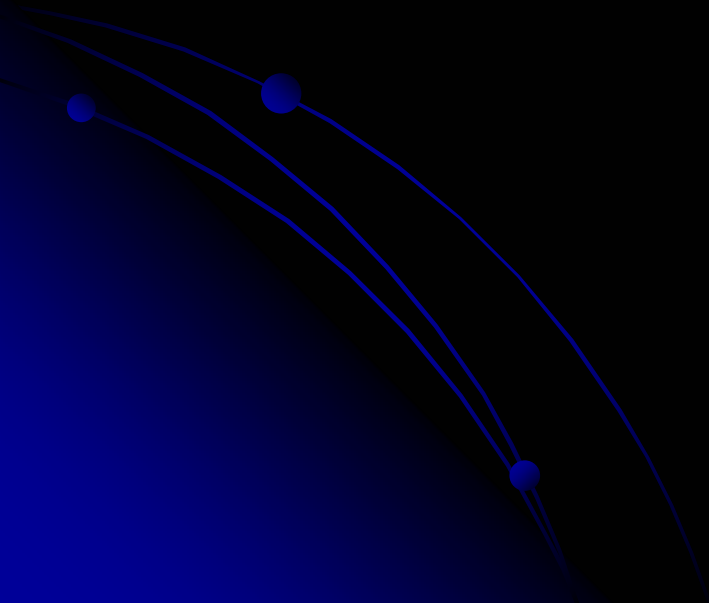


# Schedule

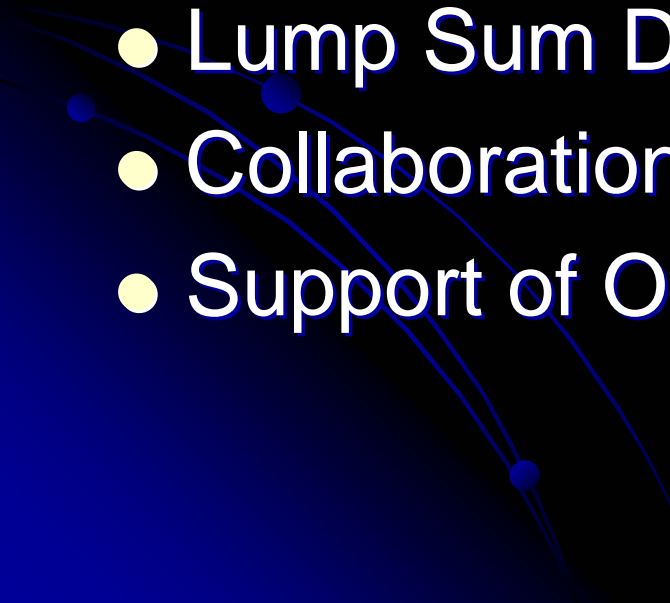
- Summer 2005 - 2 years after Scoping
    - SIB Loan Approved
    - Project Advertised
    - Contract awarded to C J Mahan Construction Company and Janssen & Spaans Engineering
      - Design begins
- 

# Schedule

- Summer 2006
  - Construction
    - To be completed October 2006
    - No Contract Modifications!

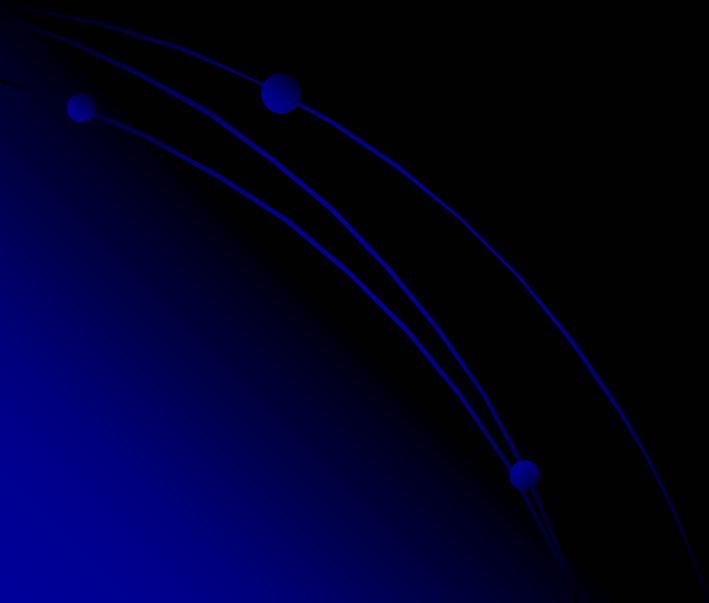


# Keys to Success

- Commitment of County Engineer
    - Clyde S. Willis
  - Preliminary Engineering of Site
  - Good Scope Document
  - Lump Sum Design Build Contract
  - Collaboration with District 9
  - Support of ODOT Central Office
- 

# Scope Document

- Pre-Qualification of Design-Build Team:
  - “It is a requirement that each member of the DBT has successfully completed at least one similar design build bridge project.”



# Scope Document

- Scope of Work

- “...The proposed structure shall be a simple span ... the structure type shall be limited to prestressed or cast-in-place concrete, or galvanized steel girders as approved by the Scioto County Engineer prior to award of the contract. The design criteria shall be HS20-44 with Alternate Military Loading....”

- Special thanks to:

- Todd Long, P.E., Planning Administrator, ODOT District 9
- Andrew Gall, ODOT Chief-of-Staff
- Glenn Sprowls, Executive Director, CEAO





# Dixon Mill Road Design-Build Bridge Replacement Innovative Design Features

Presented by:

C. Brian Slagle, P.E., S.E.

Janssen & Spaans Engineering



# Challenges

- Design Build
- 200' Simple Span
- Bridge Type Selection
- Transportation / Handling Issues with Site
- Construction



# Design Build

- Scope of Work
  - Provided Profile
  - Span Criteria (simple 200' span)
  - Design loading: HS20-44 + 60 psf FWS
  - Superstructure Type Option



# 200' Simple Span

- Structure Depth Limitations
  - Controlling Deflections
  - Limited Feasible Options for Simple Spans of this Length
- Need for multi-piece (spliced) beam system
  - Falsework required

# Bridge Type Selection

- Prepare 2 Alternate Designs:
  - 103" Spliced Post-Tensioned Bulb-Tee
  - 96" Steel Plate Girder

# Bridge Type Selection

- 103" Spliced Post-Tensioned Bulb Tee
  - 4 Beam Line System
  - System Composed of Splicing Two Beam Sections
  - Falsework Required for Temporary Support
- 96" Steel Plate Girder
  - 3 Girder Line System
  - System Composed of Splicing Three Beam Sections
  - Falsework Required (Potentially)
  - 315,000 lbs Total Structural Steel Weight

# Design Considerations

- Semi-Integral Abutments
- Future Deck Removal
- Post-Tensioning Loss Calculations
- Semi-Lightweight Concrete
- Multi-Staged Post-Tensioning
- Stay-In-Place Galvanized Steel Deck Forms

# Transportation / Handling Issues with Site

- Beam Piece Lengths limited for Transportation to Site - Weight
- Superelevation along Route
- Staging Area Constraints within ROW
- Handling Beam Sections on Site



# Construction

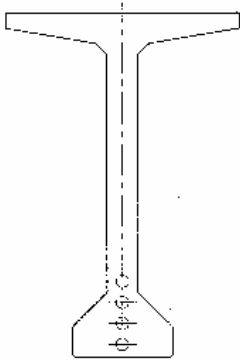
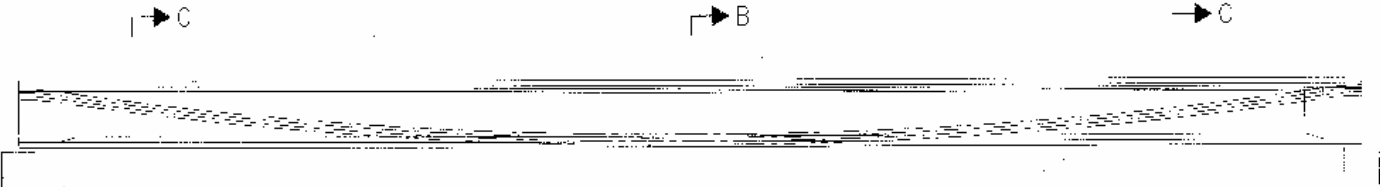
- Innovations
  - 103" Spliced Bulb Tee
  - Swept Post-Tensioned Ducts in Bottom Flange
  - Multi-Staged Post-Tensioning
  - Semi Lightweight Concrete
  - No Beam Fillets



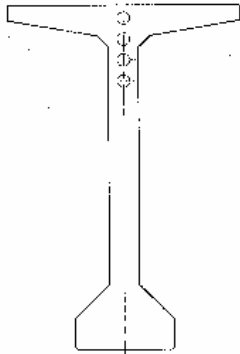
# 103" Spliced Bulb Tees



# Typical Ducts



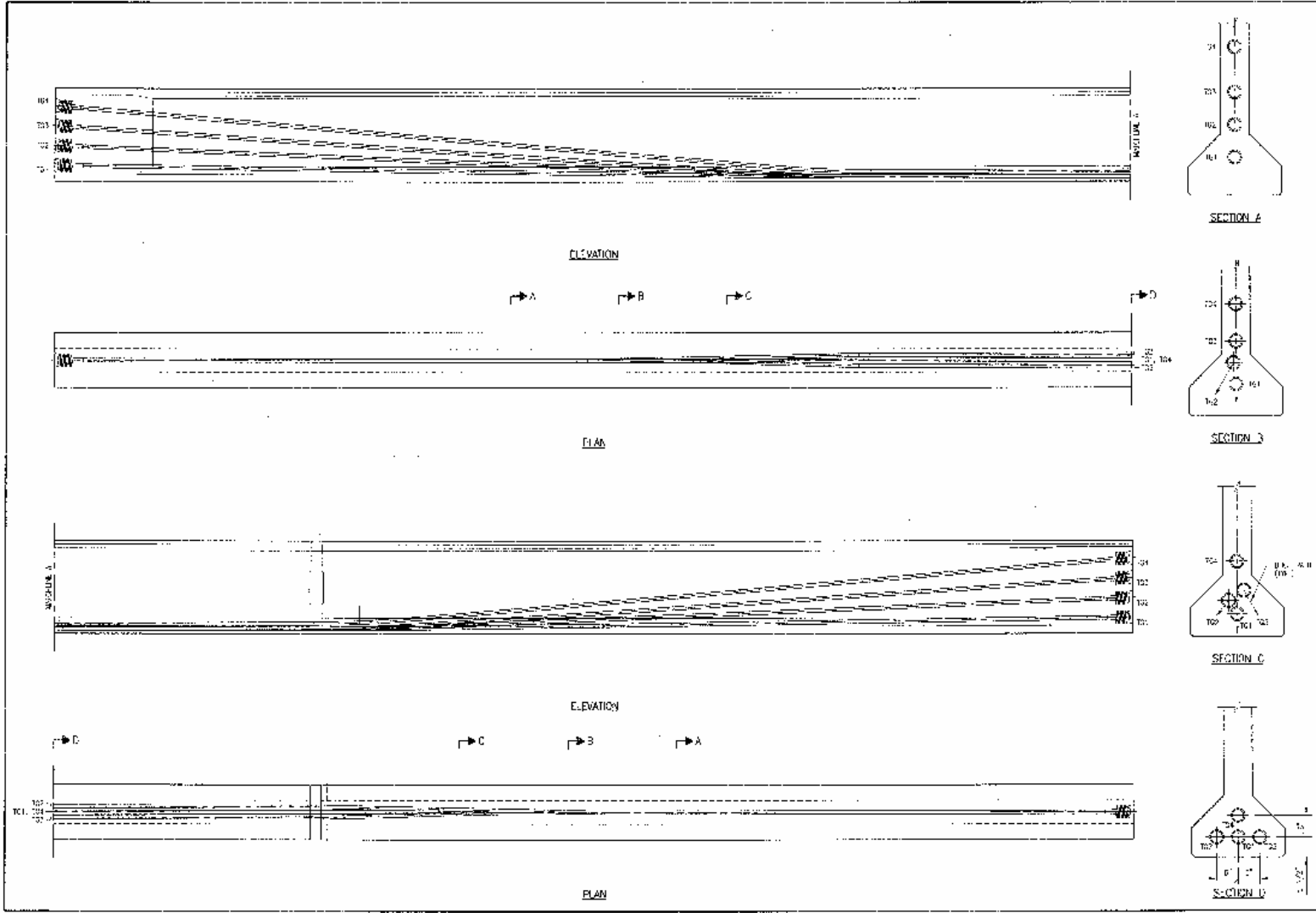
SECTION B



SECTION C

<table border="1"> <tr><td>REVISED</td><td>DATE</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	REVISED	DATE									<table border="1"> <tr><td>REVISION</td><td>DATE</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	REVISION	DATE									<p><b>JANSSEN &amp; SPANNS ENGINEERING, INC.</b>          CONSULTING ENGINEERS          8122 HARRISON PARK COURT          INDIANAPOLIS, INDIANA 46261          (317) 298-8282</p>	<table border="1"> <tr><td>DESIGNED</td><td>DATE</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	DESIGNED	DATE									<table border="1"> <tr><td>CHECKED</td><td>DATE</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	CHECKED	DATE									<table border="1"> <tr><td>PROJECT</td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	PROJECT										<table border="1"> <tr><td>DATE</td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	DATE									
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<p>POST-TENSIONING LAYOUT</p>						<p>PROJECT NUMBER</p>	<p>DATE</p>																																																											

# Swept Ducts



PROJECT: SCOTTS COUNTY BRIDGE NO. 101-15-112 SHEET NO. 17	DESIGNER: J. L. SCOTT CHECKER: J. L. SCOTT DATE: 11/12/12	CONTRACTOR: MERRILL & BRADY ENGINEERING, INC. BRIDGE NO. 101-15-112 SHEET NO. 17
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17  
17

# Swept Ducts



# Construction

- Demolition of Existing Structure
- Abutments
- Temporary Falsework
- Beam Erection
- Repair of Damaged Beam
- Closure Pour
- Stage One Post-Tensioning





MAR 21 2005

# Demolition





# Demolition



# Spread Footing Abutment



# Spread Footing Abutment



# Spread Footing Abutment



# Spread Footing Abutment



# Drilled Shaft Abutment



# Drilled Shaft Abutment



# Drilled Shaft Abutment





# Drilled Shaft Abutment



# Temporary Falsework



# Temporary Falsework



# Beam Erection



# Beam Erection



# Beam Erection



# Beam Erection



# Beam Erection





# Beam Erection



# Beam Erection



# Repair Damaged Beam



# Repair Damaged Beam



# Repair Damaged Beam



# Repair Damaged Beam



# Repair Damaged Beam



# Repair Damaged Beam





# Closure Pour



# Closure Pour



# Stage One Post-Tensioning



# Stage One Post-Tensioning



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# Stage One Post-Tensioning



# Stage One Post-Tensioning



# Stage One Post-Tensioning





# Stage One Post-Tensioning



# Stage One Post-Tensioning





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# Questions?

