## Agenda

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<td>Registration</td>
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<tr>
<td>8:30-8:45</td>
<td>Welcome</td>
<td>Jon Epps – TTI</td>
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<td>8:45-9:00</td>
<td><strong>History of Accelerated Construction</strong></td>
<td>David Newcomb – TTI</td>
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<td><strong>TxDOT's Interest</strong></td>
<td>Randy Hopmann – TxDOT, ADM</td>
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<td><strong>Project Selection Economics</strong></td>
<td>Briianne Glover – TTI</td>
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<td>9:50-10:10</td>
<td>Break</td>
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<tr>
<td>10:10-10:40</td>
<td><strong>Project Development</strong></td>
<td>Michael Bostic – TxDOT, CST</td>
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<td>10:40-11:00</td>
<td><strong>Accelerated Bridge Construction</strong></td>
<td>Greg Turco – TxDOT, BRG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buddy Williams – TxDOT, ATL</td>
</tr>
<tr>
<td>11:00-11:20</td>
<td><strong>Design Considerations</strong></td>
<td>Doug Marino – TxDOT, BRY</td>
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<tr>
<td>11:20-11:30</td>
<td><strong>Traffic/Safety</strong></td>
<td>Martin Gonzalez – TxDOT, PAR</td>
</tr>
<tr>
<td>11:30-11:40</td>
<td>Public Information</td>
<td>Vernon Webb – TxDOT, TYL</td>
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<tr>
<td>11:40-12:00</td>
<td><strong>Construction</strong></td>
<td>Robert Adamson – Longview Bridge and Road, Ltd.</td>
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<tr>
<td>12:00-12:45</td>
<td>Lunch</td>
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<tr>
<td>12:45-1:00</td>
<td>Charge to Breakout Groups</td>
<td>David Newcomb – TTI</td>
</tr>
<tr>
<td></td>
<td>- A-Pavement Strengthening</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- B-Pavement Widening</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- C-Rural Intersection Reconstruction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- D-Bridge Widening</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- E-Small Town Main Street</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- F-Suburban/Rural Road Widening</td>
<td></td>
</tr>
<tr>
<td>1:00-2:30</td>
<td><strong>Group Discussion of Example Problems</strong></td>
<td>Group Moderators/Recorders – TxDOT</td>
</tr>
<tr>
<td>2:30-3:15</td>
<td>Reports from Groups</td>
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<td>3:30-3:45</td>
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<td>Robert Adamson – Longview Bridge and Road, Ltd.</td>
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<td>Randy Hopmann – TxDOT, ADM</td>
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<tr>
<td>4:15-4:30</td>
<td><strong>Summary/Adjourn</strong></td>
<td>Jon Epps – TTI</td>
</tr>
</tbody>
</table>
District Workshops on Accelerated Construction
Welcome
AC-PP-17-01
Jon Epps

Tyler
Holiday Inn – South Broadway
November 28, 2017

www.txdot.gov/business/resources/construction/regional-workshops.html
Interest in Accelerated Construction

• Visibility to public
• Safety
• Economics
Accelerated Construction

• Welcome
• Definition
• Overview of day
• Overview of topics
• Overview of goals
• Introductions

Definition of Construction
Greenfield

• Capacity improvement
• Reconstruction
• Rehabilitation
• Major maintenance
• Minor maintenance
## Project Delivery

<table>
<thead>
<tr>
<th>Planning &amp; Programming</th>
<th>Preliminary Design</th>
<th>Environmental</th>
<th>ROW Utilities</th>
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<td>• Value Engineering</td>
<td></td>
<td></td>
<td>• Misc structures</td>
</tr>
</tbody>
</table>

**Time**

- Letting
- Construction

---

*Texas Department of Transportation*
Acceleration Goals

Good

construction time

reduction in time to complete project

Better

construction time
Not All Projects Are Suitable for Accelerated Construction
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ACCELERATED CONSTRUCTION DOCUMENTS

- Briefs
- Implementation Reports
- Presentations

ACCELERATED CONSTRUCTION BRIEF
Construction Division

AC-B-17-04 ACCELERATED CONSTRUCTION GUIDELINES

BACKGROUND
The costs of delays during construction are generally less than delays associated with other elements of the delivery process. Traffic delays due to construction are extremely costly in both time and money. Costs can be in excess of the actual construction project. In addition, adjacent businesses may incur user costs, which can be significant and should be included in the economic impact analysis.

The combination of these economic impacts affects directly the public agency and society, and it is the involvement of the public and the public agencies that can mitigate the impacts. Additional assistance is needed for new approaches to contracts that can be used to develop the final product's overall expenditure of time and time with the ability to rework in a more timely manner, and the reliability of the project work that can be delivered to the public agency.

AND SELECTED

ACCELERATED CONSTRUCTION GUIDELINES

Project Level Economic Screening Tool

by
Brianne A. Glover, J.D.
David R. Ellis, Ph.D.
Workshop Goals

• Information sharing

• Existing TxDOT “tools”

• Identify needed “tools” & “policies”
Accelerated Construction

Construction Methods

Traffic Management

Work Zone Safety

Equipment

Materials

Economics
Introductions
District Workshops on Accelerated Construction

www.txdot.gov/business/resources/construction/regional-workshops.html
District Workshops on Accelerated Construction

www.txdot.gov/business/resources/construction/regional-workshops.html
District Workshops on Accelerated Construction
US History
AC-PP-17-02
David Newcomb

Tyler
Holiday Inn – South Broadway
November 28, 2017
Accelerated Construction

U.S. History
History

• 1988 – GET-IN  STAY –IN: GET-OUT STAY-OUT (NV)
• 1998 – GET-IN  STAY –IN: STAY-OUT (CA)
• 1999 – TRB Task Force
• 2000 – Workshop to Define State-of-Practice (DC)
• 2002 – Accelerate Construction Technology Transfer (ACTT)
• 2002 – Workshops for Specific Project (IN) (PA)
• 2003 – Project Pegasus (TX) (IH 30 & IH 35E)
### 1990’s – 2000’s Driving Forces

#### Increasing Demand (1980-2000)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicles Miles</td>
<td>+80%</td>
</tr>
<tr>
<td>Drivers</td>
<td>+31%</td>
</tr>
<tr>
<td>Lane Miles</td>
<td>+3.8%</td>
</tr>
</tbody>
</table>

#### Aging System

- 40% Bridges +40 Years Old
- Pavements Exceeded Design Life
## Accelerated Construction Skill Sets

<table>
<thead>
<tr>
<th>• Financing</th>
<th>• Utilities</th>
<th>• Long Life Bridges</th>
</tr>
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<tbody>
<tr>
<td>• Contracting</td>
<td>• ROW</td>
<td>• Long Life Pavements</td>
</tr>
<tr>
<td>• Work Zone</td>
<td>• Railroad</td>
<td>• Quality Control</td>
</tr>
<tr>
<td>• Mobility</td>
<td>• Communication/Outreach</td>
<td>• Modular/Prefab Construction</td>
</tr>
<tr>
<td>• Corridor Improvement</td>
<td>• Training</td>
<td>• Constructability</td>
</tr>
<tr>
<td>• Worker Health &amp; Safety</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Recurring Peak-Period Congestion on NHS

- Uncongested
- Congested
- Highly Congested
Project Costs by Type, Related to Duration

- Total Cost
- Construction Cost
- Road User Cost
- Contract Administration Cost
AR and LA - Rubblization Projects

• 300 Miles of Interstate Concrete Pavement (Decker and Hansen, 2005)
  - Rehabilitation needed
  - Slowest construction operation – demolition and removal
  - Rubblization kept in-place PCC to serve as high-quality base
  - Rate of production for rubblization = 1 lane-mile/day (twice the rate for PCC removal (Mn/DOT, 2005)

• Louisiana (Landers, 2011)
  - Used for I-55 (hurricane evac route)
  - Completed in seven months as opposed to 2-3 years for reconstruction
Wilmington, DE – I-95, 2000 (FHWA, 2003)

- $23.5 million - 2 years
- 24.4 lane-miles, 10 interchanges, bridge repairs, drainage improvements, lighting/safety
- AADT = 100,000 vpd (11% Commercial)
- Full road closure (reroute to I-495)
- Rubblilzation with asphalt overlay
- SB and NB I-95 closed 3 months each
- $25,000/day bonus for early completion, penalty for delay
- 75% reduction in duration (185 days)
- Detour - overall project costs increased
Maine – I-295, 2008 (Lane, 2009)

- 1970’s JRCP in S. Maine had ASR
- Important tourist route
- Remove top 3” JRCP, rubblize rest
- Full road closure, mid June – end of Aug
- Conventional lane closures = 3 construction seasons
- Traffic detoured on local roads – some improvements
- Incentive/disincentive up to $2 million
- Work completed 20 days ahead of schedule
- Contractor used up to 5 paving crews at once on project
California I-15, (Anderson et al., 2005)

- Rebuild I-15
- Used 96-hr closures
- Compressed work from 8.5 months to 6 weeks
- Had contingencies for brush fires, weather, congestion, material shortage, etc.
- Selective use of rapid-curing cement
- Contractor flexibility – key to success
Austin Lamar Blvd. (Anderson et al. 2005)

- Complex project involving utilities
- Prequalified bidders
- Req’d 12-hr days, 7 d/wk (14 on/2off)
- 3 milestones with up to $120k bonus for each
- Penalty - $20k/day
- Urban area – intersections on weekend, noise mitigation at night
- PR campaign was successful
Summary

• Accelerated construction not new

• Requires
  ▪ Right application
  ▪ Incentives/disincentives
  ▪ Recognition of and planning for risks
  ▪ Flexibility on part of agency and contractor
  ▪ Innovative thinking
  ▪ Public engagement

• Will become more standard with time
Things Will Not Become Simpler!

(a) Year 2011

Recurring Peak-Period Congestion

- Uncongested

(b) Year 2040

- Congested
- Highly Congested
Outline

• Background
• Texas Landscape
• Texas History
• Opportunities
• Workshop Outcomes
## Project Delivery

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- Time

- Letting
- Construction

\[ \text{Texas A&M Transportation Institute} \]
# Economic Considerations - Examples

<table>
<thead>
<tr>
<th>Project</th>
<th>Per Month Costs</th>
<th>Project Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widen FM road from 2-lanes to 4-lanes (2.7 miles)</td>
<td>$96,000</td>
<td>$3.5M</td>
</tr>
<tr>
<td>Widen Freeway (2.6 miles)</td>
<td>$297,000</td>
<td>$17.8M</td>
</tr>
<tr>
<td>Interchange in urban area (1.5 miles)</td>
<td>$447,000</td>
<td>$5.1M</td>
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</tbody>
</table>
Acceleration Goals

Good

reduction in time to complete project

Better
Economic Considerations - Stakeholders

- **Agency**
  - Extra engineering costs
  - Extra management
  - Price escalation
  - Safety

- **Public**
  - Time
  - Fuel
  - Vehicle Damage
  - Safety

- **Contractor**
  - Unproductive labor/equipment
  - Material inventory
  - Insurance/bonding capacity
  - Safety
Economic Consideration

• Direct project costs
  ▪ Agency
  ▪ Some contractor

• Indirect project costs (user/non-user)
  ▪ User fuel/time
  ▪ Roadside businesses
  ▪ Business efficiency (timely delivery)
  ▪ Some Contractor

All costs eventually borne by the public
Safety & Economics

- Reduce time traffic in work zone
- Traffic not in work zone
- Reduce user delay costs
  - Fuel
  - Time
- Vehicle maintenance
- User cost savings exceed construction costs
Reduce Construction Time

• Contracting methods
  ▪ Design/Bid/Build
  ▪ Cost-Plus Time (A+B)
  ▪ Interim completion dates
  ▪ No-excuses incentives
  ▪ Construction manager at risk
  ▪ Design/Build

• Lane occupancy time
  ▪ Off peak traffic
    • Day
    • Night
  ▪ Long weekend closures
  ▪ Close facility
Reduce Construction Time

- Bridges/Culverts (ABC)
- Pavements
Not for every project
Outline

- Background
- **Texas Landscape**
- Texas History
- Opportunities
- Workshop Outcomes
Population 2050

- 1 - 50,000
- 50,000 – 250,000
- 250,000 – 1,000,000
- 1,000,000 – 1,500,000
- Over 1,500,000
Unified Transportation Plan

2017 Unified Transportation Program (UTP)

2017–2026
Transportation Planning & Programming
We Build Texas

Field Guide to
Successful Project Delivery

We build Texas – Safely
We build Texas – Quality
We build Texas – On Time
We build Texas – Together

Working together to successfully deliver projects.
Workforce
Outline

• Background
• Texas Landscape
• **Texas History**
• Opportunities
• Workshop Outcomes
• 1998 – Heald
  ▪ Legislators – TxDOT & User Costs for Liquidated Damage
  ▪ Commission – Reduce Construction Time
  ▪ Incentives/disincentives

• 2001 – Johnson’s “Transportation Working Group”
  ▪ Reduce project delivery time by 15% by 2006
  ▪ Address cost of disruption of traffic

• 2002 – Saenz
  ▪ Accelerated construction – Businesses & traffic flow impacted
  ▪ Calendar day definition of working day
  ▪ Milestones for incentives/disincentives
  ▪ Lane rental
  ▪ A+B
• 2003 – “Accelerated Construction Strategies Guidelines”

• 2004 – Saenz
  ▪ Use accelerated construction on
    • High traffic locations
    • Significant impact on safety or businesses
    • Other project specific reasons

• 2009 – Bohuslav – AASHTO Scan Tour
Katy Freeway (IH-10)

- Traditional construction – 12 years
- Accelerated construction – 6 years
Katy Freeway (IH-10)

- 23 miles
- 280,000 VPD
- $2.6 billion (2/3 construction)
- 6 years vs 12 years
Katy Freeway Economics

- $150 - $200 million/year
- Accelerated construction benefit - $2.8 billion
- Cost of accelerated construction - $309 million
- B/C ratio – 9.0
Outline

• Background
• Texas Landscape
• Texas History
• Opportunities
• Workshop Outcomes
Materials

- Strength gain (time, temp)
- Removal
- Production
- Transportation
- Placement
Equipment

• Materials handling
• Demand for equipment
• Prototype/production unit/redesign
• Cost
Process Control/Quality Control

- High production/placement rates
- Rapid tests
- Quick feedback to produce quality
- Management to insure quality
Traffic Control

• Place/remove quickly
• Moving construction zone
• Protect driver/contractor workforce
Workforce

- Skill set
  - New equipment
  - New materials
  - QC/QA
- Congested work zone
- Shift length

- Housing/facilities
- Personal life
- Management team
- Financial
Economic Incentives - Contractor

• One job/occasional job
• Return on investment (equipment)
• Bonding capacity
• Backlog of work
• Risk
Key Items

- Project selection & planning
- Contracting methods
- Design - Simpler design = faster construction
- Contractor selection
- Construction considerations
Planned Accelerated Construction

- TxDOT champion
- TxDOT/FHWA support team available
- Vision – goals & objectives
- Policies & procedures
- Partnering
- Alternative contracting methods
- Cultural change
Planned Accelerated Construction (Cont’d)

• New technologies
• Total costs – Agency, construction, user, non-user, safety environmental
• Engage construction & materials industries
• Performance measures
• Learn from past & improve
Keys to Accelerated Construction

• Consider accelerated construction in planning stage
• Isolate construction work from traffic
• Reuse existing materials on site
• Maintain lane closure as long as possible
• Innovative approaches to traffic handling
Outline

• Background
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• Workshop Outcomes
Workshop Goals

- Information sharing
- Existing TxDOT “tools”
- Identify needed “tools” & “policies”
Not All Projects Are Suitable for Accelerated Construction
District Workshops on Accelerated Construction

Tyler
Holiday Inn – South Broadway
November 28, 2017
District Workshops on Accelerated Construction Economic Screening Tools
AC-PP-17-04
Brianne Glover

Tyler
Holiday Inn – South Broadway
November 28, 2017
Project Level Economic Screening Tool

- Benefit-Cost tool
- Focus – road user costs and economic losses

Economic Impact
Project Level Economic Screening Tool

Inputs

• Traffic Data
• Geographic Location
• Cost to Accelerate Construction
• Project Timing
• Construction Segments
• Adjacent Retail Businesses
Project Level Economic Screening Tool

**Urban**
- Major metropolitan and urban areas

**Suburban**
- Areas adjacent to major metropolitan and urban areas

**Rural**
- Areas outside of urban and suburban areas
## Project Parameters Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Operating Speed</td>
<td>50</td>
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<tr>
<td>Segment Length (miles)</td>
<td>6.0</td>
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<tr>
<td>Pre Construction ADT</td>
<td>215,000</td>
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<tr>
<td>Percent Trucks</td>
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<tr>
<td>Project Region</td>
<td>Urban</td>
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<tr>
<td>Retail (SQFT)</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Travel Time per Trip (minutes)</td>
<td>7.2</td>
</tr>
</tbody>
</table>

## Preconstruction Conditions

NOTE: There can be significant variation in economic impact due to the type of business as well as type of area (urban, suburban and rural). For the purposes of this model retail sales per square foot was used as the default method of calculation. Further, while the model has three different area types from which to chose, even within those area types, there can be significant variation in sales per square foot depending on the specific location. In terms of economic impact, this model provides general guidance only.

### Traditional Construction Parameters Values

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>Total Project Period (calendar days)</td>
<td>900</td>
</tr>
<tr>
<td>Percent of ADT that is Traveling During Peak Periods</td>
<td>75%</td>
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</tbody>
</table>

### Accelerated Construction Parameters Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Project Period (calendar days)</td>
<td>365</td>
</tr>
<tr>
<td>Percent of ADT that is Traveling During Peak Periods</td>
<td>75%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td></td>
</tr>
<tr>
<td>Automobile Travel Time Value</td>
<td>$331,828,313</td>
</tr>
<tr>
<td>Truck Travel Time Value</td>
<td>$102,219,084</td>
</tr>
<tr>
<td><strong>Total Travel Time Value</strong></td>
<td><strong>$434,047,397</strong></td>
</tr>
<tr>
<td>Automobile Operating Cost</td>
<td>$99,277,110</td>
</tr>
<tr>
<td>Truck Operating Cost</td>
<td>$78,576,480</td>
</tr>
<tr>
<td><strong>Total Operating Cost</strong></td>
<td><strong>$177,853,590</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerated</td>
<td></td>
</tr>
<tr>
<td>Automobile Travel Time Value</td>
<td>$134,574,816</td>
</tr>
<tr>
<td>Truck Travel Time Value</td>
<td>$41,455,517</td>
</tr>
<tr>
<td><strong>Total Travel Time Value</strong></td>
<td><strong>$176,030,333</strong></td>
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<tr>
<td>Automobile Operating Cost</td>
<td>$40,262,384</td>
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<tr>
<td>Truck Operating Cost</td>
<td>$31,867,128</td>
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<td><strong>Total Operating Cost</strong></td>
<td><strong>$72,129,512</strong></td>
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</table>
## Preconstruction Conditions

<table>
<thead>
<tr>
<th>Project Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Operating Speed</td>
<td>50</td>
</tr>
<tr>
<td>Segment Length (miles)</td>
<td>6.0</td>
</tr>
<tr>
<td>Pre Construction ADT</td>
<td>215,000</td>
</tr>
<tr>
<td>Percent Trucks</td>
<td>15%</td>
</tr>
<tr>
<td>Project Region</td>
<td>Urban</td>
</tr>
<tr>
<td>Retail (SQFT)</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>
## Project Level Economic Screening Tool

### Preconstruction Conditions

<table>
<thead>
<tr>
<th>Project Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Project Region</td>
<td>Urban</td>
</tr>
<tr>
<td>Retail (SQFT)</td>
<td>2,000,000</td>
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<tr>
<td>Travel Time per Trip (minutes)</td>
<td>7.2</td>
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</tbody>
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### Traditional Construction Parameters

<table>
<thead>
<tr>
<th>Values</th>
</tr>
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<tbody>
<tr>
<td>Total Project Period (calendar days)</td>
</tr>
<tr>
<td>Percent of ADT that is Traveling During Peak Periods</td>
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</tbody>
</table>

### Accelerated Construction Parameters

<table>
<thead>
<tr>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Added Cost of Accelerate Construction</td>
</tr>
<tr>
<td>Added Cost of Incentives</td>
</tr>
<tr>
<td>Total Project Period (calendar days)</td>
</tr>
<tr>
<td>Percent of ADT that is Traveling During Peak Periods</td>
</tr>
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</table>

### Traditional Construction Scenario

<table>
<thead>
<tr>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automobile Travel Time Value</td>
</tr>
<tr>
<td>Truck Travel Time Value</td>
</tr>
<tr>
<td><strong>Total Travel Time Value</strong></td>
</tr>
<tr>
<td>Automobile Operating Cost</td>
</tr>
<tr>
<td>Truck Operating Cost</td>
</tr>
<tr>
<td><strong>Total Operating Cost</strong></td>
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### Accelerated Construction Scenario

<table>
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<tbody>
<tr>
<td>Automobile Travel Time Value</td>
</tr>
<tr>
<td>Truck Travel Time Value</td>
</tr>
<tr>
<td><strong>Total Travel Time Value</strong></td>
</tr>
<tr>
<td>Automobile Operating Cost</td>
</tr>
<tr>
<td>Truck Operating Cost</td>
</tr>
<tr>
<td><strong>Total Operating Cost</strong></td>
</tr>
</tbody>
</table>

**NOTE:** There can be significant variation in economic impact due to the type of business as well as type of area (urban, suburban and rural). For the purposes of this model retail sales per square foot was used as the default method of calculation. Further, while the model has three different area types from which to choose, even within those area types, there can be significant variation in sales per square foot depending on the specific location. In terms of economic impact, this model provides general guidance only.
<table>
<thead>
<tr>
<th>Traditional Construction Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Project Period (calendar days)</td>
<td>900</td>
</tr>
<tr>
<td>Percent of ADT that is Traveling during Peak Periods</td>
<td>75%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accelerated Construction Parameters</th>
<th>Values</th>
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<tbody>
<tr>
<td>Added Cost of Accelerated Construction</td>
<td>$200,000,000</td>
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<tr>
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<td></td>
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<tr>
<td>Total Project Period (calendar days)</td>
<td>365</td>
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## Project Level Economic Screening Tool

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<th>Traditional Construction Parameters</th>
<th>Values</th>
<th>Accelerated Construction Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment 1:</strong></td>
<td></td>
<td><strong>Segment 1:</strong></td>
<td></td>
</tr>
<tr>
<td>Days</td>
<td>450</td>
<td>Days</td>
<td>180</td>
</tr>
<tr>
<td>Segment Length</td>
<td>3</td>
<td>Segment Length</td>
<td>3</td>
</tr>
<tr>
<td>Average Operating Speed (Peak)</td>
<td>10</td>
<td>Average Operating Speed (Peak)</td>
<td>10</td>
</tr>
<tr>
<td>Average Operating Speed (Off-Peak)</td>
<td>45</td>
<td>Average Operating Speed (Off-Peak)</td>
<td>45</td>
</tr>
<tr>
<td>Percent of Traffic Diverted</td>
<td>20%</td>
<td>Percent of Traffic Diverted</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Segment 2:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days</td>
<td>450</td>
<td>Days</td>
<td>185</td>
</tr>
<tr>
<td>Segment Length</td>
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<td>Percent of Traffic Diverted</td>
<td>20%</td>
<td>Percent of Traffic Diverted</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Segment 3:</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Days</td>
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<td>Days</td>
<td></td>
</tr>
<tr>
<td>Segment Length</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Percent of Traffic Diverted</td>
<td></td>
<td>Percent of Traffic Diverted</td>
<td></td>
</tr>
<tr>
<td><strong>Segment 4:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days</td>
<td></td>
<td>Days</td>
<td></td>
</tr>
<tr>
<td>Segment Length</td>
<td></td>
<td>Segment Length</td>
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</tr>
<tr>
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<td></td>
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<td></td>
</tr>
</tbody>
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<th>Values</th>
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<td></td>
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</tr>
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<tr>
<td>Segment 2</td>
<td>Values</td>
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</tr>
<tr>
<td>-----------</td>
<td>--------</td>
<td>-----------</td>
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<td>20%</td>
<td>Percent of Traffic Diverted</td>
<td>20%</td>
</tr>
</tbody>
</table>
Economic Loss

- Sales
- State Sales Tax Revenue
- Local Sales Tax Revenue
### Results

#### Traditional Construction Tools

<table>
<thead>
<tr>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Road User Costs and Economic Loss</td>
<td>$1,832,284,439</td>
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#### Accelerated Construction Tools

<table>
<thead>
<tr>
<th>Value</th>
<th>Value</th>
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<tbody>
<tr>
<td>Total Road User Costs and Economic Loss</td>
<td>$771,059,803</td>
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</tbody>
</table>

#### Traditional vs Accelerated

<table>
<thead>
<tr>
<th>Value</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Change in Road User Costs and Economic Loss</td>
<td>$1,061,224,636</td>
</tr>
<tr>
<td>Road User Cost and Economic Daily Cost</td>
<td>$1,983,597</td>
</tr>
<tr>
<td>B/C of Accelerated construction</td>
<td>5.31</td>
</tr>
</tbody>
</table>
Estimated User Costs and Economic Losses

- **Travel Time Value**: $1,832,284,439
- **Operating Costs**: $771,059,803
- **Loss of Sales**: $628,059,803
- **Loss of Tax Revenue**: $145,059,803
- **Cost to Accelerate**: $14

**Comparing Traditional and Accelerated Models**

Traditional: $1,832,284,439
Accelerated: $771,059,803
District Workshops on Accelerated Construction

Contacts
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b-glover@tamu.edu

David Ellis  
d-ellis@tamu.edu

Tyler
Holiday Inn – South Broadway
November 28, 2017
District Workshops on
Accelerated Construction
Project Development
AC-PP-17-05
Michael Bostic

Tyler
Holiday Inn – South Broadway
November 28, 2017
OUTLINE

• Project Selection and Planning
• Contracting Methods
• Design
• Contractor Selection
• Involvement of Contractor
• Construction Considerations
• Project Development Process Manual-2017
• Bridge Project Development Manual-2016
• PS&E Preparation Manual-2016
• Roadway Design Manual-2014
• Bridge Design Manual-2015
• Bridge Detailing Guide-2016
• Pavement Design Manual-2011
• Hydraulic Design Manual-2016
• Texas Manual on Uniform Traffic Control Devices -2014
• Accelerated Construction Strategies Guidelines – (Under Revision)
PROJECT SELECTION & PLANNING

• General Guides
• Economic Considerations
• ROW, Utilities, Environmental & Railroads
• Risk Assessment
• Public Information
• Other
General Guidelines

• FHWA
  • High Traffic - generally urban areas
  • Complete a “gap” in a highway system
  • Major project that will disrupt traffic
  • Major bridges out of service
  • Lengthy detour required
General Guidelines

• TxDOT-2003
  • Interstates with lane closures
  • Bridge closure
  • Road closure
  • Added capacity project
  • Non-freeway with ADT>10,000 & lane closures
  • Restrict access to schools, emergency services, etc.
  • Affect adjacent businesses
General Guidelines

• Rural areas
  • Impact on small towns traffic flow
  • Impact on small town businesses
  • Intersections

• Key transportation routes for major industries
  • Energy development
  • Agriculture
  • Mining
Economic Considerations

• Agency Administrative Costs
• Road User Costs
• Non-User Costs (adjacent businesses)
• Construction Costs
• Contractor Management Costs
Calculation Tools

- TxDOT Road User Cost Calculator
- Project Level Economic Screening Tool

Estimated User Costs & Economic Losses

Traditional

Accelerated
PROJECT SELECTION & PLANNING

• ROW
• Utilities
• Environmental
• Historical Preservation
• Archeology
• Railroad
Public Information

- Early and often
- Involve public during planning stages
- Short term inconvenience for long term convenience
- Use of coordinator
Contracting Methods

TxDOT Guides

• Calendar day definition for working day
• Incentive Using
  • Contract administration liquidated damages
  • Road user costs
• Milestones with Incentives/Disincentives
• Substantial Completion Incentives/Disincentives
• Lane Rental Disincentive
• A+B Provisions
• Design-Build
Selection of Contracting Method

- Influencing factors in selection of method
  - Project size
  - Project type - new construction, rehabilitation, etc.
  - Project complexity
  - Critical completion time
Contracting Methods

A+B Contracting

• A - Traditional bid for the unit prices multiplied by the contract quantities
• B - Time to complete the project x daily road user costs
• Road user costs provided by TxDOT
• Contract state minimum and maximum work days
• Contractors bids “time” is the “time” used for contract cost adjustments
DESIGN

- General Considerations
- Geometric Design
- Bridge Design
- Drainage Design
- Pavement Design
- Roadside Safety Design
- Traffic Control and Job Sequencing
- Project Duration
DESIGN

Traffic Control and Job Sequencing

• Texas Manual on Uniform Traffic Control Devices

• Deployment and removal time for traffic control devices

• Design for safety (speed if possible as public will push the speed limits)

• Constructability review
CONTRACTOR SELECTION

TxDOT Prequalification

• Confidential Questionnaire
  • Audited financial statement
  • Completion of questionnaire

• Bidder’s Questionnaire
  • Confidential questionnaire waived
  • Smaller projects, routine maintenance, emergency, specialty projects
Contractor Selection

Possible Future Considerations

• Quality
• Past performance
• Safety
• Special technical capabilities
• Key personnel
Involvement of Contractor

• Planning and Design Reviews
• Partnering
• Workforce
Planning and Design Reviews

- More early and detailed reviews by TxDOT
- Provide state wide resource of experienced engineers, etc.
- Include contractors, materials suppliers, fabricators, equipment manufacturers, transportation companies
Partnersing

- Agreement to
  - Solve issues at low level in organizations
  - Openness to change as information becomes available
  - Attention to detail
  - Focus on project with unselfish effort
  - Take steps to insure that no interruptions take place
  - Co-locate key personnel on project
  - Empower workforce to make immediate decisions
  - Technical expertise on job site or immediately available
  - Include all stakeholders-TxDOT, contractors, materials suppliers, fabricators, local governments, utility companies, trucking companies
IN VolvEMENT OF CONTRACTOR

Workforce
• Extended hours
• Rapid pace
• Worker fatigue
• Redundant critical personnel
• Hand-off work between shifts
• Equipment maintenance
CONSTRUCTION CONSIDERATIONS

- General Considerations
- Work Plan and Work Sequence
- Workforce
- Work Space
- Equipment
- Quality Control/Quality Assurance
- Information Exchange
CONSTRUCTION CONSIDERATIONS

General Considerations

• “We Build Texas-Field Guide to Successful Project Delivery”

• Key elements of successful project
  • Safety
  • Money
  • Timeliness
  • Relationships
  • Perception
  • Quality

We Build Texas

Field Guide to
Successful Project Delivery
General Considerations

• Activities that produce successful project
  • Contract Relationships
  • Activities Prior to Letting
  • Post-Letting to Contractor Start Activities
  • Construction Start to Contract Completion Activities
CONSTRUCTION CONSIDERATIONS

• Work Plan and Work Sequence
• Workforce
• Workspace
• Equipment
• QC/QA
• Information Exchange
Summary

• Project Selection and Planning
• Contracting Methods
• Design
• Contractor Selection
• Involvement of Contractor
• Construction Considerations
District Workshops on Accelerated Construction

Tyler
Holiday Inn – South Broadway
November 28, 2017
ACCELERATED BRIDGE CONSTRUCTION IN TEXAS (AND BEYOND)

Gregory Turco – Bridge Division
Buddy Williams – Atlanta District
## Accelerated Bridge Construction (ABC) Techniques

<table>
<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Prefabricated Elements</td>
</tr>
<tr>
<td>2</td>
<td>Self Propelled Modular Transporters (SPMTS)</td>
</tr>
<tr>
<td>3</td>
<td>Modular Units</td>
</tr>
<tr>
<td>4</td>
<td>Lateral Slide-in Bridge Construction</td>
</tr>
</tbody>
</table>

Photo Courtesy of FHWA
Prefabricated Elements

- TxDOT’s primary technique for accelerated bridge construction.
- In addition to increased speed, also typically comes with increased quality.
- Can encompass practically every element from the ground up.
Precast Bent Caps
Precast Bent Caps – Long Water Crossings
Precast Abutments
Precast Columns
TxDOT’s Bread & Butter: Girders and Deck Panels
• Prefabricated elements are largely what make TxDOT bridges the least expensive and most durable in the country. Keep it up!

• Prefabricated elements typically speed up construction considerably, but are not really considered “Accelerated Bridge Construction.”

• Now let's talk fast!
Decked Slab Beams
Decked Slab Beams: 6 – 10 Day Construction Projects

Precast Abutment

Decked Slab Beams

Precast Bent Cap

Steel Piling
Full Width, Full Depth Panels
Full Width, Full Depth Panels – Upcoming Waco Project

Section B-B

Concrete Curb with anchor bolt precast with deck, (Typ).
See T1W for info not shown.
Self Propelled Modular Transporters (SPMT)

Photos Courtesy of Heavy Equipment Guide
SPMT – Fort Worth West 7th Street Arches
Modular Units
Modular Units – I-93 Fast 14 in Boston
Modular Units (No Deck) – West Dallas St. in Houston
Modular Units – West Dallas St. in Houston
Modular Units – West Dallas St. in Houston
Lateral Slide-in

- Re-use of Existing Substructure
- New Bridge under Construction
Lateral Slide-in – LP 345 (San Antonio)
Lateral Slide-in – LP 345 (San Antonio)
Lateral Slide-in – LP 345 (San Antonio)
QUESTIONS?

Gregory Turco – Bridge Division
Buddy Williams-Atlanta District
Entities or individuals that copy and present state agency information must identify the source of the content, including the date the content was copied. Entities or individuals that copy and present state agency information on their websites must accompany that information with a statement that neither the entity or individual nor the information, as it is presented on its website, is endorsed by the State of Texas or any state agency. To protect the intellectual property of state agencies, copied information must reflect the copyright, trademark, service mark, or other intellectual property rights of the state agency whose protected information is being used by the entity or individual. Entities or individuals may not copy, reproduce, distribute, publish, or transmit, in any way this content for commercial purposes. This presentation is distributed without profit and is being made available solely for educational purposes. The use of any copyrighted material included in this presentation is intended to be a “fair use” of such material as provided for in Title 17 U.S.C. Section 107 of the U.S. Copyright Law.
PRECAST OVERHANG PANELS (SAFE & FAST)

Buddy Williams
Director of Construction, Atlanta District
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<th>Page</th>
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<td>3-5</td>
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<td>Fabrication</td>
<td>6-8</td>
</tr>
<tr>
<td>3</td>
<td>FM 726 at Brushy Creek, Marion County</td>
<td>10-45</td>
</tr>
<tr>
<td>4</td>
<td>Questions/Comments</td>
<td>46</td>
</tr>
</tbody>
</table>
Fabrication
Fabrication
FM 726 at Brushy Creek, Marion County
Existing Brushy Creek bridge at FM 726
Proposed bridge - FM 726 at Brushy Creek, Marion County

- 2 span (90’ – 90’) bridge (180’)
- 34’ wide overall bridge width
- Rail Type – T223
- No Skew
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
FM 726 at Brushy Creek, Marion County
Proposed bridge – FM 726 at Brushy Creek
FM 726 at Brushy Creek, Marion County
Contractor’s Comments

– Didn’t particularly like nor dislike
– Realized the potential once contractors get by the “newness”
– Lifting loops too close to concrete/steel at times to get a lifting hook or shackle easily attached
Contractor - Longview Bridge and Road
Panel Fabricator – Austin Prestressed
Deck Concrete Provider – TXI
Concrete Pump – East Texas Concrete Pumping
Material Testing – ETTL

Thanks to,
- Kevin Moyer, P.E. (Bridge Division)
- Paul Wong, P.E. (Marshall AE)
- Ralph Brown, P.E.
Questions/Comments?
ACCELERATED CONSTRUCTION STRATEGIES

DESIGN CONSIDERATIONS

Doug Marino, P.E. - Bryan District
What does Accelerated Construction suggest to you?

BRY TP&D Section Poll

- Innovation
- Precasting
- Contracting
- Traffic Control
- Fast Track Materials

% 0% 10% 20% 30% 40% 50%

TP&D Design Staff
Design Engineer
Accelerated Construction – What’s In A Name?

Efficient Construction Results in Accelerated Construction

• Provide Design Specified Technique
• Minimal Parameters to allow for Contractor Innovation and Efficiency
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<tr>
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<td>2-3</td>
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<td>Iterative Process for Developing Efficient Construction</td>
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<td>OSR in Madison Co. – TCP Determination Process</td>
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<td>SH 7 Leon Co. – Cement Treat &amp; Flex Base vs. Foamed Asphalt</td>
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<td>6</td>
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</table>
Iterative Process for Developing Efficient Construction

Initial Pavement Design → Initial TCP → Evaluation → Final Pavement & TCP Design

- Feedback
- Refinement
- Refinement
- Coordination

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

Initial Pavement/TCP Designs
- Developed soon after Project Kickoff

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

Evaluation
- Discuss Options and Constraints

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

Refinement
- Sketch TCP Phases in Detail – ROW, Bridges, etc.
- Look for Potential Issues

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

Coordination
- Discuss Issues and Details with Pavement Engineer and Area Engineer

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

- Initial Pavement Design
- Initial TCP
- Evaluation
- Final Pavement & TCP Design

Refinement
- Update Pavement Design and TCP based on Ideas Developed During Coordination

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

Feedback
- Seek Input from Internal and External Stakeholders
- DTSRT, Contractors, City/County Officials – SB 312

Pavement & Traffic Control Plan Example
Iterative Process for Developing Efficient Construction

Final Pavement/TCP Designs
- Consider Accelerated Contracting Techniques
- Finalize Designs

Pavement & Traffic Control Plan Example
OSR in Madison Co. – TCP Determination Process

- **OSR – State Highway in Madison Co.**
  - Currently in Design – Summer 2018 letting

- **Shoulder Widening and Rehabilitation Project**
  - Project length is 15 miles
  - Limited Right-of-Way width
  - Poor Soils
  - Includes 5 bridge replacements
<table>
<thead>
<tr>
<th>Iterative Steps</th>
<th>Pavement Design</th>
<th>TCP</th>
</tr>
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<td>Preliminary – Cement or Lime Subgrade</td>
<td>Standard Daily Lane Closure for Cement Option</td>
</tr>
<tr>
<td>Final Draft Pavement Design</td>
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<tr>
<td>Held Meeting</td>
<td>No change to primary design – Added fast track design for section through small town</td>
<td>Decided Road Closures should be considered – Investigate further</td>
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<td>Engineer developed hybrid plan – 30% Road Closure</td>
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<td></td>
<td></td>
<td>30% Triple CTB w/Temp Pavement</td>
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<td></td>
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<tr>
<td>Analysis</td>
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<td>Hybrid Plan vs. Complete Closure</td>
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<tr>
<td></td>
<td></td>
<td>Hybrid requires <strong>258</strong> additional working days</td>
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<td>District Traffic &amp; Safety</td>
<td>Discussed Evaluation Process</td>
<td><strong>Selected Complete Closure</strong></td>
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<tr>
<td>Review Committee Meeting</td>
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<tr>
<td>Final Design</td>
<td>No change – Lime Treat entire project + 1 mi. section of 4 ft. undercut + ½ mi. fast track section</td>
<td>4 main closure sections + fast track section; considering milestones &amp; incentives; Communicated with AE &amp; BRG throughout</td>
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</tbody>
</table>
TCP Option Considered

TCP Step 6 of 14
Required for 30% of Project

Hybrid Option
### OSR in Madison Co. – TCP Determination Process

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SH 7 Leon Co. – Cement Trt & Flex Base vs. Foamed Asphalt

- **SH 7 – State Highway in Leon Co.**
  - Let in 2015

- **Shoulder Widening and Rehabilitation Project**
  - High Truck Traffic due to Energy Sector

- **Considered Two Options to Rehabilitate the Existing Pavement**
  - Option A: Cement Treat & Flex Base
  - Option B: Foamed Asphalt
Material Options Considered

**Option A**
- Flex Base
- Cement Treat Existing Material

**Option B**
- Foamed Asphalt Treat Existing Material

---

**SH 7 Leon Co. – Cement Trt & Flex Base vs. Foamed Asphalt**

**Accelerated Construction Workshop - Design**

November 28, 2017
SH 7 Leon Co. – Cement Trt & Flex Base vs. Foamed Asphalt

Benefits of Foamed Asphalt

Material Performance
- Single process treatment includes a mix of water, cement, and asphalt
- Double strength compared to standard cement or lime treatment
- Less rigid than cement results in less cracking – Eliminates the need to place flex base
- Adds a water barrier not present with flex base, cement, or lime treatment

Construction Time
- Same time to construct as cement layer – Overall time savings due to no flex base
- Expect long term time benefit by reducing the need maintenance crack sealing

<table>
<thead>
<tr>
<th></th>
<th>Cement Treat &amp; Flex Base</th>
<th>Foamed Asphalt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option A</strong></td>
<td>$224,000</td>
<td>$294,000</td>
</tr>
<tr>
<td><strong>Option B</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost (2-12’ lanes/mi)</td>
<td>Additional 7 days +/- for flex base step</td>
<td>–</td>
</tr>
</tbody>
</table>

Selected Option B: Foamed Asphalt
### Example Innovation

- Statewide Specification since 2011
- Applicable to Common Type of Work
- Attainable – Not Proprietary

<table>
<thead>
<tr>
<th></th>
<th>Standard Technique</th>
<th>Innovative Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (4-12’ lanes/mi)</td>
<td>$53,000</td>
<td>$11,000</td>
</tr>
<tr>
<td>Time (4-12’ lanes/mi)</td>
<td>1 day + Multi-day Cure</td>
<td>0 Impact; Inclusive</td>
</tr>
</tbody>
</table>

Is the Choice Obvious?

### Challenge

- Embrace Innovation
- Don’t Stand in the Way of Others
Questions & Answers

For more information, please feel free to contact:

Doug Marino, P.E.
District Design Engineer
TxDOT, Bryan District
Doug.Marino@txdot.gov
(979)778-9635

Credit to the following for assisting with presentation content:
James Robbins, P.E.
Lorena Patranella, P.E.
Bill Eisman, P.E.
Bryan Brown, P.E.
TRAFFIC AND SAFETY

Martin N. Gonzalez, P.E.
Greenville Area Engineer, Paris District
TRAFFIC AND SAFETY

Maximum Protection in Work Zone
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Traffic and Safety

• **Drivers need to be particularly alert traveling through highway work zones.**

• **When a road is not in its usual condition due to construction, it is a good idea to slow down.** Fines for speeding **DOUBLE** in work zones when construction workers are present.

• **Most work zone crashes are rear-end collisions resulting from speeding or inattentive driving.**

**“EXPECT THE UNEXPECTED”**
Causes of Workzone Crashes

Struck By Crashes in Work Zones

- Distracted Driving
- Blind Spots
- Night Work
- Run Overs
- Back Overs
Night Work

On the worksite:
• Reduced visibility for motorists and workers
• Communication between shifts
• Impaired or drowsy drivers present

Physical and social disruptions:
• Sleep disruption
• Risk of injury form drowsiness
• Impaired family/social relationships

Night work changes the environment.
Night Work Specifications

- Work periods
- Planning
- Training
- Signing
- Channelization Devices
- Traffic Control Personnel
- Workers
- Work Vehicles
- Lighting
- Site Maintenance
Runovers and Backovers

- Remain alert at all times.
- Check surroundings often & listen for warnings.
- Keep a safe distance from traffic.
- Stay behind protective barriers when possible.
- Look out for each other & warn co-workers
Things to Consider

- Designers provide detail in Sequence of Work.
- Study Traffic Control Plan and ask questions.
- Maximize the efficiency of TCP by combining phases whenever possible.
- Consider using innovative methods, such as movable barriers and using DMS and additional PCMS on project.
- Traffic separation through barriers may allow for continuous work unencumbered and may expedite phases.
- Communicate with public and officials early and often informing them of upcoming changes to driving patterns.
- Ensure delineation and guidance is clear.
- Do not be afraid to make changes.
Questions

Questions?
Accelerated Construction Workshop

ATLANTA, LUFKIN, PARIS, TYLER AND BRYAN DISTRICTS
Accelerated Construction Concepts
How Do We Get From Here?
To Here.
And Reduce The Overall Time We Spend Here.
Culture of Accelerated Construction

- It’s about reducing critical path activities.
- It’s about keeping utility delays out of the schedule.
- It’s about simplifying the design.
- It’s about committing the resources necessary to meet the goals.
- It’s about avoiding red tape.
- It’s about checking egos at the door.
- It’s about being proactive instead of reactive.
- It’s about keeping an open mind. It can be done.
Keys parts of a successful Accelerated Project

- Design and Construction methods
- Rules and Regulations
- Partnering and Project Delivery
Design and Construction Methods
Design the project for success

- Can the project be accelerated in the first place? Are there alternate routes for traffic? Is there enough ROW for detours? Are the utilities out of the way? Can all or portions of existing roads be closed?

- Consider different ways to achieve design requirements of drainage, subgrade and pavement structure - precast vs cast-in-place, subgrade soil parameters vs depth of stabilization, HMAC vs concrete

- Plan for changes. Have alternate designs, pricing, and bid items in place to use as conditions change. Much better to bid it in than change order it in.

- Consider availability as well as delivery of material. Don’t design in unintended restrictions due to material source, haul distance or seasonal limitations.

- Spend more time in advance planning, don’t settle for “That’s a field problem.”
Plan for change. Don’t let utility conflicts control the project.

- Utility conflicts will always happen, but by working together, TxDOT and the contractor can ALWAYS move faster than a franchise utility.

- Be prepared to think WAY out of the box on rerouting foundations, structures, utilities, etc. Additional construction costs are almost always cheaper than utility delay claims.

- Accelerated construction culture moves past asking “Do we have a pay item?” or “What is the standard?” and starts with asking “What will solve the problem?” and “What will work?”

- Both contractor and TxDOT need to have individuals on site EVERY DAY authorized and capable of making decisions to keep the project moving.
Translate simpler designs into faster construction

- Eliminate HMAC under Curb and Gutter, place C&G directly on subgrade. Reduce the number of move-ins for paving operation.

- Avoid using multiple types or classes of HMAC in a section. Most plants only run one type of mix in a silo per day. Changing mix designs slows down production rates.

- Will a thicker pavement section eliminate the step of subgrade stabilization? Will deeper soil stabilization eliminate the need for off-site material?

- Use common paving widths where possible. Reduce the need for machine and formwork changes. Make the process repeatable.

- Slip-form concrete wherever possible – bridge rail, C&G, sidewalk.
Accelerated construction does not mean reduced safety

- On the contrary, room to work safely is a key to accelerating a process.
- Close portions of existing roadways and intersections to traffic wherever possible.
- Nighttime work may be necessary, but does not translate into increased production or safety.
- Daily safety coordination meetings are a must. Everyone on site needs to be aware of what’s happening and what to do in case of an emergency.
- Plan for safety, it’s not an accident.
Regulations and Rules
Tools for success, not reasons for delay

- Consider the spec book as a guide to use in combination with common sense.
- Look for opportunities to succeed, don’t be held back by the perception of “regulations and protocol.”
- Accelerated construction culture moves past the approach of “Build it per plan” and commits to the concept of “Plan to build it.”
- Constant communication of specification understanding and expectation between the contractor and TxDOT is a major part of accelerating a project.
Look beyond “That’s the way we’ve always done it.”

- In urban areas, if lane closures have always been restricted to certain hours during the day, consider increasing the number of work hours to maximize day time production and commit the labor and equipment to make it happen.

- In rural areas, if lane closures have always been limited to certain distances, consider increasing the length of closure to maximize day time production and commit the labor and equipment to make it happen.

- Reinforce the things that facilitate a process, don’t waste time on things that don’t.
Partnering and Project Delivery
Success is on purpose

- Both contractors and TxDOT must empower personnel to make field level decisions to keep the project moving.
- Eliminate the concept of a specific number of days to review an issue. If it helps the project, walk it through and expedite. Both the contractor and TxDOT should take the active role.
- Don’t plan for IF something goes wrong, but plan for WHEN something goes wrong.
- It may be a last minute idea, doesn’t mean it’s too late.
- Work towards joint success. Neither the contractor or TxDOT should have surprises waiting for them.
- Move past “Bid it like you see it” and address known concerns before the letting - change orders add another step and delay.
Use the proper tool for the desired result

- Use of incentives and disincentives; don’t use one without the other and it always works better with more carrot and less stick.

- Share thoughts and ideas on what it will take to meet project goals. Commit the necessary resources to make it happen.

- Time determination calculations. Are the assumptions made for the base line reasonable? Is the entire project being accelerated or just portions of it?

- Don’t discount value engineering and time savings proposals. Discuss at the pre-con.

- Both contractors and TxDOT should understand the project bid items and their proper application.
Accelerated or Accentuated?

- Reduction of aesthetics, landscaping, form liner, bridge rail, etc.
- Prop 1/7 and the promise to the taxpayer. 80%+ of the voters didn’t support more funding for aesthetics. Even if third party pays - it still slows down the project.
- Understanding the workforce challenges and shortfalls, you’re not going to cut 50% out of project time in the current environment. One project gains - another project suffers.
- Accelerating time too much limits competition and success ratio.
- Accelerate key projects wisely. If you accelerate every project, you’ve accelerated none of them.
- Gains of 10-25% are realistic.
Successful Project Delivery

- Successful project delivery begins with successful project planning.
- Consistency in personnel and equipment are key to successful project delivery.
- High levels of open and productive communication are a must.
- Successful project delivery is the result of meeting realistic goals and expectations.
- All project team members have to take ownership of the project from beginning to end.
Thanks

- **TxDOT:** Administration, District Engineers, Area Engineers, and staff.
- **TTI:** Jon Epps
- **AGC of Texas:** Thomas Bohuslav
- **Contracting community**
Typical Projects

A. Pavement Strengthening
B. Pavement Widening
C. Rural Intersection Reconstruction
D. Bridge Widening
E. Small Town Main Street
F. Suburban/Rural Road Widening
# Breakout Groups

<table>
<thead>
<tr>
<th>Group/Room</th>
<th>Problem Title</th>
<th>Moderator</th>
<th>Recorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Ballroom 2</td>
<td>Pavement Strengthening</td>
<td>Daniel Taylor</td>
<td>Kim Garner</td>
</tr>
<tr>
<td>B – Ballroom 2</td>
<td>Pavement Widening</td>
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<tr>
<td>C – Phoenix</td>
<td>Rural Intersection</td>
<td>Ryan Jackson</td>
<td>Shannon Ramos</td>
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<tr>
<td>D – Orion</td>
<td>Bridge Widening</td>
<td>Bill Compton</td>
<td>Mark Shafer</td>
</tr>
<tr>
<td>E – Pegasus</td>
<td>Small Town Intersection</td>
<td>Kevin Buranakitipinyo</td>
<td>Dan Perry</td>
</tr>
<tr>
<td>F – Gemini (at end of restaurant)</td>
<td>Suburban/Rural Widening</td>
<td>Martin Gonzalez</td>
<td>Preston Friend</td>
</tr>
</tbody>
</table>
Project Details:

**Work**
- Project length: 6 mi.
- Existing: 11” asphalt, over 8” flexible base
- Mill & remove 3” & replace with 4” AC or 6” PCC
- Shoulders to match
- Soil: Expansive clay

**Traffic:**
- AADT = 60,000
- Peak: M-F
  - 6:30 am to 9:00 am
  - 4:00 pm to 6:30 pm

Possible Detours:
- Frontage road, busy downtown on wkends, ramps @ 1 mi. interval

**Geometric Design:**
- High speed freeway design

**Drainage:**
- Drainage structures: adequate

**Utilities:**
- Not an issue on project

**Economics:**
- Approx. $5 M in user & non-user costs savings possible with aggressive accelerated construction schedule
### Project Details:

**Work**
- Project length: 6 mi.
- Existing: 11” concrete over 4” base
- Add 12’ lane + 4’ shldr to inside
- Alt: 8” AC/6” flex base or 8” JPCP/4” Type B
- New concrete median between directions
- Trucks not allowed on inside lane
- Soil - Expansive clay

**Traffic**
- AADT = 75,000
- Peak: M-F
  - 6:00 am to 9:30 am
  - 4:00 pm to 7:00 pm
- Weekend heavy not congested

**Geometric Design:** High speed freeway design

**Drainage:** Drainage structures adequate. Must be relocated from median area

**Utilities:** Electrical for highway lighting

**Economics:** Approx. $40 M in user & non-user costs savings possible with aggressive accelerated construction schedule

---

### Exercise B: Pavement Widening

<table>
<thead>
<tr>
<th>Traffic Limits</th>
<th>New Lane Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10’ shldr</td>
<td>4’ shldr</td>
</tr>
<tr>
<td>12’ lane</td>
<td>40’ Median</td>
</tr>
<tr>
<td>12’ lane</td>
<td>4’ shldr</td>
</tr>
<tr>
<td>12’ lane</td>
<td>12’ lane</td>
</tr>
<tr>
<td>10’ shldr</td>
<td>10’ shldr</td>
</tr>
</tbody>
</table>

**Frontage road requires strengthening, ramps @ 1.5 mi. interval**

**Possible Detours:**
- Frontage road requires strengthening, ramps @ 1.5 mi. interval
- Fishing road @ 1.5 mi. interval
- Bypass @ 1.5 mi. interval

**Soil - Expansive clay**

---

**Peak Traffic:**
- M-F: 6:00 am to 9:30 am, 4:00 pm to 7:00 pm
- Heavy not congested

**Weekend:**
- Not congested
Exercise C: Rural Intersection Reconstruction

Shaded Area for Reconstruction

Project Details:

Work
- Project: Shaded Area
- Existing: 4” AC/6” flex base
- Fix: 8” AC or PCC/remaining material
- Soil: Silty sand

Traffic
- AADT = 12,000 for 4-lane;
- 3,000 for 2-lane
- Peak: M-F 6:30 am to 9:00 am & 4:00 pm to 7:00 pm,
- Weekend heavy traffic to recreational lake on 2-lane roadway
- Possible Detours: Result in additional 15 miles

Geometric Design
- No sight distance problem

Drainage
- Drainage away from intersection with drop inlets

Utilities
- Limited electrical, cable removed & relocated

Economics
- Approx. $300 K in user & non-user costs savings possible with aggressive accelerated construction schedule
Exercise D: Standard Bridge Overpasses – Widening Medium Span Bridges and Solutions for Replacing Short- and Medium-Span Bridges

**Project Details**

*First part of exercise focuses on widening existing bridge to add more lanes for increased capacity*

- **Setting** - Suburban area
- **Existing bridge**
  - Medium-span lengths (80-120 ft)
  - Simply supported prestressed concrete I-girder construction
  - See figure for typical transverse section (girder type can vary)
  - Deck: reinforced concrete with precast concrete stay-in-place forms and an asphalt overlay.
- **Traffic** - AADT = 15,000
  - Peak M-F
    - 6:30 am – 9:00 am
    - 4:00 am - 7:00 pm
- **Economics:** Approx. $5 M in user & non-user costs savings possible with aggressive construction schedule

*Discussion will be expanded to discuss alternatives and challenges for full replacement of short- and medium-span bridges*
Geometric Design: Tangent section, 10 cross roads

Drainage: Install storm drains

Utilities: Relocate cable, install electrical for lighting

Economics: Approx. $500 K in user & non-user costs savings possible with aggressive accelerated construction schedule

Project Details:

Work
- Project length: 2 mile
- Existing: 4” AC/6” flex base, No curb/gutter
- Replace 4’ sidewalk with curb/gutter

Traffic
AADT = 3,000 for main road, 500 for crossroads
Peak: M-F 7:00 am to 9:00 am & 4:30 pm to 6:30 pm
Possible Detours: side streets. Businesses on Main Street affected (20,000 sq. ft.)
Exercise F: Suburban/Rural Road Widening

Project Details:

Work
• Project length: 6 mi.
• Existing: 2” AC/8” Flex Base,
• FDR entire existing 24’ width
• Add 6’ Shldr. Widening
• Place 4” HMA surface
• Soil: Expansive clay

Traffic
AADT = 3,000 for main road with
20 driveways
Peak: M-F
  6:30 am to 9:00 am &
  4:30 pm to 6:30 pm

Possible Detours: Result in additional 5 mi.
Geometric Design: Adequate design, no major changes in horizontal & vertical alignment
Drainage: 1 box culvert & 5 pipe culverts need widening
Economics: Approx. $ 1M in user cost savings possible with aggressive accelerated construction schedule
Utilities: Not an issue
Items to Consider

- Key economic analysis factors
- ROW, utilities, environmental, historic preservation, archeology
- Public information
- Contracting methods
- Design
- Contractor selection
- Involvement of contractor
- Construction considerations
- Other
Suggested Time Utilization

- General project discussion – 15 min
- Items to consider – 15 min
- Top five challenges – 45 min
- Information needs – 15 min
Facilitator Report

• Briefly describe project

• Top 5 challenges

• Information needs
District Workshops on Accelerated Construction

Tyler
Holiday Inn – South Broadway
November 28, 2017
District Workshops on Accelerated Construction

Workshop Summary

AC-PP-17-14

Jon Epps

Tyler

Holiday Inn – South Broadway

November 28, 2017

www.txdot.gov/business/resources/construction/regional-workshops.html
Recurring Peak-Period Congestion

- Uncongested
- Congested
- Highly Congested

Peak-Period Congestion on NHS
2017 Unified Transportation Program (UTP)

2017–2026
Transportation Planning & Programming
We Build Texas

Field Guide to
Successful Project Delivery

We build Texas – Safely
We build Texas – Quality
We build Texas – On Time
We build Texas – Together

Working together to successfully deliver projects.
Interest in Accelerated Construction

• Visibility to public
• Safety
• Economics
Acceleration Goals

**Good**

- **Construction time**

**Better**

- **Construction time**

reduction in time to complete project
Economic Consideration

- Direct project costs
  - Agency
  - Some contractor

- Indirect project costs (user/non-user)
  - User fuel/time
  - Roadside businesses
  - Business efficiency (timely delivery)
  - Some Contractor

All costs eventually borne by the public
## Project Delivery

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- **Letting**
- **Construction**
- **Time**
Katy Freeway (IH-10)

- 23 miles
- 280,000 VPD
- $2.6 billion (2/3 construction)
- 6 years vs 12 years
Economic Incentives - Contractor

- One job/occasional job
- Return on investment (equipment)
- Bonding capacity
- Backlog of work
- Risk
Policies and Procedures

• Develop guidelines
• District support team
  - Bridges
  - Pavements
  - Construction planning
  - Drainage
  - Traffic
  - Production rates
Involvement of Contractor

- Planning and design review
- Partnering
- Communication
- Workforce
Development Needs

- Project selection
- Contracting methods
- Design guides
- Contractor selection
- Involvement of contractor
- Construction considerations
Development Needs

• Evaluation tools to allow use of existing materials
  ▪ Condition of existing material
  ▪ Recycling
• Traffic modeling
• Economic analysis
• Rapid QC/QA
• Removal & replacement of materials
• Equipment development
• Materials development
Not All Projects Are Suitable for Accelerated Construction
District Workshops on Accelerated Construction

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