

# **Accelerated Bridge Construction (ABC) and the Utah Experience**

**by**

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# What is “Accelerated Bridge Construction (ABC)”?

- Building the bridge more quickly than your conventional practice, while maintaining quality
- What ABC means to you depends on where you are now
- ABC spans the entire process, from planning through construction

# Examples of ABC - Planning

- Early owner meetings with contractors & suppliers to innovate
- Right-of-way acquisition & utility relocations before advertising project
- Early environmental clearance & permitting
- Innovative contracting strategies in contract documents (e.g., A+B bidding, lane rental, incentive/disincentive clauses)

## Examples of ABC – Planning, cont'd.

- Electronic shop drawing submittal & approval process
- Procurement of materials before advertising project (e.g., prestressed concrete girders, structural steel girders)

# Examples of ABC - Design

- Prefabrication of bridge components or entire bridge
- Geotechnical engineering enhancements (e.g., mechanically-stabilized earth walls instead of conventional cantilever retaining walls; reinforced or lightweight backfills)

# Examples of ABC - Construction

- Allowing contractor options to innovate
- Use of innovative equipment (e.g., self-propelled modular transporters – SPMTs – to move entire bridge; launching, pivoting, or skidding equipment)
- Concurrent onsite engineering operations (e.g., building abutments & interior supports simultaneously)

# “Accelerated Bridge Construction”

- Replacement or new construction
- Uses innovative design & construction methods & high performance materials
- Reduces typical construction time
- Maintains or enhances quality
- Reduces traffic disruption
- Increases work-zone safety
- Produces cost-effective, long-lasting bridges with early openings

# “Prefabricated Bridges”

- One ABC method
- Bridge elements or systems, or entire bridges, built at offsite locations
- Controlled offsite environment assures quality construction
- Transported to site & quickly installed, e.g.,
  - Girders & partial-depth deck panels
  - Full-depth precast deck panels
  - Superstructure systems
  - Substructure systems
  - Entire bridges of prefabricated elements



# Benefits of ABC

- Minimized traffic disruption – from months to days
- Improved work-zone safety – improved worker safety & motorist safety
- Improved product quality – controlled environment, cure times, easier access, etc.

# **The Utah Experience**

**Making ABC Standard Practice**

**What does  
“ABC as Standard Practice”  
mean?**

# **ABC as standard practice means considering ABC at the initial planning stage of each project**

- Use FHWA Framework for Prefabricated Bridge Elements and Systems (PBES) Decision-Making

- <http://www.fhwa.dot.gov/bridge/prefab>

or

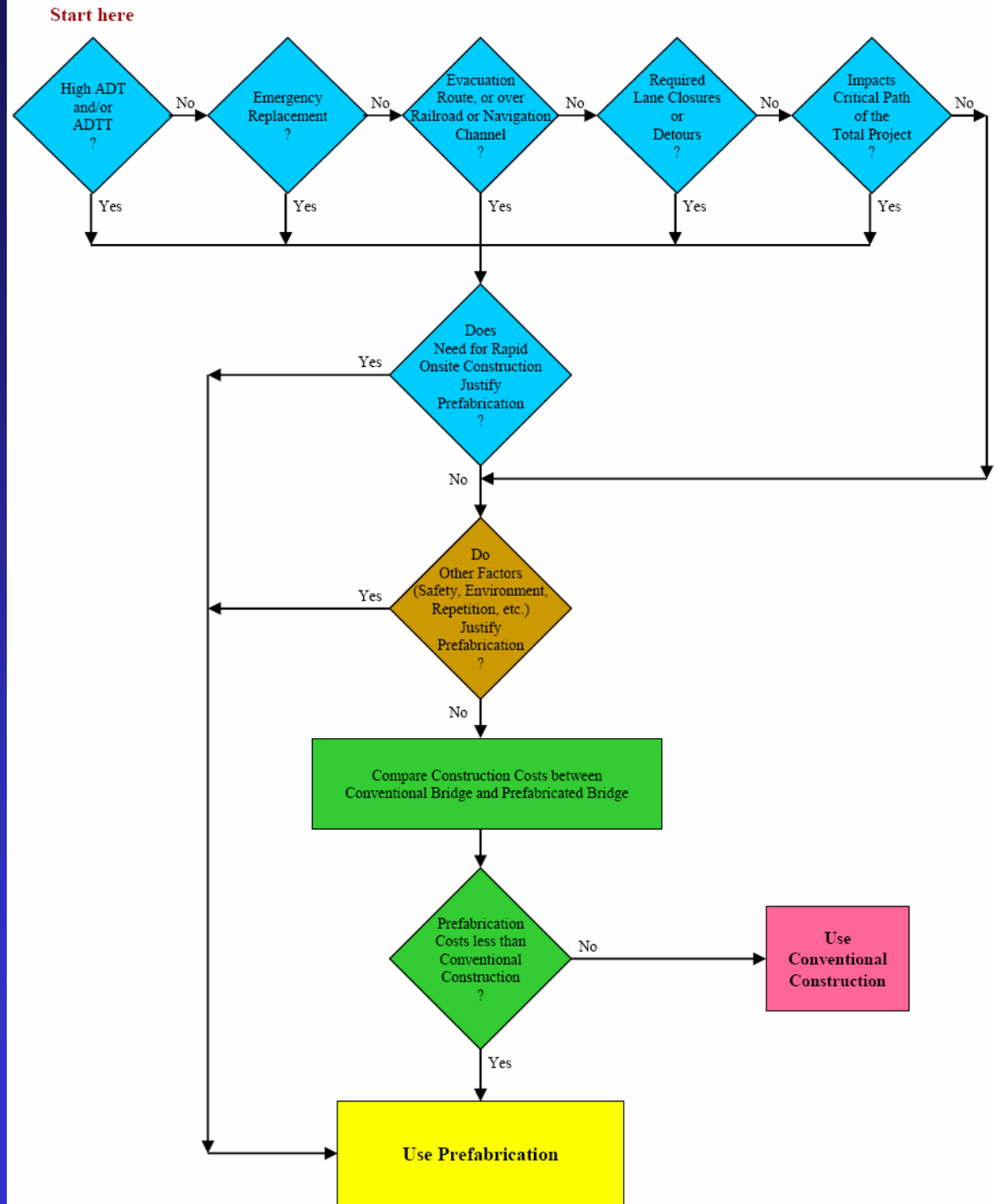
- Develop your own decision-making tool
  - Example: Utah DOT Decision Chart

## **And having a business model in place to use ABC as appropriate**

# FHWA Decision- Making Framework

3 formats:

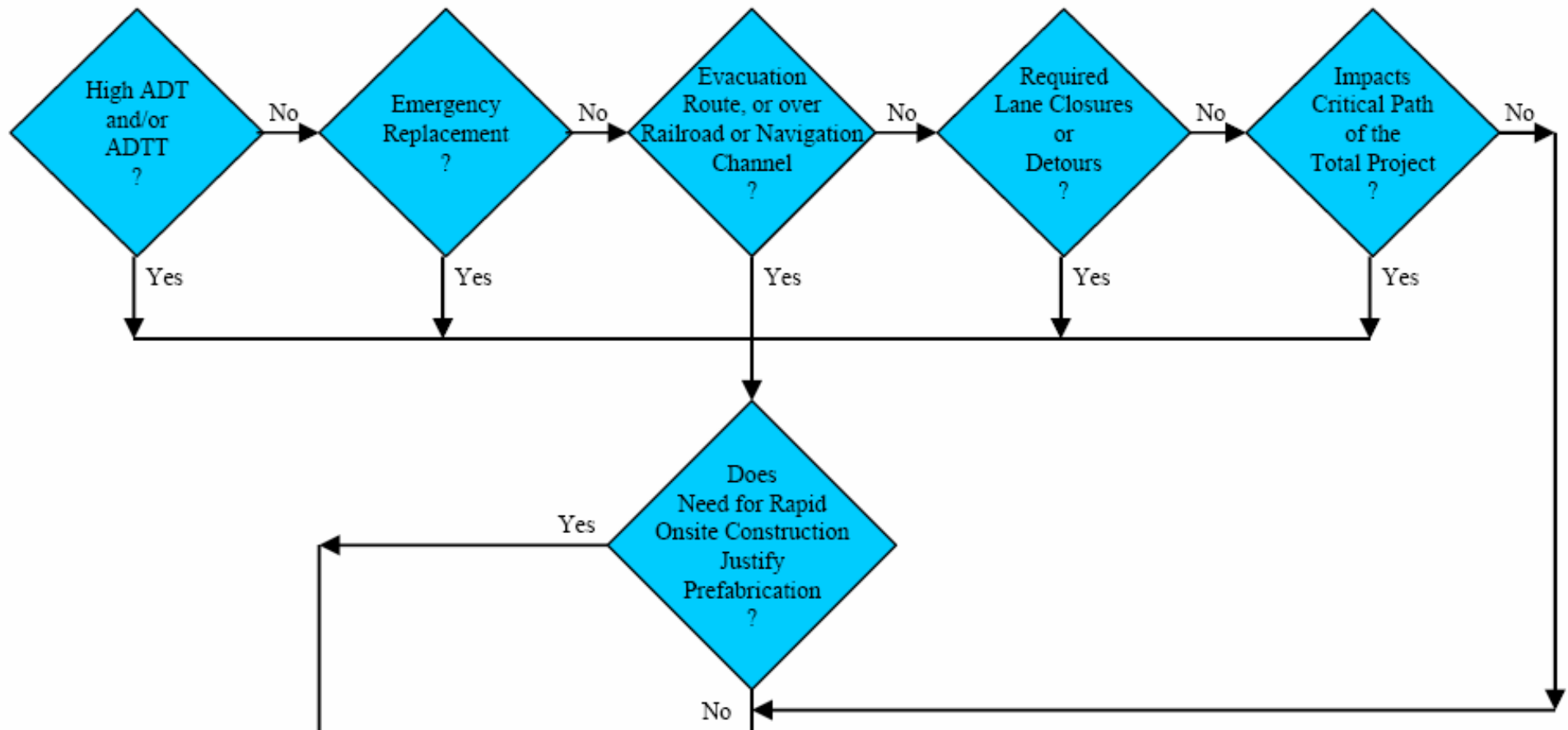
- Flowchart
- Matrix Questions (yes-no-maybe)
- Q&A Discussion



# RAPID ONSITE CONSTRUCTION FACTORS

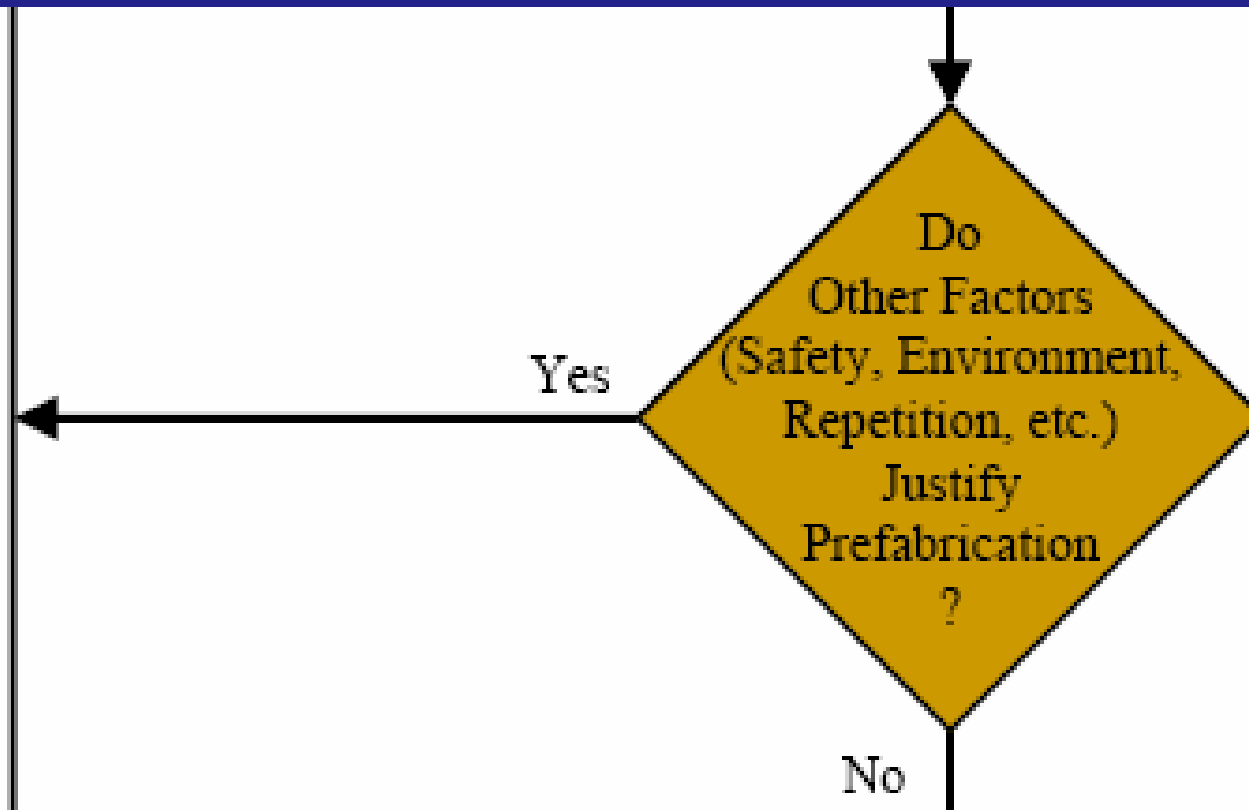
Traffic Volume / Emergency / Commerce /  
User Delay  
???

Start here

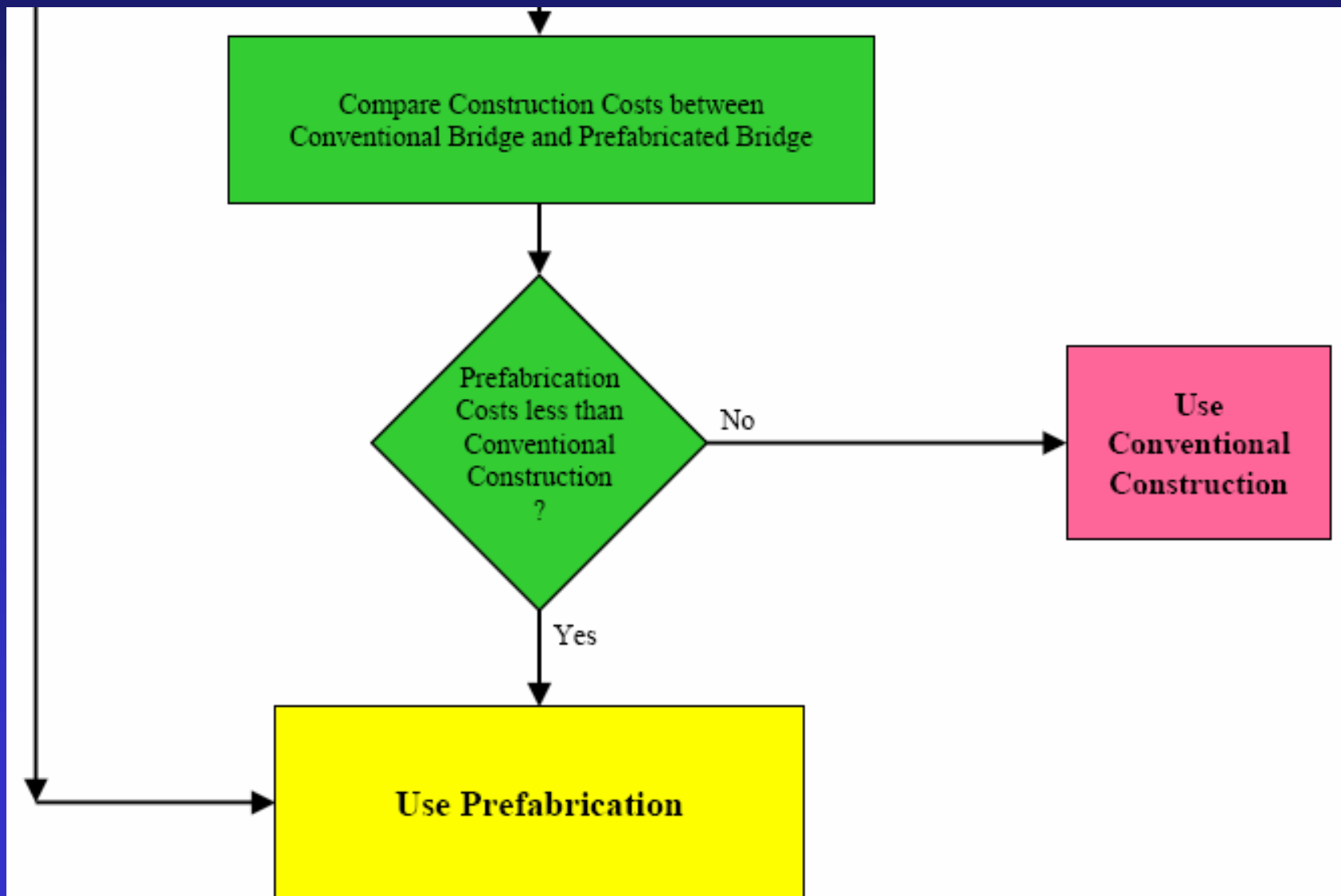


# OTHER FACTORS

Worker Safety / Wetlands-Air Quality-Noise /  
Endangered Species / Multiple Similar Sections  
???



# PBES CONSTRUCTION COSTS LESS ???





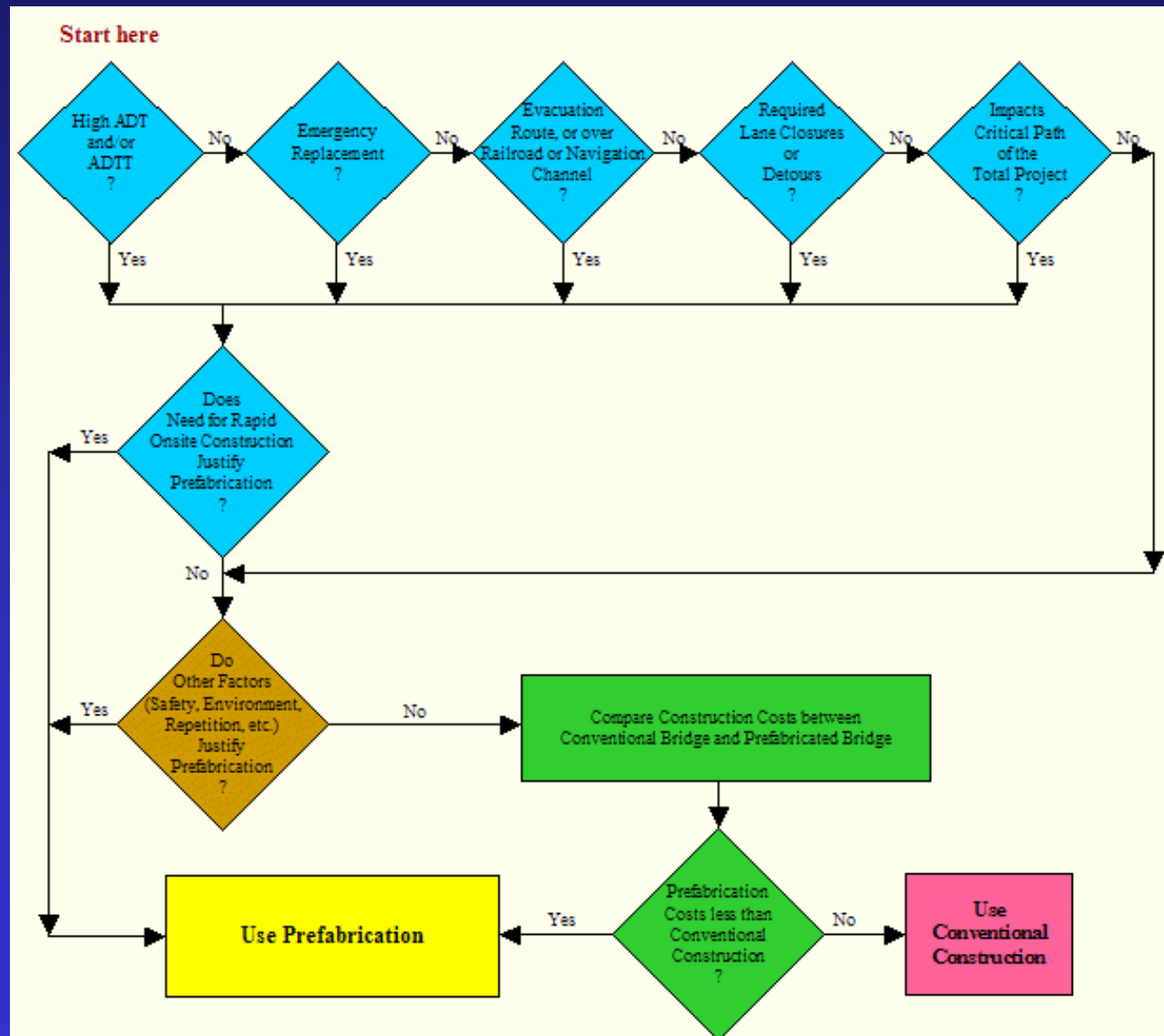
# FHWA Decision-Making Framework

## Decision-Making Matrix

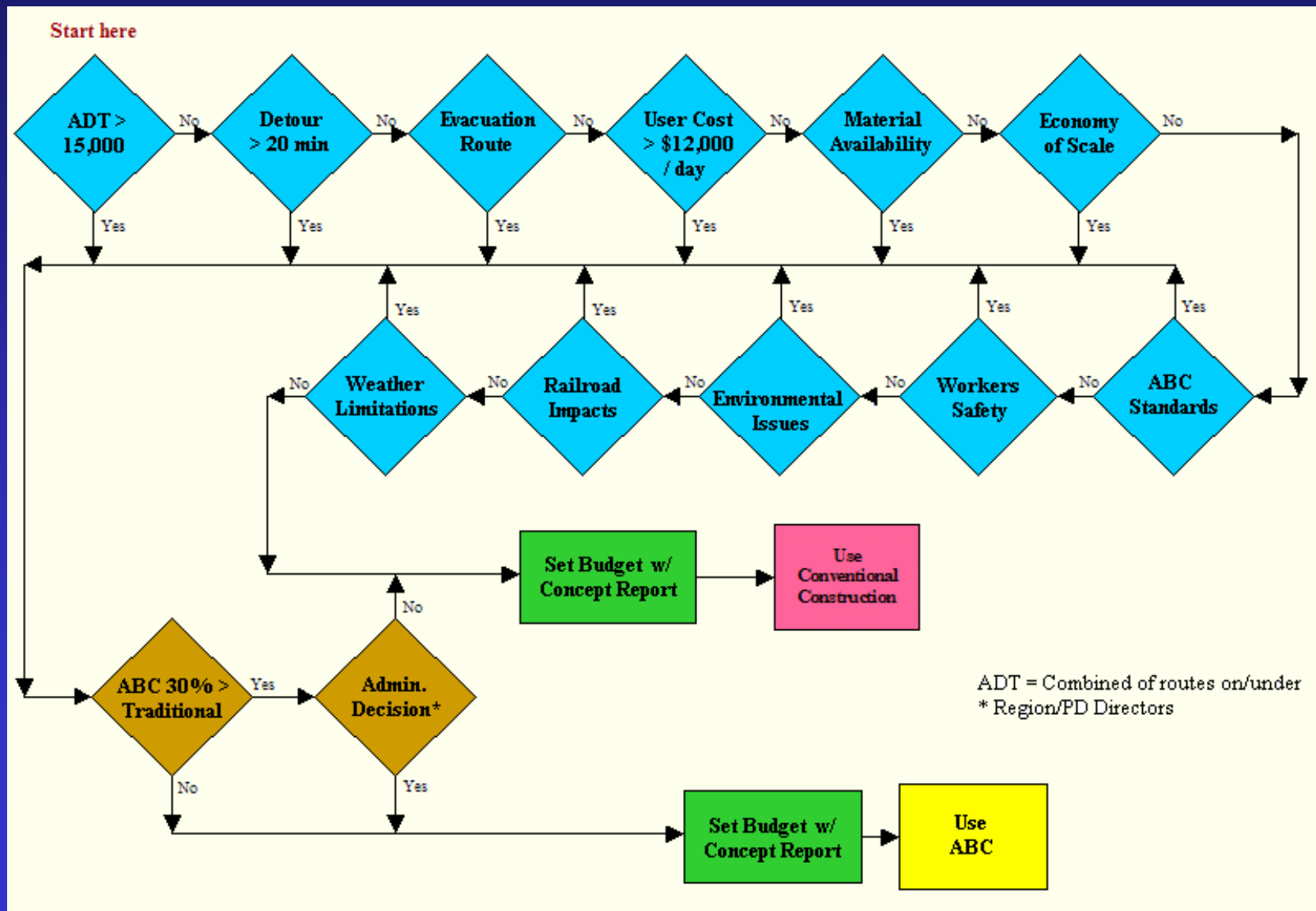
### Example Questions

Question	Yes	Maybe	No
High traffic volume? ...	Yellow	Gray	Pink
Emergency replacement? ...	Yellow	Gray	Pink
Worker safety concerns? ...	Yellow	Gray	Pink
High daily traffic control costs? ...	Yellow	Gray	Pink

# FHWA Decision-Making Framework



# Utah DOT Decision Chart



# Utah's Transition to ABC as Standard Practice

- Developed decision-making chart
- Completed project-specific prefabricated ABC, e.g.,
  - Full-depth deck panels
  - Precast bent caps
  - Prefabricated superstructure installed with SPMTs
- Conducted domestic scanning tours
- Identified a program of ABC projects
- Requested demonstration project funding

# Utah's Transition to ABC as Standard Practice, cont'd.

- Involved nationally
- Developed first 2 sets of draft prefabricated ABC standards, specifications, design aids
  - Full-depth precast deck panels
  - Use of SPMTs to move superstructure spans
- Hosted workshop with national experts & local industry to receive recommendations
  - First 2 draft products
  - Transitioning to ABC as standard practice by 2010

# Utah's Transition to ABC as Standard Practice, cont'd.

- Revised first 2 sets of ABC standards
- Hosted local industry feedback meeting to further refine standards to meet local needs
- Updated standards & incorporated into upcoming projects
- Maintaining communication with industry
- Updating standards as needed

# Utah's Transition to ABC as Standard Practice, cont'd.

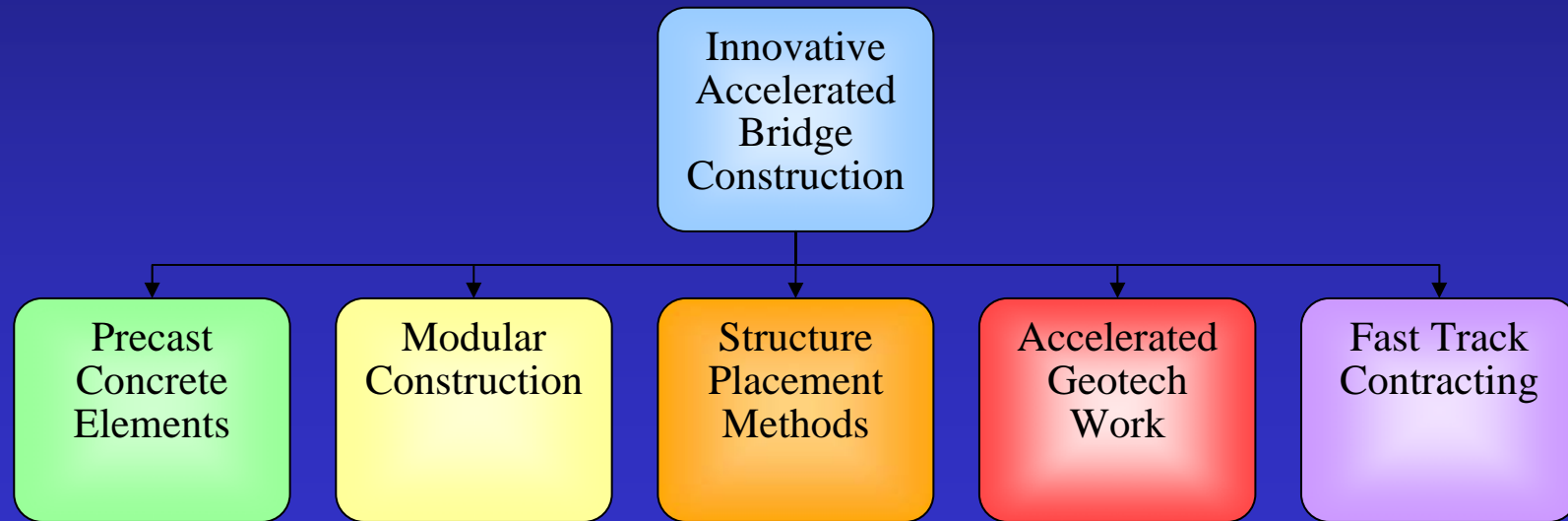
- Initiated development on 2<sup>nd</sup> round of prefabricated ABC standards, including precast
  - Pretensioned girders
  - Parapets
  - Bent caps
  - Columns
  - Footings
  - Approach slabs

# Utah's Transition to ABC as Standard Practice, cont'd.

- Assessing & implementing strategies to enhance performance of ABC by accelerating other areas, e.g.,
  - Project delivery (shortening time from funded concept to final constructed project)
  - Decision making during design & construction
  - Construction of critical path non-bridge parts of projects
- Continuing to consider workshop recommendations on transitioning to ABC



# UDOT's Family of Innovative ABC Elements and Methods



# UDOT ABC History

UDOT has 17 projects completed or under construction that utilized ABC

- Self-Propelled Modular Transports: 4 (14)
- Partial-Depth Precast Deck Panels: 2
- Full-Depth Precast Deck Panels: 8
  - In conjunction with precast abutments: 1
  - In conjunction with precast bent caps: 1
- Precast Voided Slabs: 1
- Segmental Bridges: 1
- Heavy Lift Cranes: 1

# I-15 Design-Build

17-mile Corridor Completed in 4.5 years  
for 2002 Winter Olympics – included  
partial-depth deck panels



# I-215 East over 3760 South

Precast Deck on Steel Girders  
Superstructure Replacement



# Parrish Lane Bridge over I-15

Widened with Precast Bent Caps  
& Full-Depth Precast Deck Panels



# 4500 South Bridge over I-215E

Prefabricated Superstructure  
driven into position with SPMTs

- I-215 closed over a weekend
- 4500 South closed only 10 days



# I-80 State Street to 1300 East Multiple Structures, Salt Lake City

June-July 2008 SPMT Bridge Moves in Program of Projects:

- I-80W over Highland Drive
- I-80W over 900 East Street
- I-80W over 700 East Street
- I-80W over 600 East Street
- I-80W over 500 East Street
- I-80W over 300 East Street
- I-80W 600 East Ramp Bridge



# I-80 State Street to 1300 East Bridge Farm





# I-80 State Street to 1300 East



I-80W over Highland Drive

# Upcoming SPMT Bridge Moves

## I-80 Lambs Canyon/Mt. Dell:

- I-80W at Lambs Canyon and at Mt. Dell
  - August 9-10 (approximate)
- I-80E at Lambs Canyon and at Mt. Dell
  - August 16-17 (approximate)

## I-215 East 3300 South:

- 3300 South Bridge over I-215E
  - August 22-25 (approximate)

# Upcoming SPMT Bridge Moves

For details, see UDOT's Innovate 80 link:

<http://www.udot.utah.gov/innovate80>

For exact move dates, contact:

Susan K. Parker

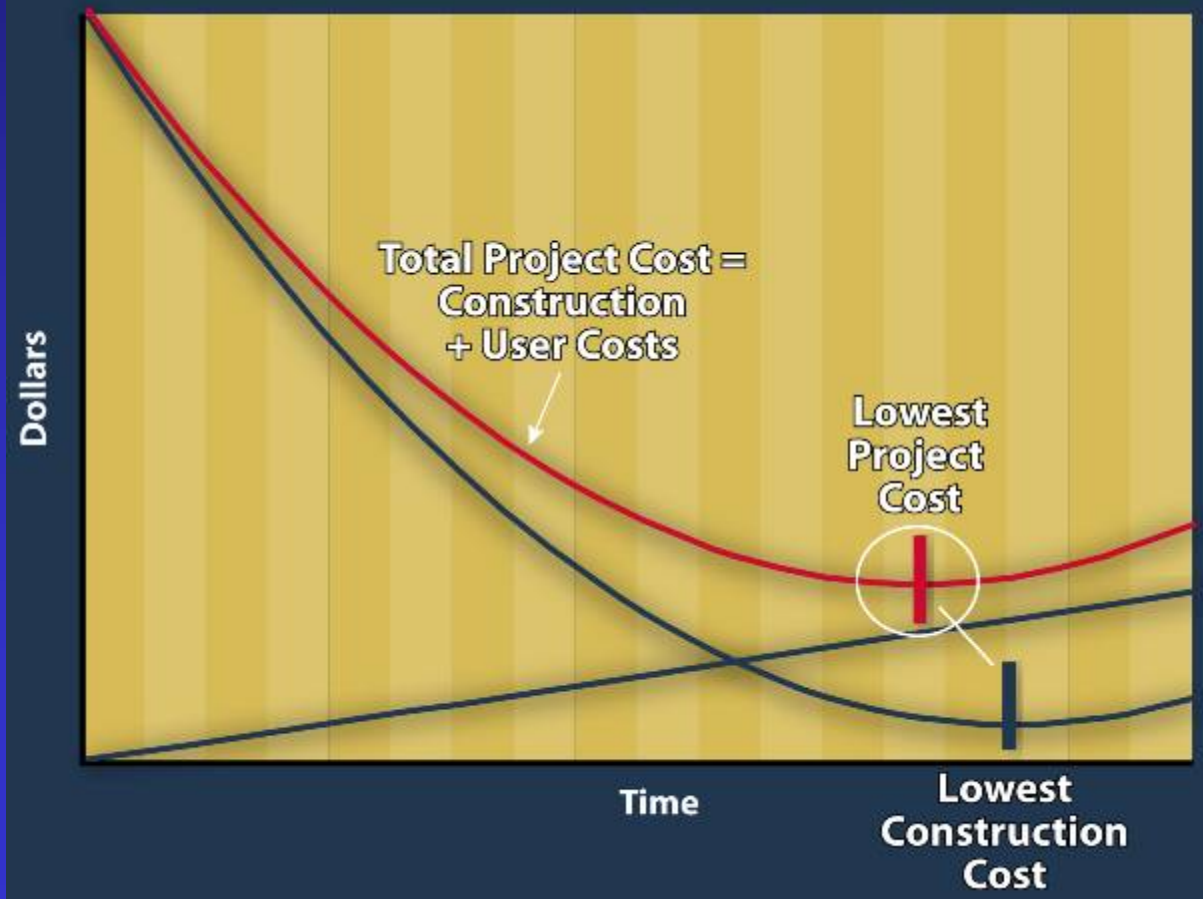
UDOT Project Development Office

Phone: (801) 965-4826

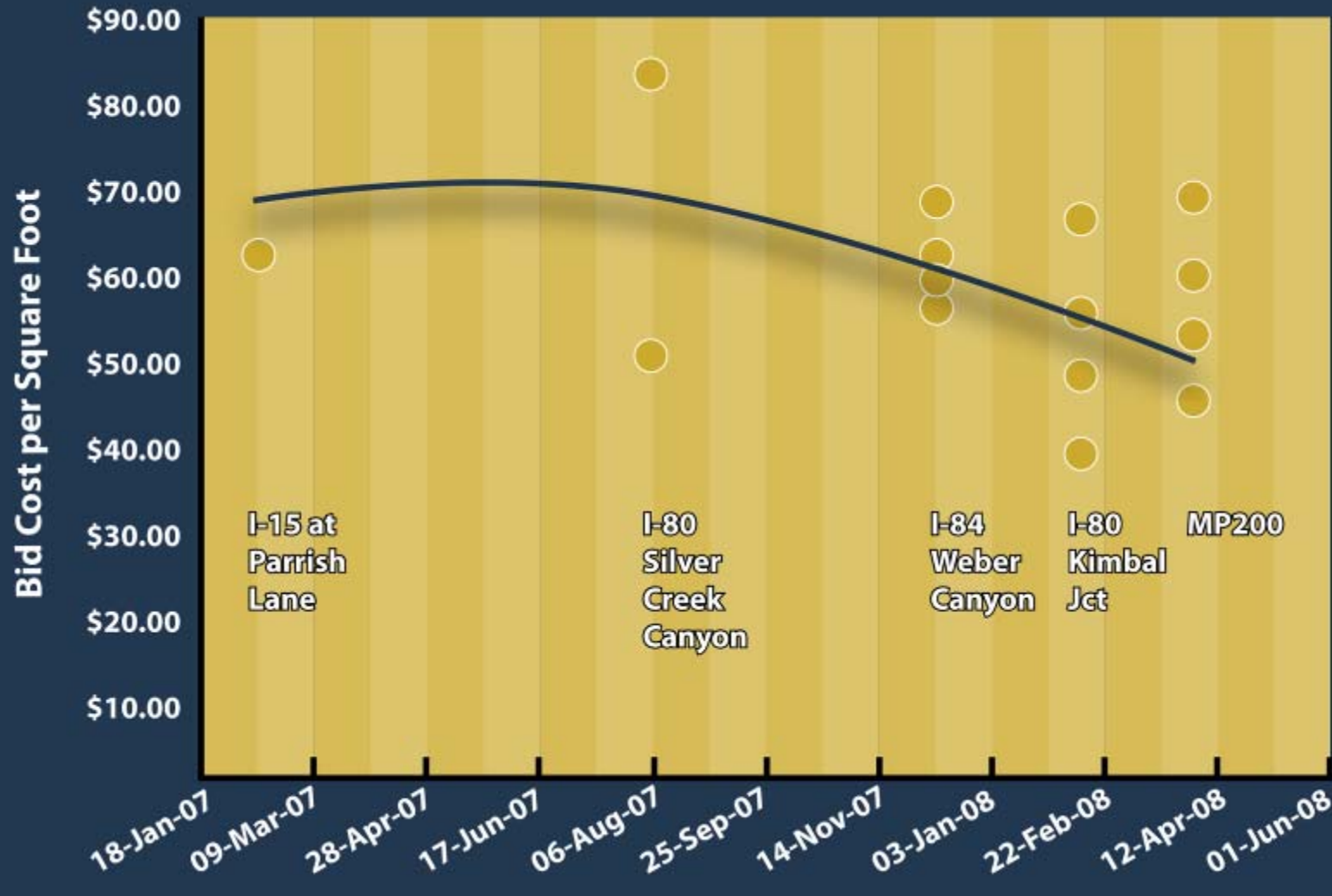
Email: [skparker@utah.gov](mailto:skparker@utah.gov)

# Utah's Transition to ABC as Standard Practice, cont'd.

- Evaluating costs



# Utah Precast Deck Panel Projects



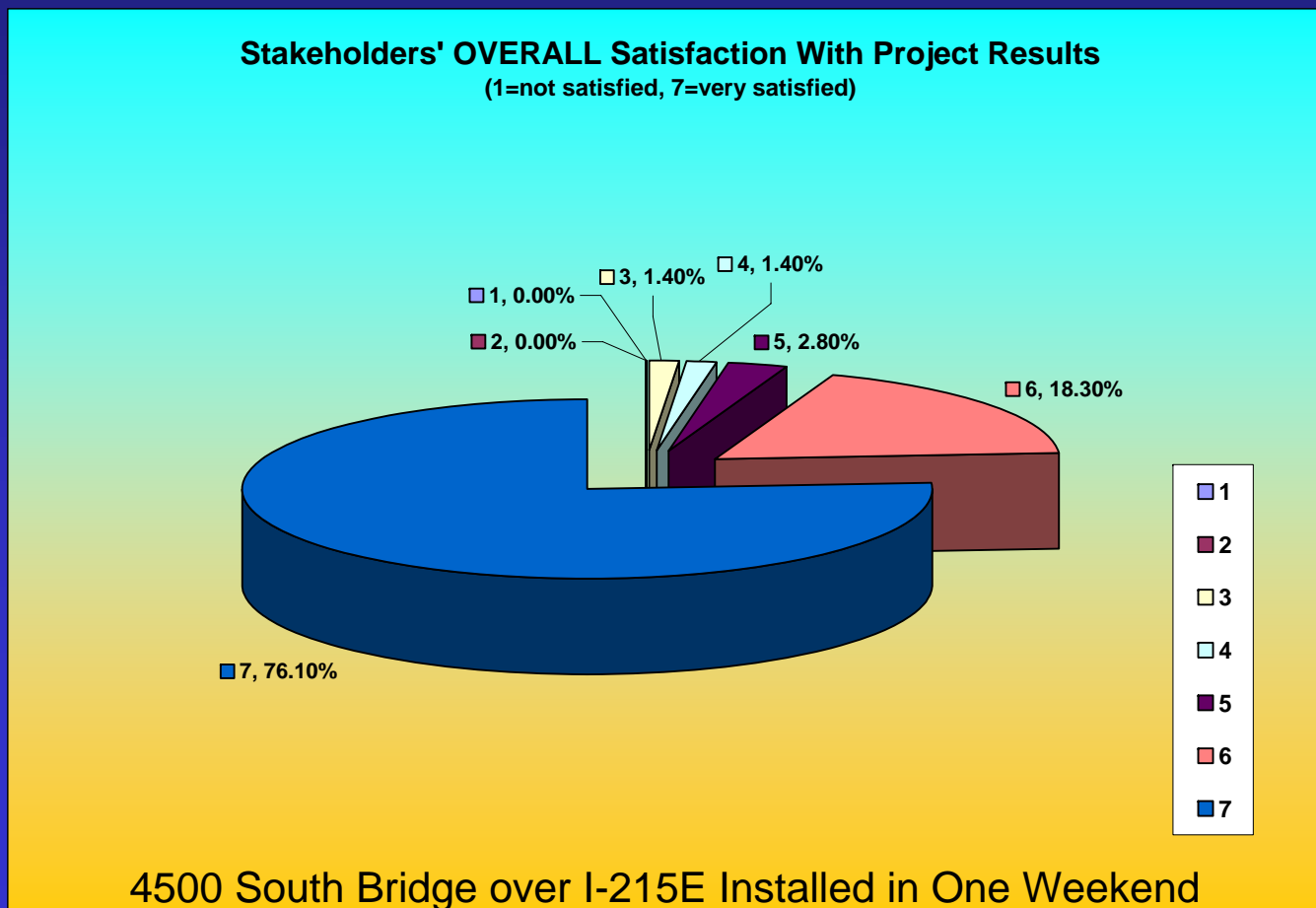
# 4500 South over I-215 SPMT Bridge Move

Construction Year:	October 2007
Total Construction Cost:	\$7,700,000
ABC Construction Cost:	\$900,000*
Facility User Cost Per Day:	\$35,500
Estimated Days Saved:	120
User Savings:	\$4,260,000
Cost Benefit Ratio:	5

\* Project cost does not take into account traffic control cost savings from traditional to ABC

# Utah's Transition to ABC as Standard Practice, cont'd.

- Communicating with the public



# Lessons Learned & Best Practices

- Get commitment from internal leadership
- Become educated nationally & internationally; consider domestic scans
- Develop business model, including decision-making tool & program of work
- Seek funding for demonstration projects
- Implement standardization
- Use innovative contracting strategies
- Educate and communicate internally, with industry, & with the public



**Accelerated Bridge  
Construction helps  
transportation agencies  
achieve their Mission**

To efficiently & effectively move  
people, goods & services

# ***Accelerated Bridge Construction***



***and  
the Utah  
Experience***

***Thank You***