

# The Tennessee River Bridge Experience

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&

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# The History of the Tennessee River Bridge Replacement



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# TENNESSEE RIVER BRIDGE

- September 1994 – Scoping Study Authorized
- September 1997 – Initial Design Funds Authorized
- February 2004 – Right of Way and Utility Funds Authorized for the substructure contract
- December 2005 – Contract let to construct truss substructure (Piers #6-#8)



# TENNESSEE RIVER BRIDGE

- October 2008 – Bulletin for superstructure design was publicized
- May 2009 – A Notice to Proceed for design services was issued to URS, Inc.
- July 2010 – Superstructure Contract was let to the joint venture of Kay & Kay Construction & Haydon Bridge for \$66,364,228.26



# PROJECT OVERVIEW

## *EXISTING BRIDGE CHARACTERISTICS*

- 2-lane bridge
- Existing structure 20' wide curb – curb
- ADT: 10,400 (2005)
- Built in late 1920's & early 1930's
- Originally a toll bridge
- Designed by Modjeski and Masters Engineers



# PROJECT OVERVIEW

## *REPLACEMENT BRIDGE CHARACTERISTICS*

- Future Design Parameters:
  - ADT: 15,000 (2023)
  - 10% Truck Traffic
- New structure approx. 1500 ft. upstream



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# PROJECT OVERVIEW

## *REPLACEMENT BRIDGE CHARACTERISTICS*

- 17 total spans
- 3 truss spans
  - 500 FT, 400 FT, AND 900 FT



- Modified Warren Truss
- Typical truss span: 4 lane roadway, barrier wall divided
- 1 River Pier

# PROJECT OVERVIEW



**Phase One: Substructure**



**Phase Two: Superstructure to Completion**



**Phase Three: Existing Bridge Demolition**



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# PHASE ONE

## OVERVIEW

- Letting: December 16, 2005
- Awarded to CJ Mahan Construction
- \$ 28.5 Million
- 16,600 C.Y. – Class A Concrete
- 8,700 C.Y. – Class AA Concrete
- 3.2 million lbs – Steel Reinforcement
- Estimated Completion: Nov. 2008
- Actual Completion: June 2010



# PHASE ONE

## *DELAYS AND ADVERSITY*

- ⦿ Weathering Steel modifications
- ⦿ Superstructure evaluation led to changes on existing design
- ⦿ Seismic issues with existing footing design found during evaluation
  - Interpretation of data based on proximity to New Madrid Fault Zone
- ⦿ High Water
  - Elev. 306 is C.I. for River pier construction
- ⦿ Muscle re-location



# PHASE ONE

## *DELAYS AND ADVERSITY*



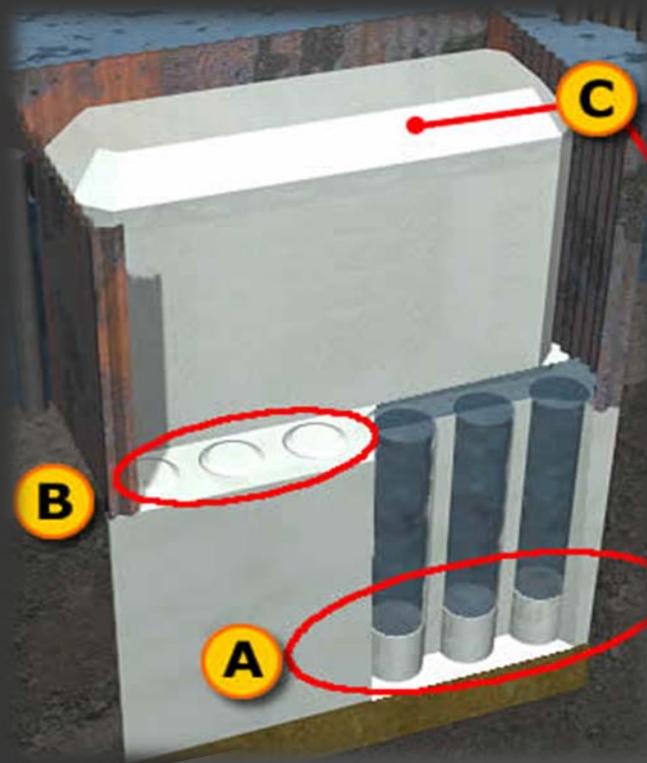
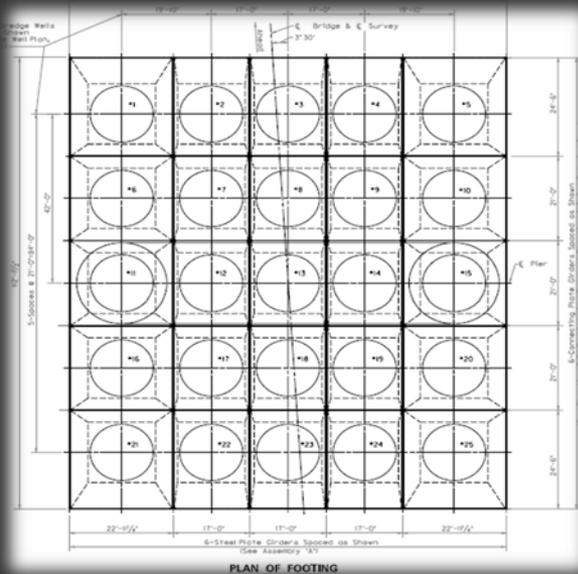
- Indiana Bats – (clear trees between Oct 15<sup>th</sup> & March 31<sup>st</sup>)
- NTP issued Feb. 28, 2006
- Access road to McCracken County side
- RR Crossing needed to access McCracken County side of River
- Power to McCracken County side – Pier # 6



# PHASE ONE

## CHANGES TO DESIGN

- Design/Build option for Pier # 7
  - Original Design
  - Similar to Greenville Bridge



Source: [www.greenvillebridge.com](http://www.greenvillebridge.com)

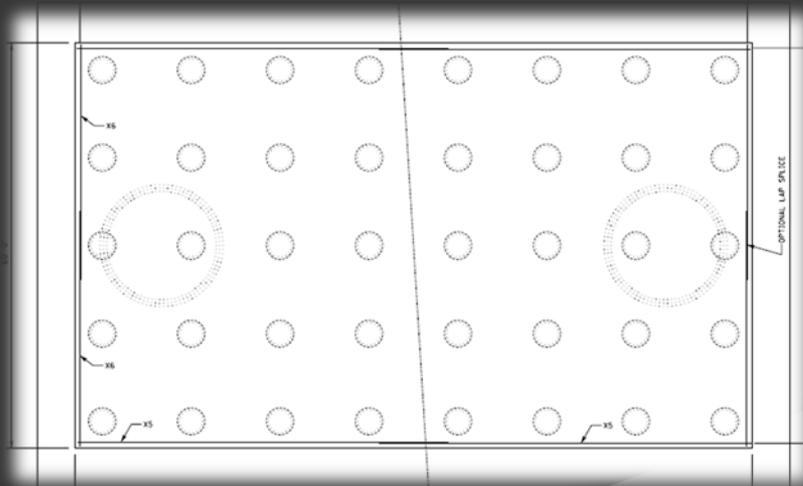


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# PHASE ONE

## CHANGES TO DESIGN

- Design/Build option for Pier # 7
  - As-Built Design



# PHASE ONE

*CHANGES TO DESIGN*

## 🕒 Pier #7 Construction



08/16/2007



# PHASE ONE

## *CHANGES TO DESIGN*

- ⦿ VE changing steel pile to concrete pile
- ⦿ VE changing size of footer at Pier # 8



# PHASE ONE

*CHANGES TO DESIGN*

- ⦿ Dynamic Load Testing vs. Static Load Testing
- ⦿ Pile Driving Criteria



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# PHASE ONE

*CHANGES TO DESIGN*



- Soil conditions at Piers 8 & 9
- Erosion Control Issues



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# PHASE ONE

*PROJECT COMPLETION*

- Project Completion
  - June 2010



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# PHASE TWO

## OVERVIEW

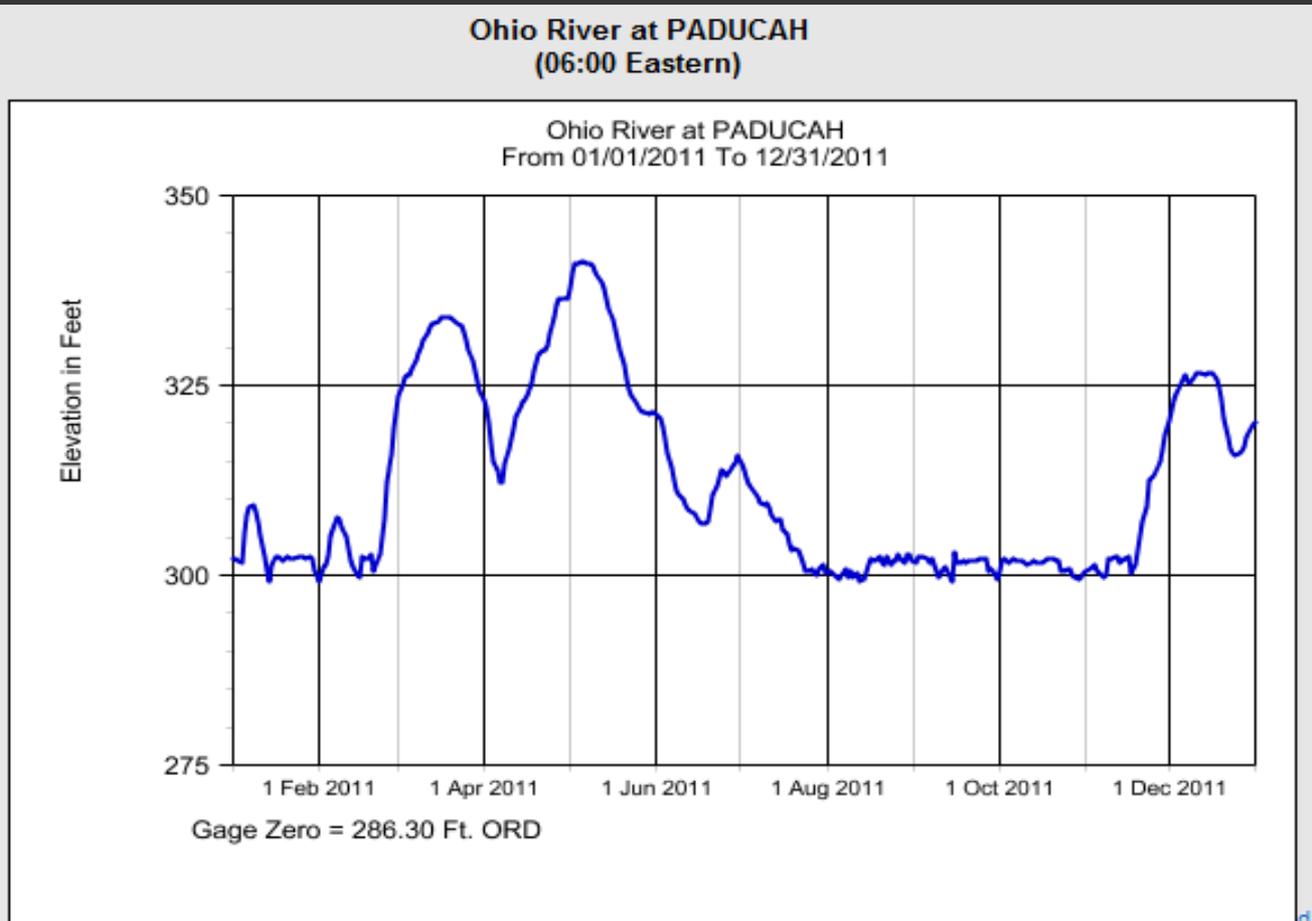
- Letting: July 30, 2010
- Awarded to Kay & Kay Contracting JV W/ Haydon Bridge Company
- \$66.4 Million
- 15.3 million lbs of Structural Steel
- 9,000 C.Y. – Class A Concrete
- 8,500 C.Y. – Class AA Concrete
- 2.5 million lbs – Steel Reinforcement
- Actual Completion: October 31, 2013



# PHASE TWO

*DELAYS AND ADVERSITY*

## ● High Water



US Army Corps of Engineers - [Louisville District](#) - Water Control Center - [Contact Us](#)



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# PHASE TWO

*DELAYS AND ADVERSITY*

## ⦿ High Water



# PHASE TWO

*DELAYS AND ADVERSITY*

## Weight Limit Reduction



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# PHASE TWO

## *DELAYS AND ADVERSITY*



- Material Delivery
- Weather
- Neither incidents related to controlling item
- Overall schedule not effected



# PHASE TWO

*DELAYS AND ADVERSITY*

- ⦿ Crane Issues
- ⦿ Related to controlling item: structural steel
- ⦿ Delay Time: 4 to 6 weeks

*BEFORE*



*AFTER*



# PHASE TWO

*OVERALL CONSTRUCTION*



# PHASE TWO

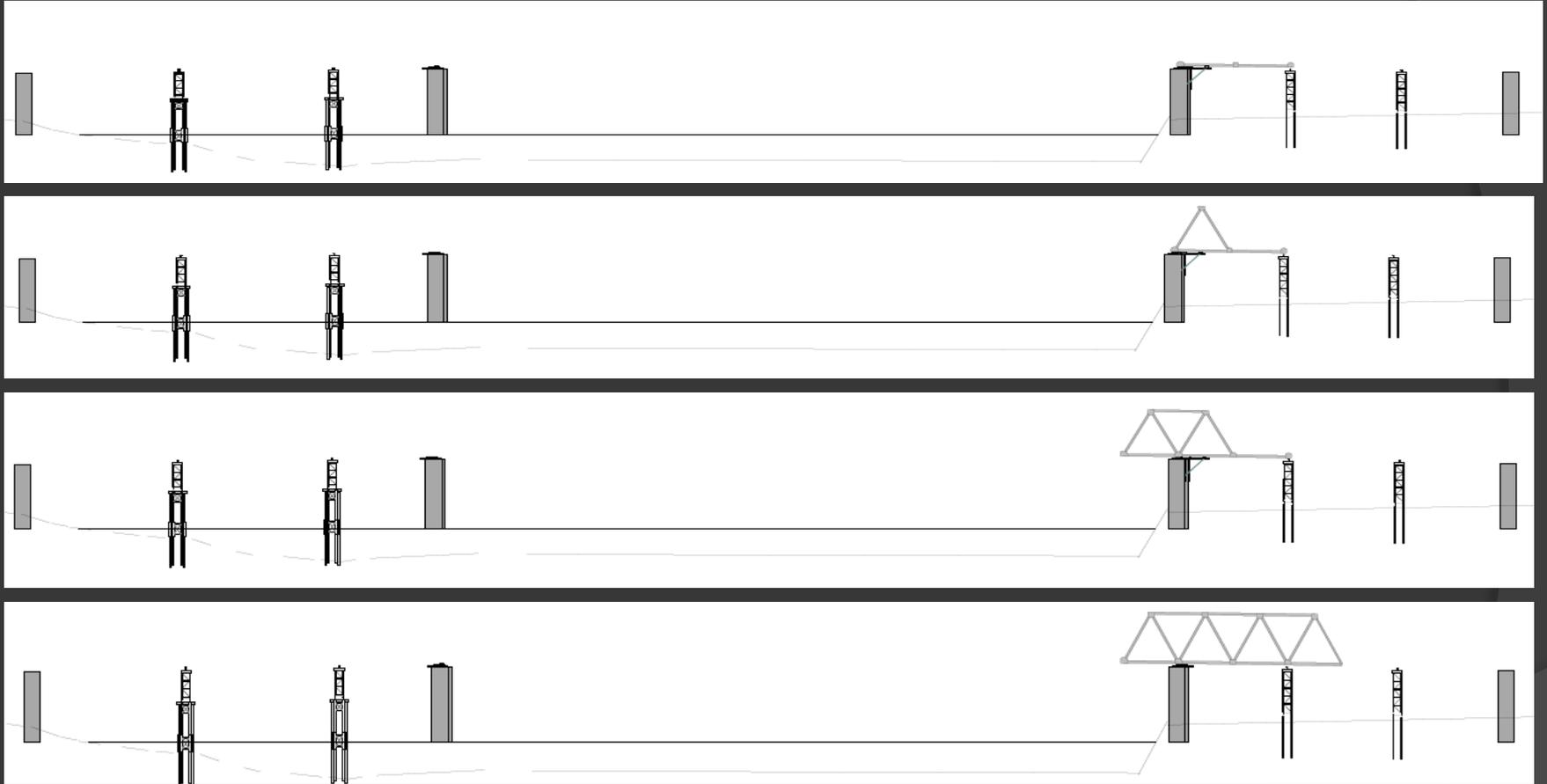
*OVERALL CONSTRUCTION*



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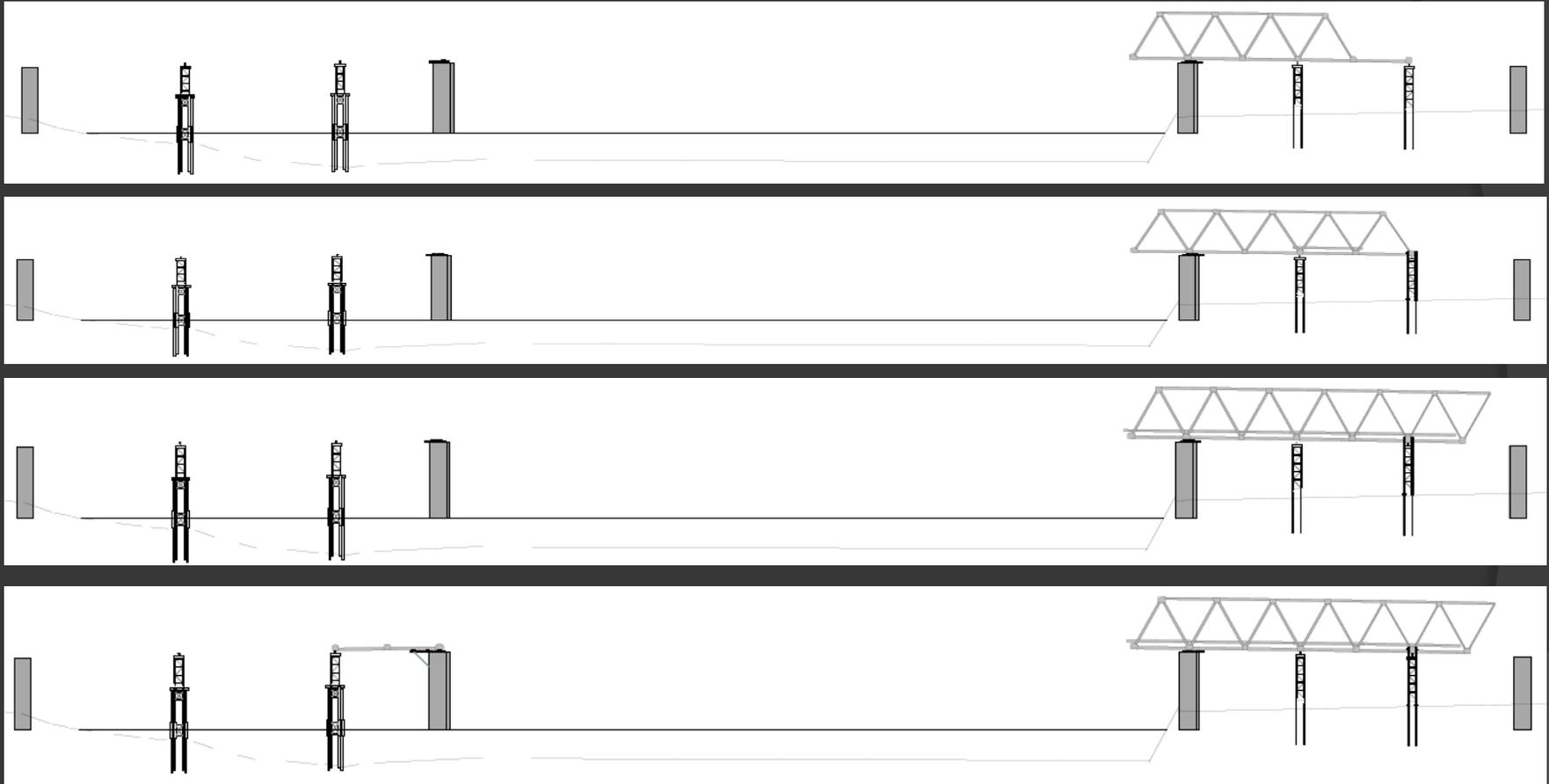
# PHASE TWO

## *STEEL ERECTION OF TRUSS*



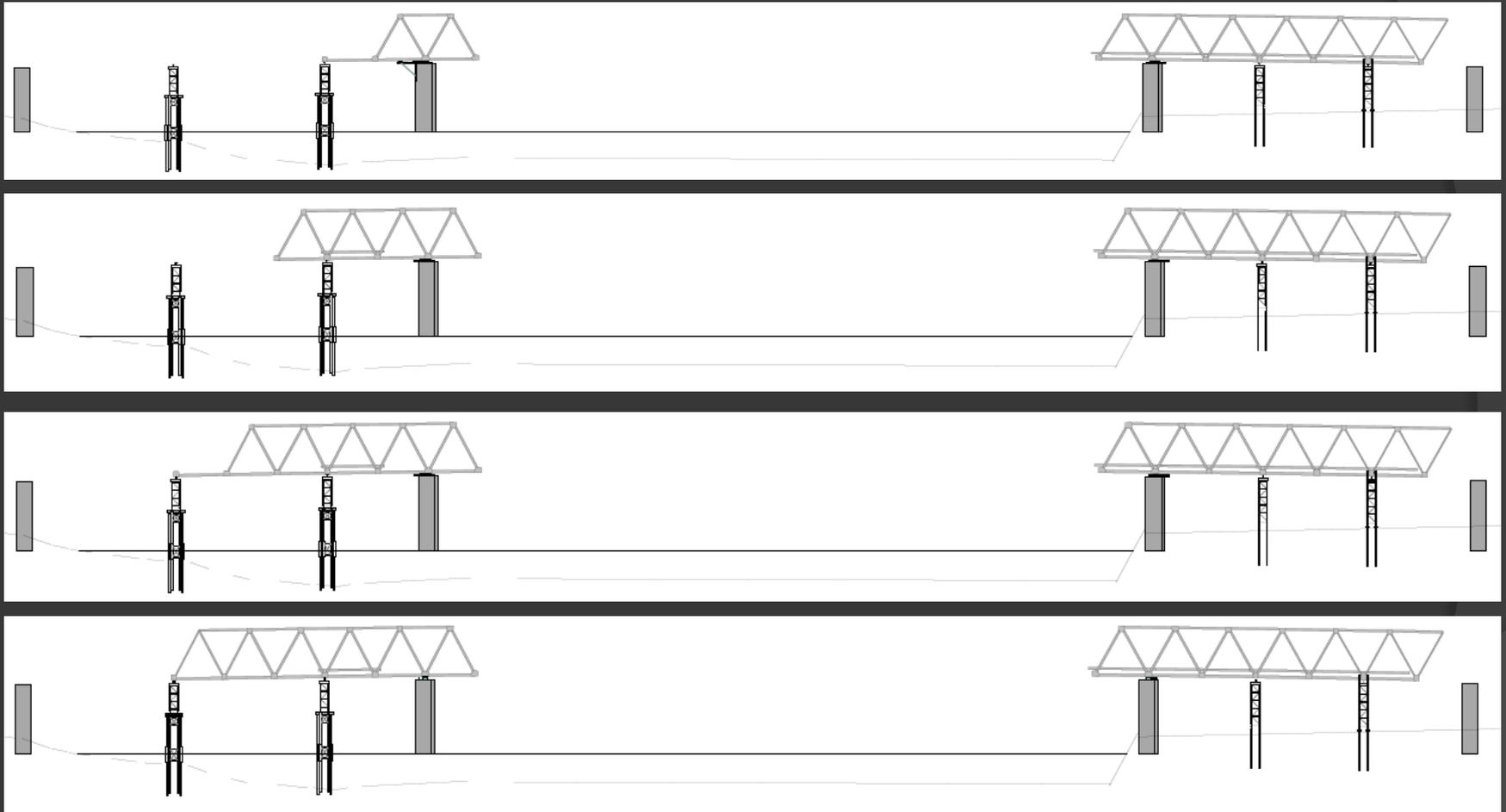
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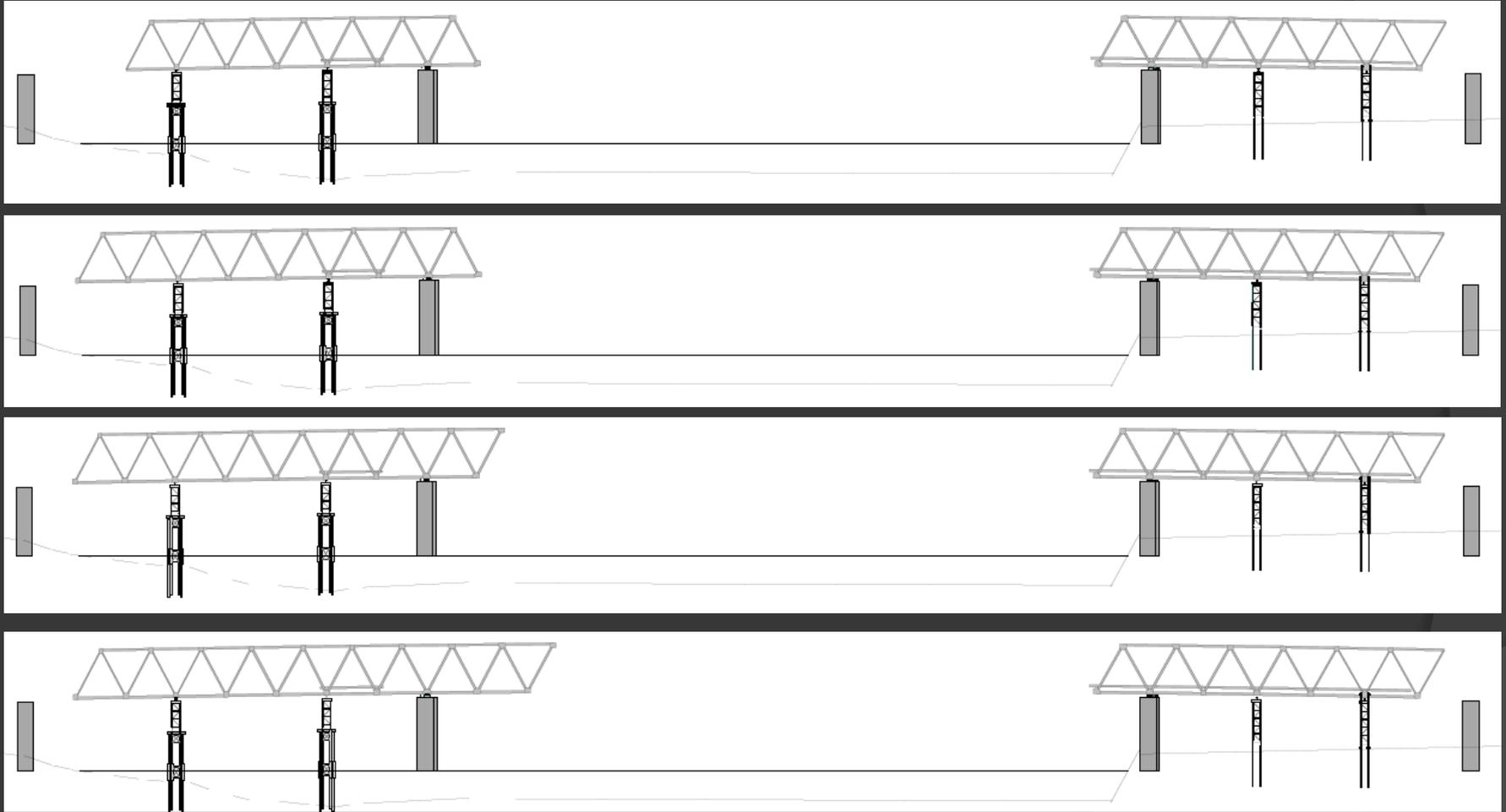
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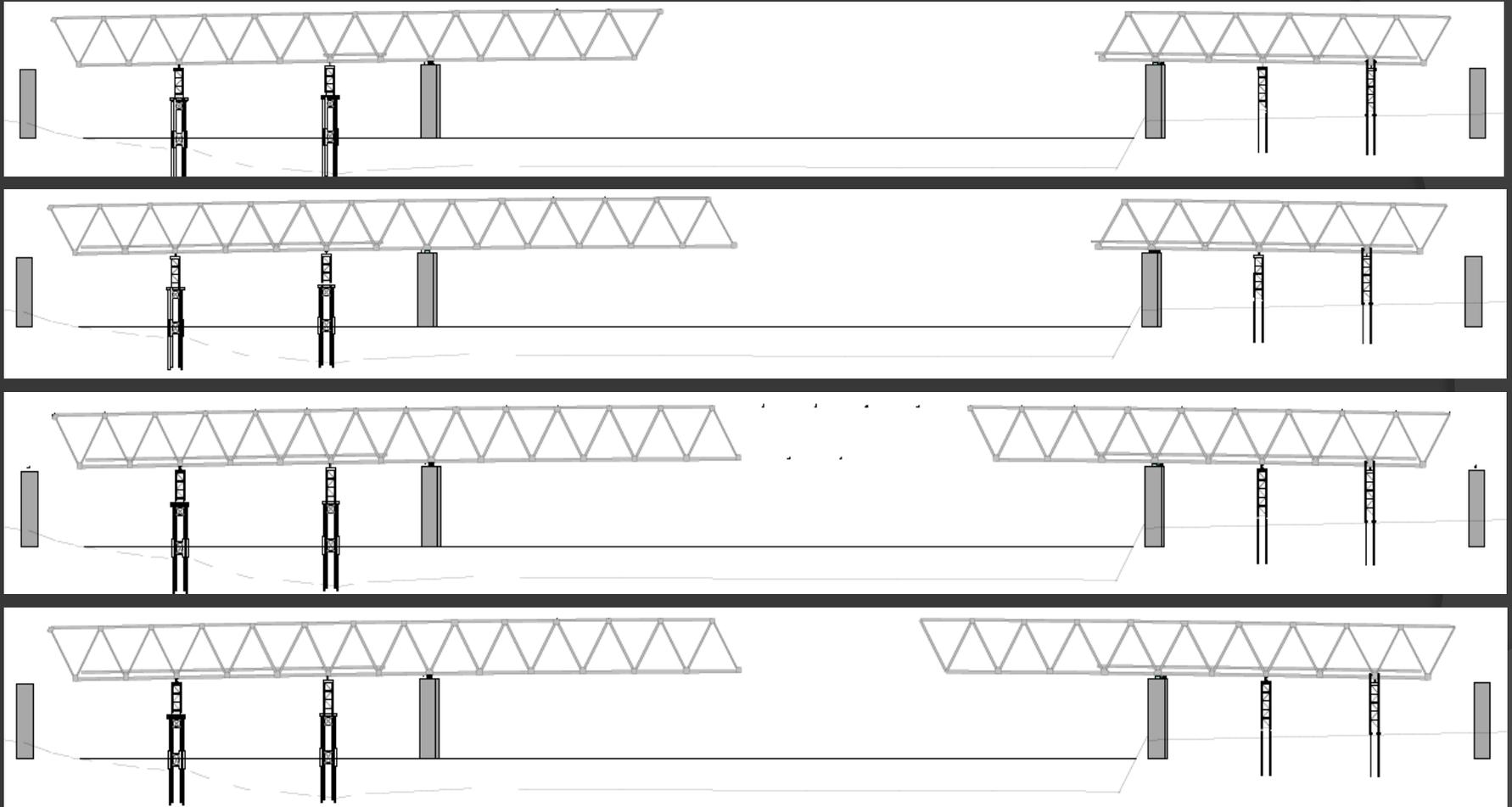
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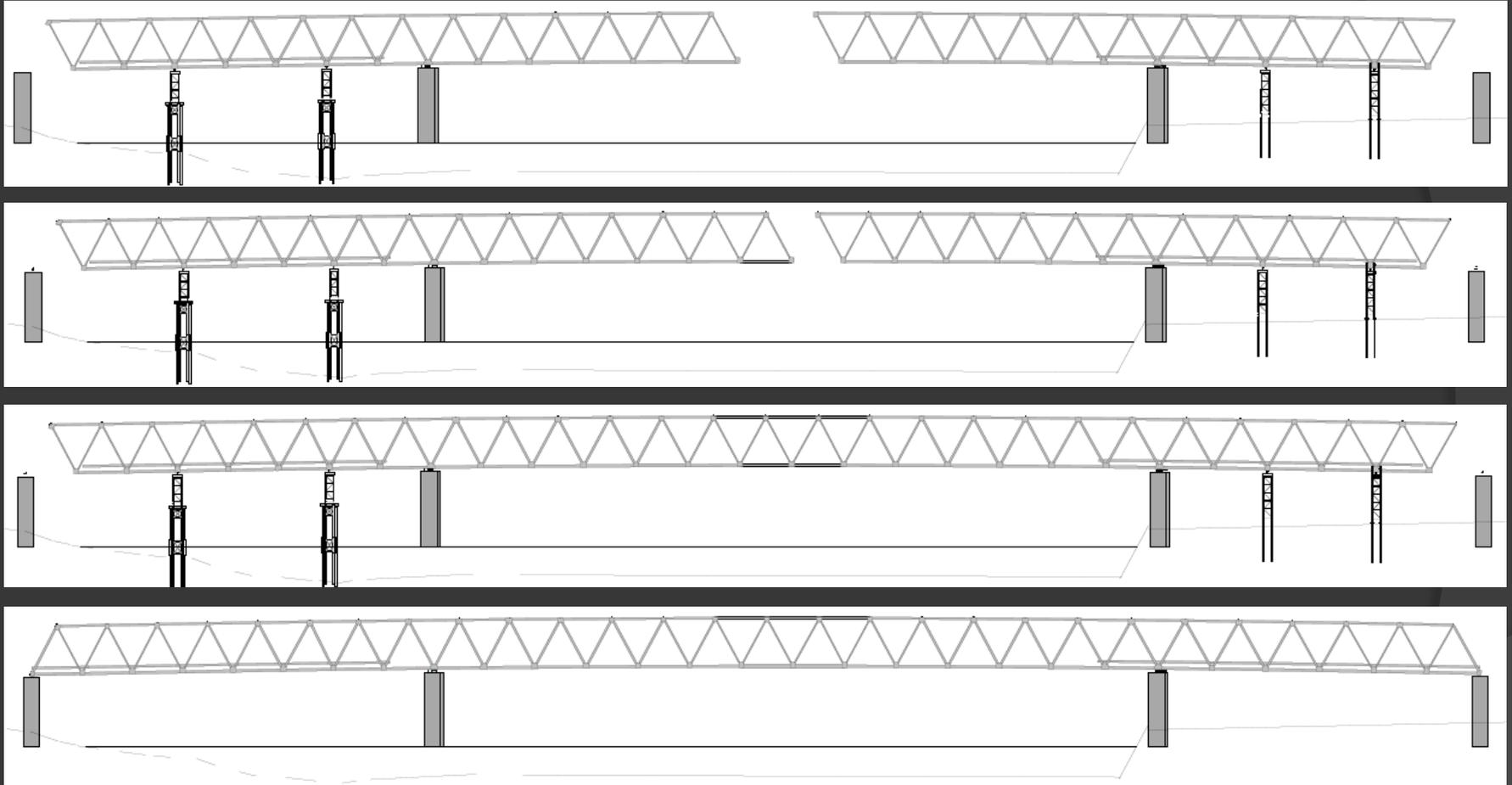
# PHASE TWO

## STEEL ERECTION OF TRUSS



# PHASE TWO

## *ERECTION*



# PHASE TWO

## *PROJECT ACCELERATION*

- Condition of Existing Structure
- Incentive/Disincentive Option
  - Associated Cost keeping existing structure open
  - Areas of Possible Acceleration
- Accepted Proposal:
  - 3.8 million dollars for 2 lanes of traffic by May 2013
  - 1.9 K disincentive per day after May 1<sup>st</sup>, 2013
  - Project Completion Date: October 31<sup>st</sup>, 2013



# PHASE TWO

*PROGRESS TO DATE*



# PHASE TWO

*PROGRESS TO DATE*



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# PROJECT PHOTOS



# PROJECT PHOTOS



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# QUESTIONS?



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