Construction Manager at Risk Project Delivery Method

Case Study:
Ohio University Shoemaker Center Pedestrian Bridge

13 Aug 2015

County Engineers Association of Ohio

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A Division of Pennoni

Introduction

- Jones-Stuckey
  - Founded in 1965
  - Offices in Columbus and Akron
  - Specialized in structural / civil engineering

Dwight Stuckey, PE, PS

Warren "Bud" Jones, PE

- Merged with **Pennoni** in March 2015
  - Established in 1966
  - Multidiscipline firm
  - 1000+ Professionals
  - Offices throughout Eastern US

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David Jones, PE

- **Project Role: Design Project Manager / Bridge Aesthetics**

- 36 years experience

- Project Delivery Experience:
  - Design – Bid - Build Delivery - Richland Avenue Bridge Rehabilitation, City of Athens
  - Design-Build – Owner's Designer, Ohio Bridge Partnership
  - Design-Build – Contractor's Designer, East Fork Lake Raw Water Pump Station and Bridge
  - Construction Manager at Risk – Criteria Designer and Representative, The Ohio State University Wexner Medical Center Infrastructure Project
  - Multiple Prime – Owner Designer & Representative, ODNR South Marina Contracts

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Construction Manager at Risk (CMAR)

A project-specific delivery method that is suited for medium to large capital or renovation projects. CMAR provides technical assistance to the designer during the design phase, has a cost-capping feature, and allows construction to start before design documents are 100% complete. The CMAR contracts directly with subcontractors, fabricators, and material suppliers.

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Construction Manager at Risk (CMAR)

1. Integrated Construction Method Delivery System often times referred to as CM/GC

2. One of the construction delivery system authorized by the Ohio Legislature in 2009.

3. CMAR is used to deliver transportation projects in Connecticut, Maryland, Florida & other states.

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Construction Manager at Risk – When to Use

- Projects that require ***early contractor involvement*** to optimize cost, schedule and quality
- When the owners wants some ***control of the scope*** and design during the project development process
- When the owner wants to use constructability, pricing and scheduling ***to finalize the scope***
- Tight budget & schedule and other requirements

FHWA

OWNER BENEFITS

- Opportunities for innovation
- Risk reduction & allocation
- Improved cost control
- Improved design quality
- Schedule optimization
- Collaboration

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General Suitability of Delivery Model

PROJECT TRAITS	D-B-B	CM/GC	D-B
RISK MANAGEMENT	Very limited	Very effective	Best for low risk shifting
COLLABORATION	Very limited	Very collaborative	Moderate collaboration contractual limitations
PRICE CERTAINTY	None, subject to over-runs and change order	Very effective, early price certainty during project development	Very effective, early price certainty during project development
SCHEDULE ACCELERATION COMPLETION	No ability to overlap design & construction. Can accelerate construction with A+B	Ability to overlap design & construction, ability to optimize schedule not just acceleration	Ability to overlap design & construction, very effective for accelerating project delivery
CONSTRUCTION QUALITY	Low bid can compromise quality	Very beneficial to building a quality project	Very beneficial to building a quality project

General Suitability of Delivery Model

PROJECT TRAITS	D-B-B	CM/GC	D-B
INNOVATION	Design innovation only, very limited opportunities for contractor innovation	Very effective for capturing design and construction innovation	Very effective for capturing design and construction innovation
CONSTRUCT-ABILITY	Very difficult to obtain construction input during design	Optimal delivery method for obtaining construction input before design is complete	Effective delivery method for obtaining construction input before design is complete
OWNER CONTROL	High level control	Optimal level of owner control	Somewhat limited owner control, more performance based outcome
COMPETITIVE PRICING	High level	Somewhat limited, competitive markup not final project cost	Good competition, but usually limited to short-listed teams

Ohio University - Chillicothe

- Existing Bridge built 1979

- Recent inspection showed severe deterioration of steel beams
- What went wrong with the existing bridge after 35+ years?
  - Aggressive use of salt
  - Moisture from top and bottom
  - Steel was primed only and hidden
  - Use of stay-in-place forms

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Why Use CMAR on Project?

1. Extremely Aggressive Schedule - Bridge required to be substantially completed April 30, 2015
2. Budget was $890,000 for a covered structure
3. Budget was $450,000 for an uncovered structure
4. Owner not sure of what bridge type was wanted.

Schedule

- RFP Submittal — May 30, 2014
- Technical Proposal Submittal — July 23, 2014
- Interviews — August 1, 2014
- Authorized to Proceed — September 23, 2014
- Design (three reviews) — September-December
- Temporary Building Access — Early November 2014
- Close Bridge — Early November 2014
- Structure Removed — Mid November 2014
- Substructure Work — Late November 2014 to Late December 2014
- Superstructure Work — Early March 2015
- Open New Bridge — Late April 2015
- Completion of Construction — May 2015
  - Graduation – May 2, 2015

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Selection Process

- Ohio requires the Contractor to be selected using a “best value” Quality Based Selection process
- The four person Selection Committee evaluated the Proposer’s:
  - Qualifications (Short List)
  - Technical Proposal
  - Interview
  - Price Proposal

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Base Scope of Work Cost

OHIO UNIVERSITY 1804

Shoemaker Bridge Improvements - DB Technical Proposal Summary:
Base Scope of Work (No Cover)

	Design Build Firm				
ITEM	SSRG	WAI-CG	Shaw & Holter	Geiger Bros.	NOTES
1.a. Preconstruction Fee	$ 3,000.00	$ 1,800.00	$ 5,000.00	$ 2,500.00	
1.b. P/C Design Services Fee	$ 50,000.00	$ 59,750.00	$ 30,000.00	$ 25,000.00	
1.c. P/C Stage Personnel Costs	$ 11,100.00	$ 12,600.00	$ 5,200.00	$ 12,776.00	
1.c. P/C Stage Personnel Hours	160	$ 280	80	148	
1.d. P/C Stage Reimbursables	$ 6,350.00	$ 5,850.00	$ 3,700.00	$ 5,630.00	
Total Preconstruction Compensation	$ 70,450.00	$ 80,000.00	$ 43,900.00	$ 45,906.00	
2.a. Const. Personnel Costs	$ 119,800.00	$ 73,600.00	$ 25,560.00	$ 18,668.00	
2.a. Const. Stage Personnel Hours	1,664	1,200	310	182	
2.b. General Condition Costs	$ 41,400.00	$ 18,875.00	$ 10,500.00	$ 25,180.00	
2.c. DB Contingency %	2%	5%	5%	2%	
2.c. DB Contingency Amount	$ 9,480.00	$ 23,725.00	$ 21,812.00	$ 9,676.00	
2.d. CSDS Fee %	4%	2%	9%	8%	
2.d. CSDS Fee Amount	$ 20,000.00	$ 10,000.00	$ 45,000.00	$ 40,000.00	
2.e. DB Fee %	5%	5%	11.7%	3%	
2.e. DB Fee Amount	$ 26,000.00	$ 25,500.00	$ 63,765.00	$ 16,200.00	
Total Const. DB Compensation	$ 207,200.00	$ 127,975.00	$ 144,825.00	$ 100,048.00	
Schedule Enhancement, Days (+/-)	-10	-	-	-	
Schedule Enhancement, Cost (+/-)	$ 10,000.00	$ -	$ -	$ -	
EDGE %	6%	5%	5%	100%	
Price Component of Best Value Selection	$ 277,650.00	$ 207,975.00	$ 188,725.00	$ 145,954.00	

Best Value Scoring Results

Shoemaker Bridge Improvements - DB Technical Proposal Summary:
Best Value Scoring Results, based on average scores.

ITEM	SSRG	WAI-CG	Shaw & Holter	Geiger Bros.	NOTES
		Design Build Firm			
Base Scope of Work:					
Total Qualifications Score	68.750	81.750	69.500	72.500	
Total Price Proposal	$ 277,650.00	$ 207,975.00	$ 188,725.00	$ 145,954.00	
Best Value Score	45.200	72.100	70.000	83.500	
Alternate Scope of Work:					
Total Qualifications Score	69.500	81.500	68.000	72.000	
Total Price Proposal	$ 330,880.00	$ 279,145.00	$ 239,131.00	$ 167,239.00	
Best Value Score	42.600	62.100	63.600	83.200	

Normalized Priced Ranking (NPR) = [1 – ((X-L)/L)] x 100

Best Value Score = 60% x TQS + 40% x NPR

72.5 x 60% = 43.5
100.0 x 40% = 40.0
83.5

Project Team

Criteria Engineer/Owner Project Manager
David Brown, PE
Ohio University

Project Manager
Scott Massie, PE
Geiger Brothers, Inc.

Design Project Manager/ Bridge Aesthetics
David Jones, PE
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Shoemaker Center, Bridge Improvements

Construction
Geiger Brothes, Inc.
Kyle Hickey, PE
Project Engineer

Chad Markins
Project Superintendent

Structural Design
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Christian Lunt, PE
Bridge Engineer

Dale Arnold, PE
Bridge Engineer

Dan Crawford
Roadway/MOT Design

Douglas Miller, PE
Quality Control

Architecture/Lighting
BDT Architects & Interior Designers
(EDGE Certified)
Don Dispenze, AIA, NCARB, LEED AP
Trent DeBruin, RA

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New Bridge Design

- How to Improve?
  - High Performance Concrete (ODOT Class QC2)
    - Denser
    - More Durable
  - Epoxy coated steel
  - Sealants on concrete
    - Silane
  - Galvanized Steel
    - 40 year life
    - Limited on tank size
    - Increase life by painting
  - Inspection
    - Not over a public road
    - Recommended to be inspected every 2 years

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New Bridge Design

- What should be designed?

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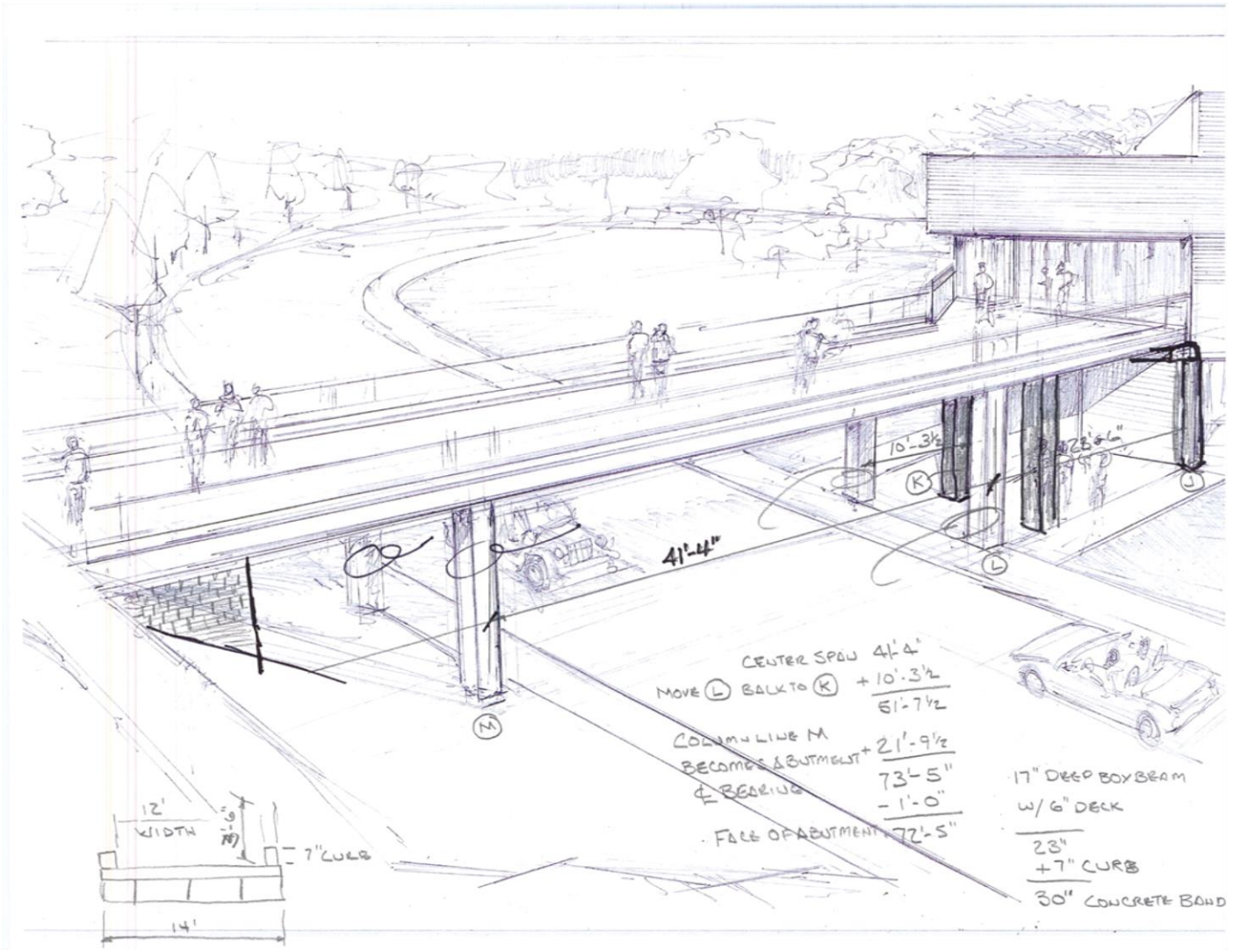
New Bridge Design



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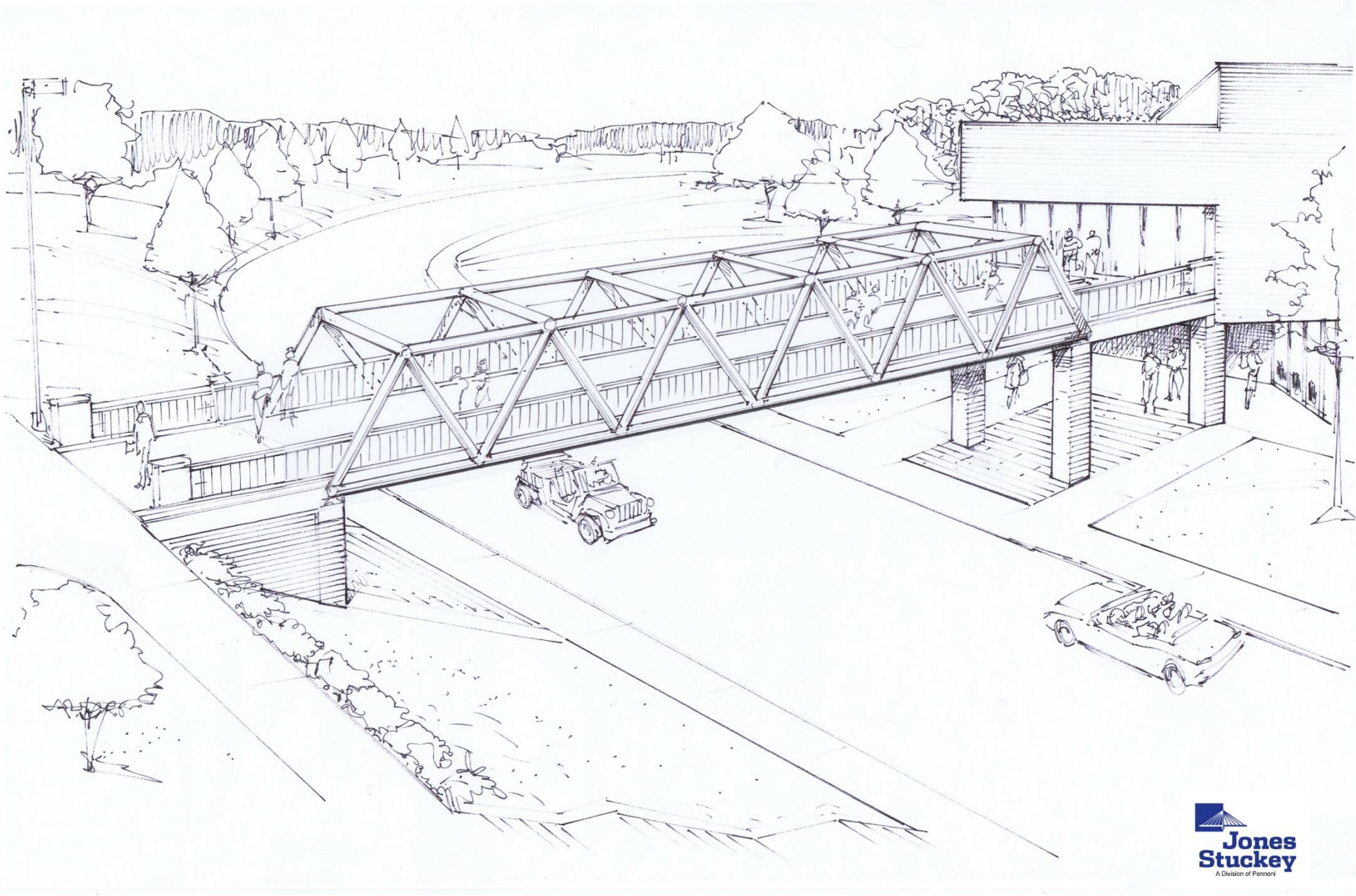
Steel Truss



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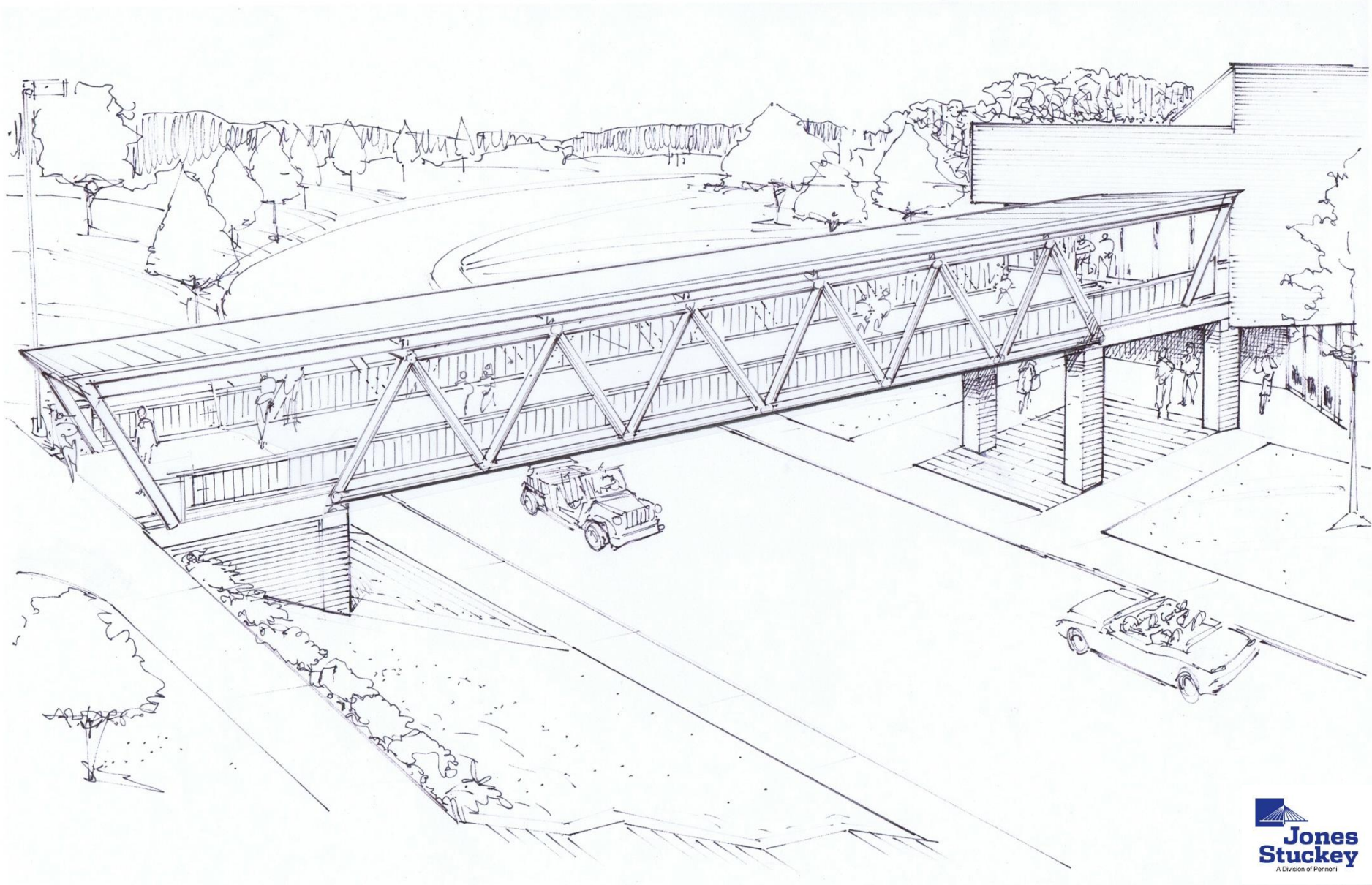
Steel Truss with Roof



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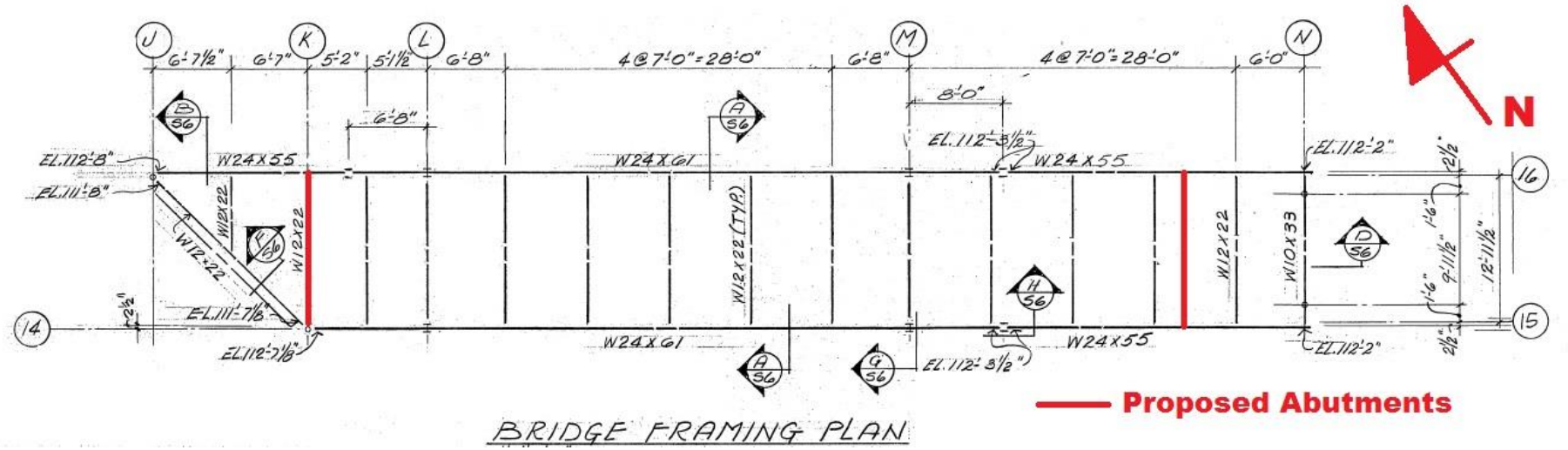
Composite Prestressed Box Beam



BRIDGE FRAMING PLAN

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Bid Packages

Case Study:
Ohio University Shoemaker Center
Pedestrian Bridge

GMP's

GMP1
- Early Site Security, Fencing and Erosion & Sediment Control
- Selective Demolition & Removals

GMP2
- Concrete Foundation and Related Civil/Structural Work
- Concrete Superstructure and Deck Placement Work

GMP3
- Procurement of Bridge Beams & Canopy Framing Steel

GMP4
- Precast Erection
- Steel Framing

GMP5
- Glazing & Railing Panels and Electrical

GMP6
- Site Restoration

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Summary

Advantages of Delivery

1. Specialty Glass
2. Project was delivered faster than traditional method.

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Questions

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