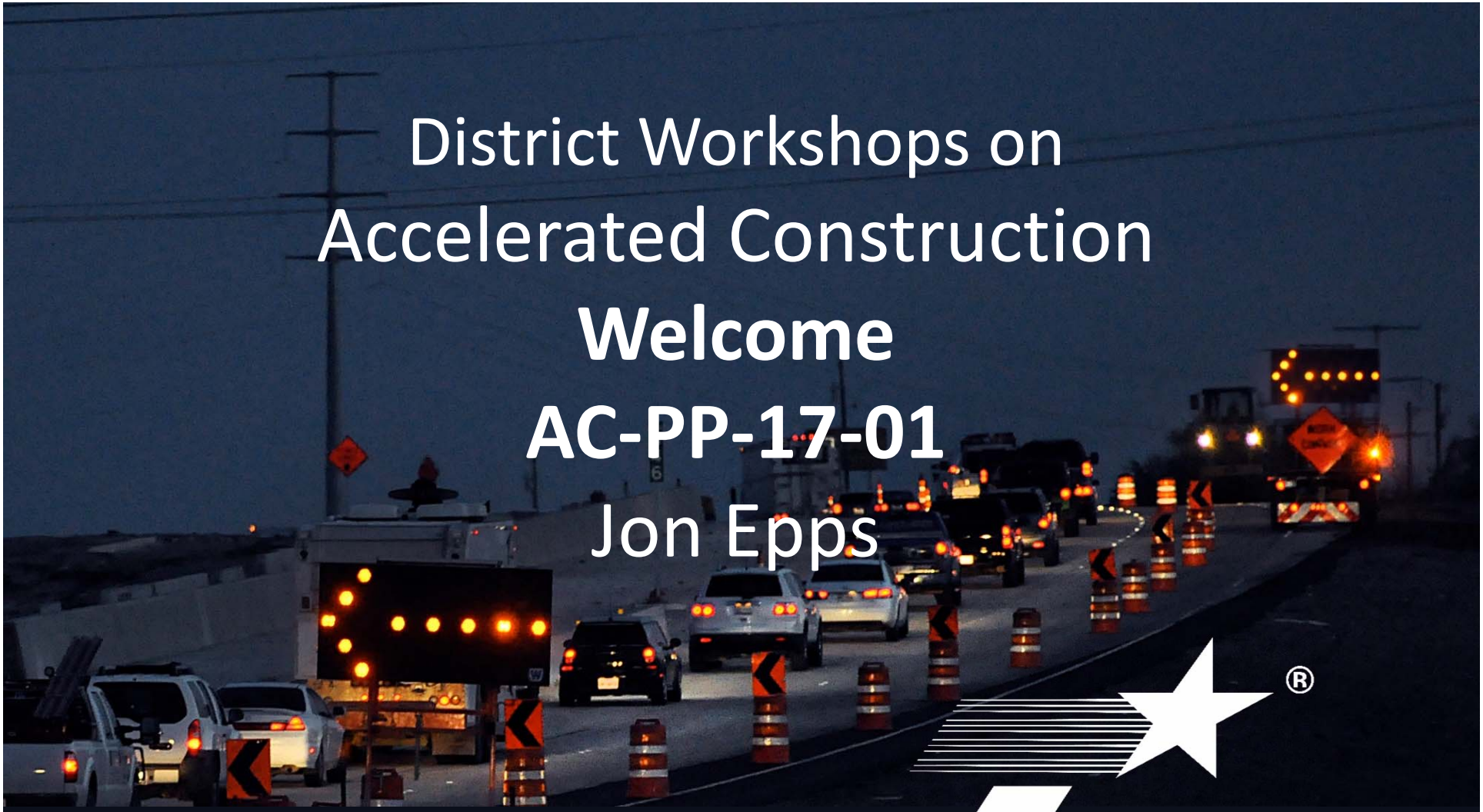
Texas Department of Transportation

Austin/San Antonio: District Workshop on Accelerated Construction
August 1, 2017
Embassy Suites, San Marcos

Agenda

Time	Topic	Facilitator
8:00-8:30	Registration	
8:30-8:45	Welcome	Jon Epps – TTI
8:45-9:00	History of Accelerated Construction	David Newcomb – TTI
9:00-9:30	TxDOT's Interest	Randy Hopmann – TxDOT, ADM
9:30-9:50	Project Selection Economics	David Ellis – TTI Brianne Glover – TTI
9:50-10:10	Break	
10:10-10:40	Project Development	Tracy Cain – TxDOT, CST
10:40-11:00	Accelerated Bridge Construction	Gregg Freeby – TxDOT, BRG Eddie Reyes – TxDOT, SAT
11:00-11:20	Design Considerations	Andy Naranjo – TxDOT, CST Mike Arellano – TxDOT, AUS
11:20-11:30	Traffic/Safety	Mike Coward – TxDOT, SAT
11:30-11:40	Public Information	Diann Hodges – TxDOT, CMD
11:40-12:00	Construction	Johnny Weisman – Hunter Industries, Ltd.
12:00-12:45	Lunch	
12:45-1:00	Charge to Breakout Groups • A-Pavement Strengthening • B-Pavement Widening • C-Rural Intersection Reconstruction • D-Bridge Widening • E-Small Town Main Street • F-Suburban/Rural Widening	David Newcomb – TTI *Leaders:* A-Victor Vargas – TxDOT, AUS B-Lea Jacobson – TxDOT, SAT C-Bobby Ramthun – TxDOT, AUS D-Jose Mendez – TxDOT, SAT E-Cathy Kratz – TxDOT, AUS F-Breakout Omitted *Recorders:* A-Carlos Arcila – TxDOT, SAT B-Brenda Guerra – TxDOT, AUS C-Diana Schulze – TxDOT, AUS D-William Semora – TxDOT, AUS E-Hector Siller – TxDOT, SAT F-Breakout Omitted
1:00-2:30	Group Discussion of Example Problems	Group Leaders/Recorders – TxDOT
2:30-3:15	Reports from Groups	Group Recorders – TxDOT
3:15-3:30	Break	
3:30-3:45	Contractor's View of the Future	Johnny Weisman – Hunter Industries, Ltd.
3:45-4:15	TxDOT's View of the Future	Randy Hopmann – TxDOT, ADM Tracy Cain – TxDOT, CST
4:15-4:30	Summary/Adjourn	Jon Epps – TTI



District Workshops on Accelerated Construction

Welcome

AC-PP-17-01

Jon Epps

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

Texas Department of Transportation

Texas A&M Transportation Institute

Accelerated Construction

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

http://www.txdot.gov/business/resources/construction/regional-workshops.html

Project Delivery

Planning & Programming	Preliminary Design	Environmental	ROW Utilities	PS&E

•Need
•Scope
•Cost estimate
•Authorization
•Planning
•Funding
	Design Concept
	• Data Collection
	• Public meetings
	• Schematics
	  • Preliminary
	  • Geometric
	• Value Engineering
		• Preliminary
		• Interagency
		• Documentation
		• Public hearing
		• Clearances
			• Data Collection
			• ROW map
			• Appraisals
			• Acquisition
			• Utility adjustment
				• Design details
				• Final alignment & profiles
				• Roadway
				• Operational
				• Bridge
				• Drainage
				• Misc structures
				• Traffic control
				• Review

Letting

Construction

Time

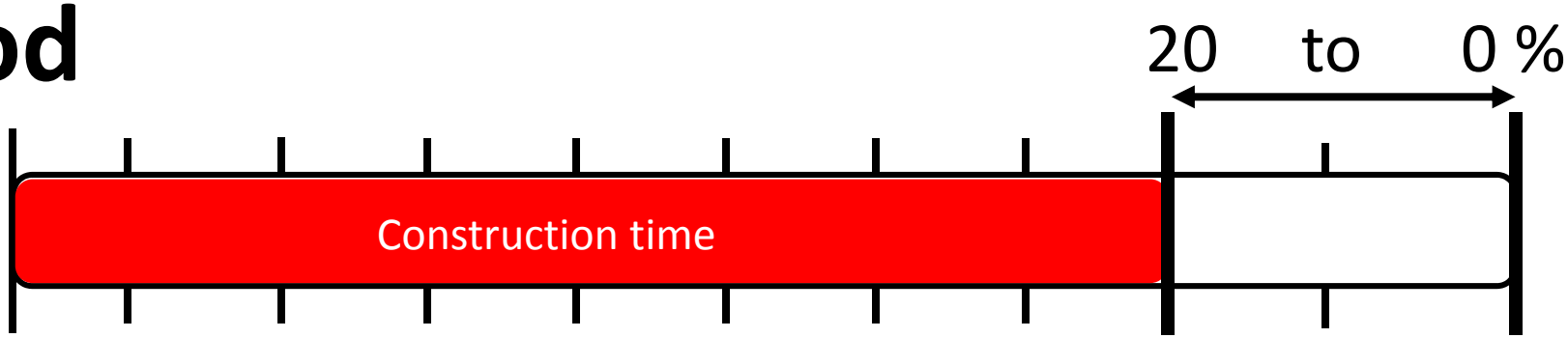
Definition of Construction

Greenfield

- Capacity improvement
- Reconstruction
- Rehabilitation
- Major maintenance
- Minor maintenance

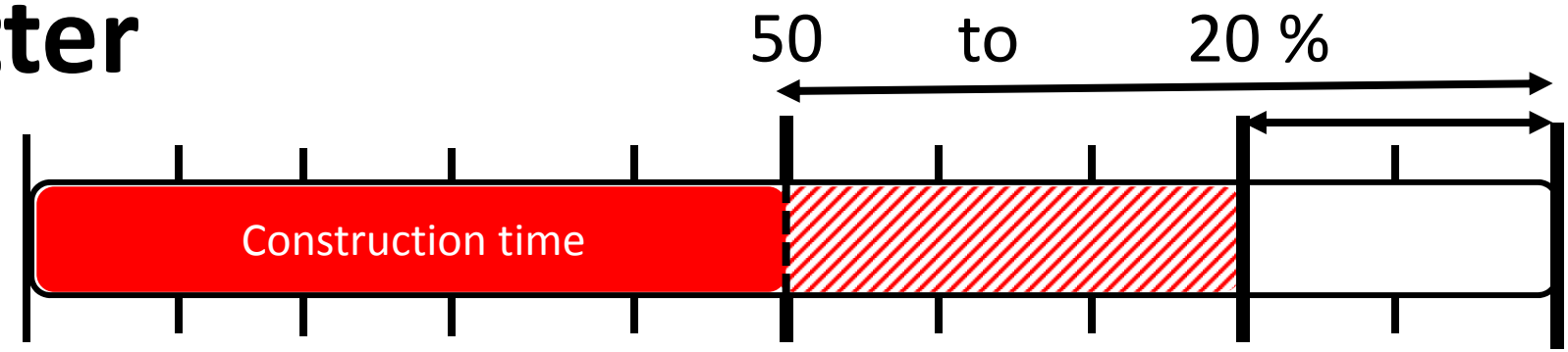
Acceleration Goals

Good



reduction in time to complete project

Better

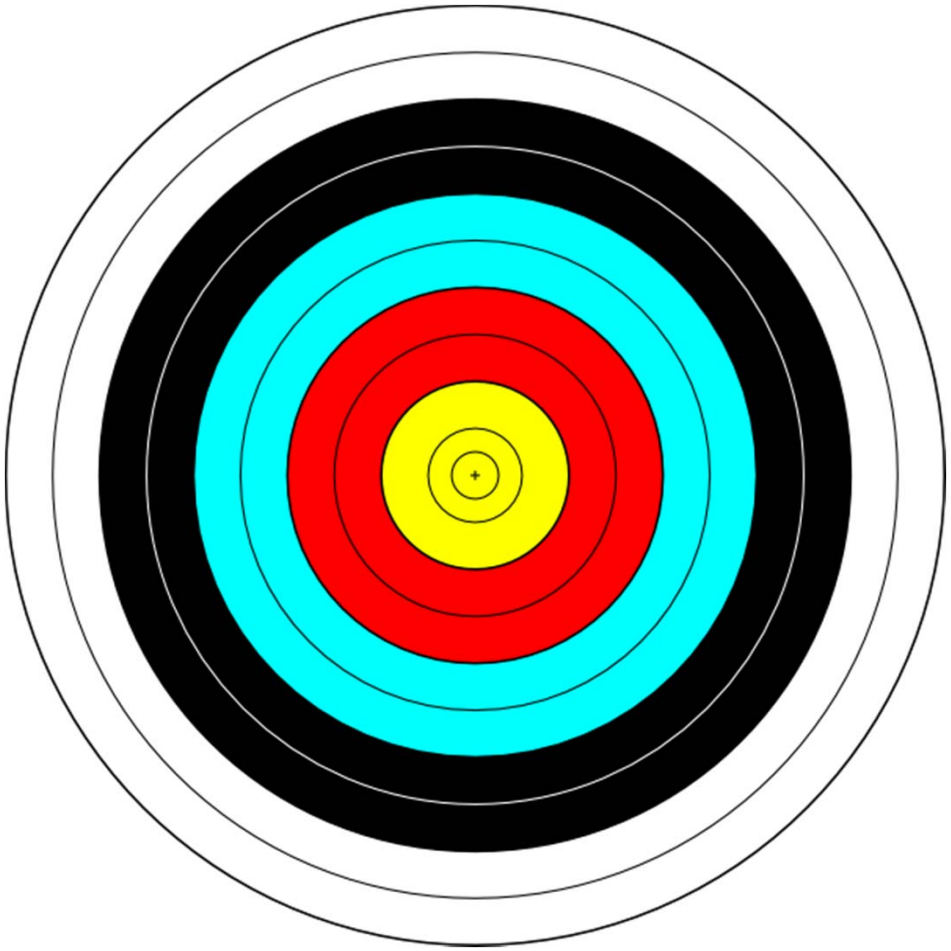


CAUTION

Not All Projects Are Suitable for Accelerated Construction

Workshop Goals

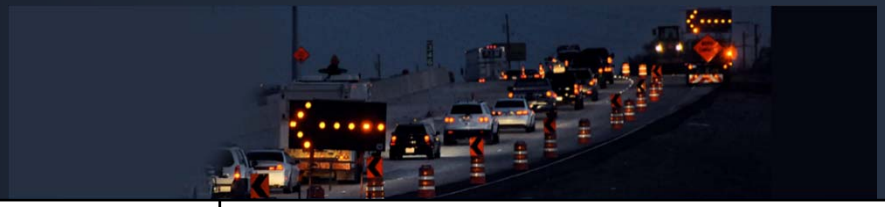
- Information sharing
- Existing TxDOT "tools"
- Identify needed "tools" & "policies"



Agenda

Time	Topic	Facilitator
8:30-8:45	Welcome	Epps
8:45-9:00	History of Accelerated Construction	Newcomb
9:00-9:30	TxDOT's Interest	Hopmann
9:30-9:50	Project Selection Economics	Ellis/Glover
9:50-10:10	BREAK	TBD
10:10-10:40	Project Development	Cain
10:40-11:00	Accelerated Bridge Construction	Freeby/Bettis/Reyes
11:00-11:20	Design Considerations	Arellano/Naranjo
11:20-11:30	Traffic/Safety	Coward
11:30-11:40	Public Information	Hodges
11:40-12:00	Construction	Weisman
12:00-12:45	LUNCH	

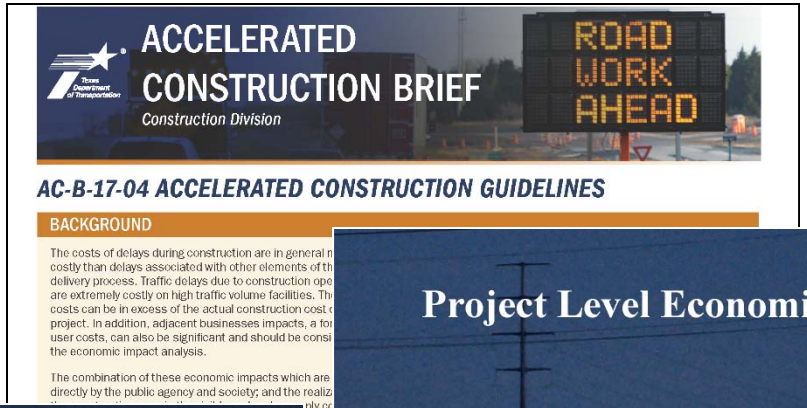
Agenda

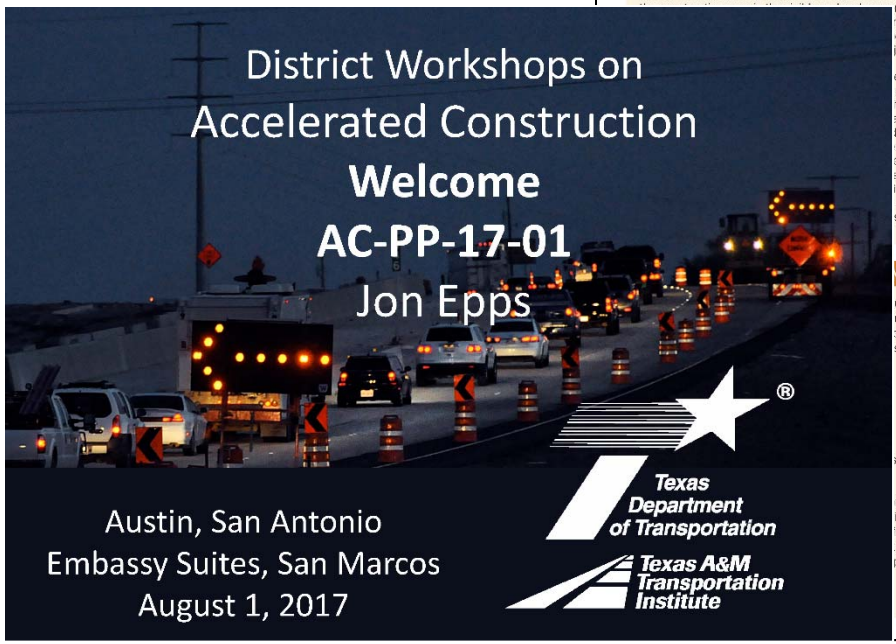


Time	Topic	Facilitator
12:45-1:00	Charge to Groups	Newcomb
1:00-2:30	Group Discussion of Example Problems	Group Leaders/Recorders
2:30-3:15	Reports from Groups	Group Recorders
3:15-3:30	BREAK	
3:30-3:45	Contractor's View of the Future	Weisman
3:45-4:15	TxDOT's View of the Future	Hopmann/Cain
4:15-4:30	Summary/Adjourn	Epps

ACCELERATED CONSTRUCTION DOCUMENTS

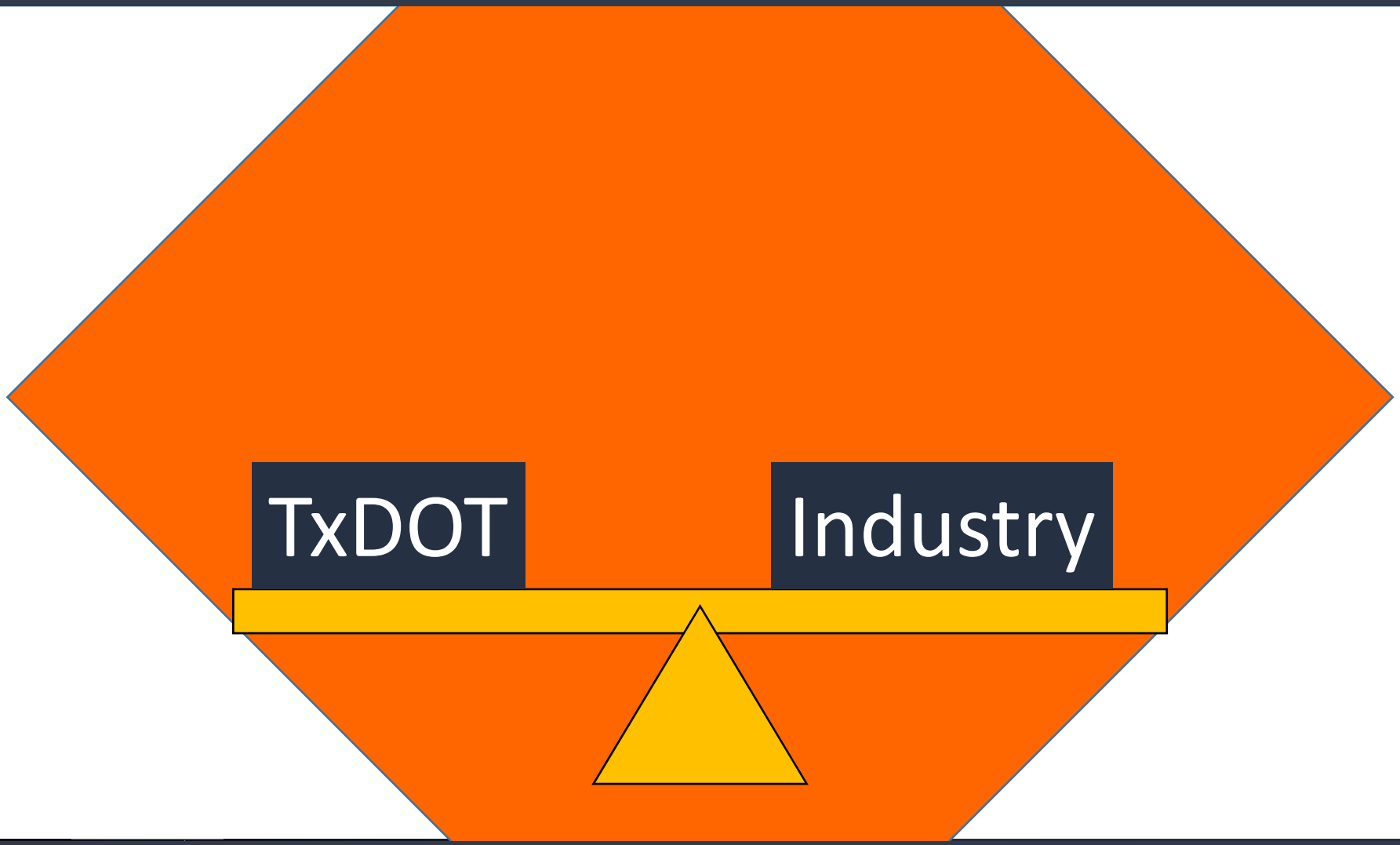
- Briefs
- Implementation Reports
- Presentations



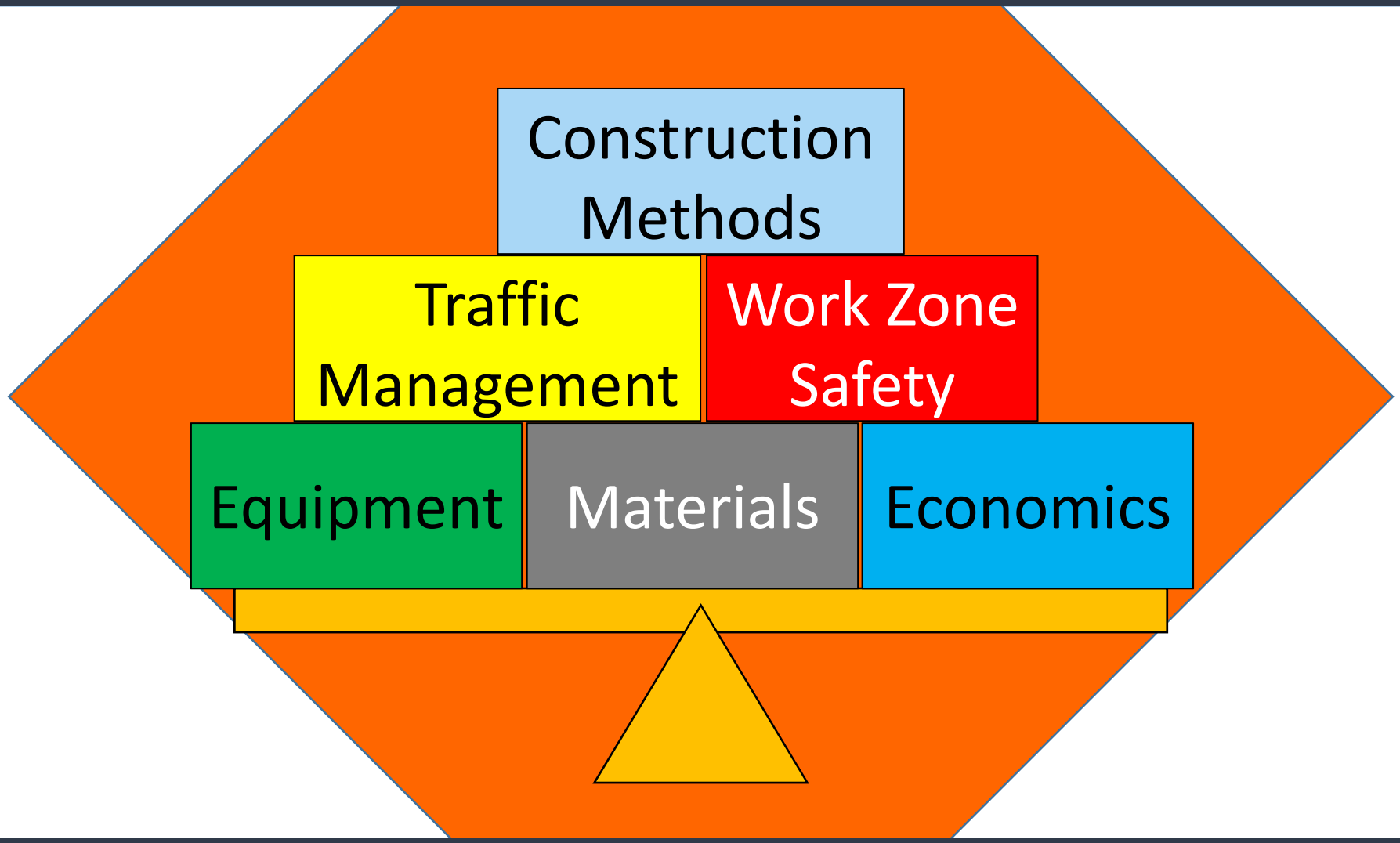


by
Brianne A. Glover, J.D.
David R. Ellis, Ph.D.

Accelerated Construction



Accelerated Construction



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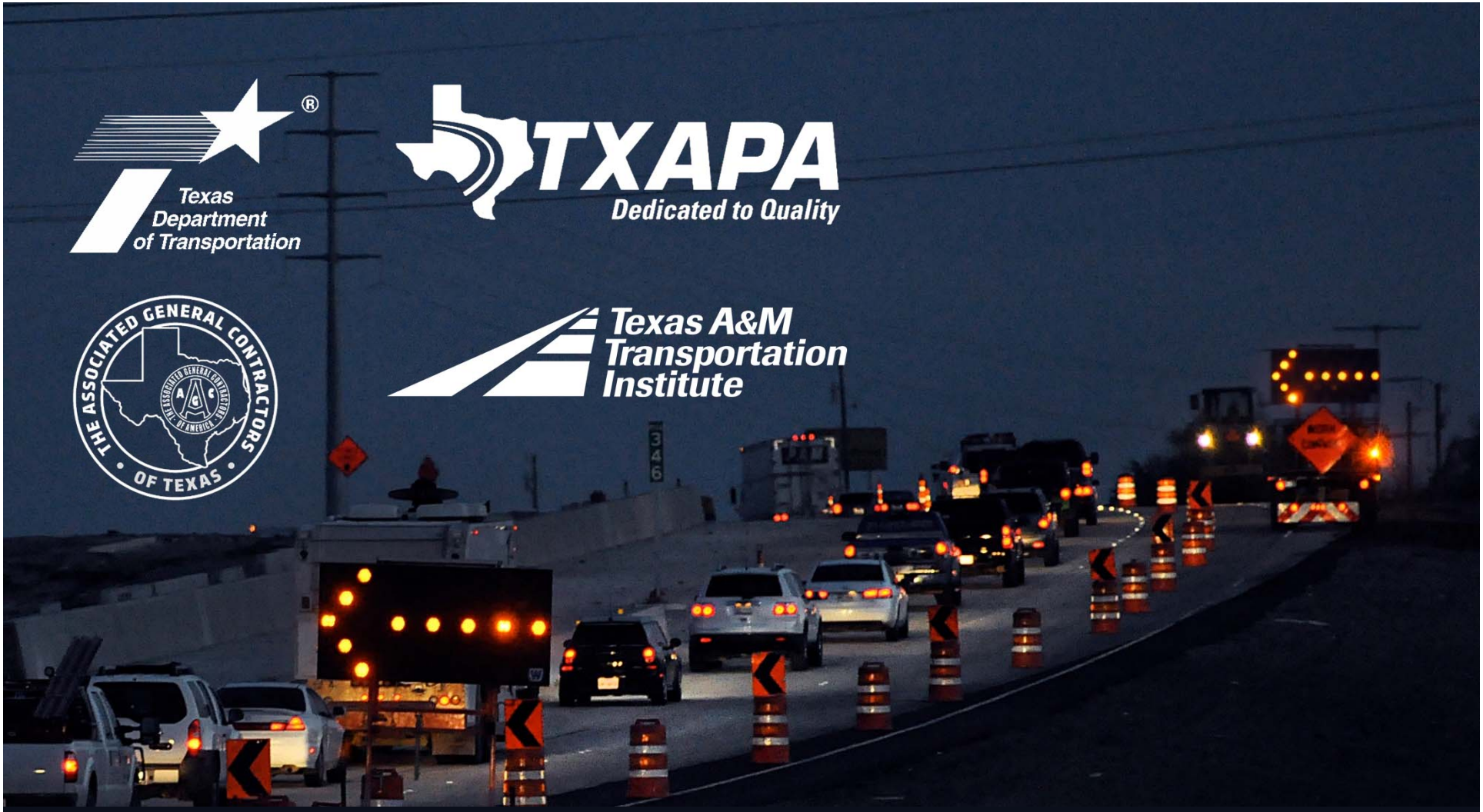
Interest in Construction

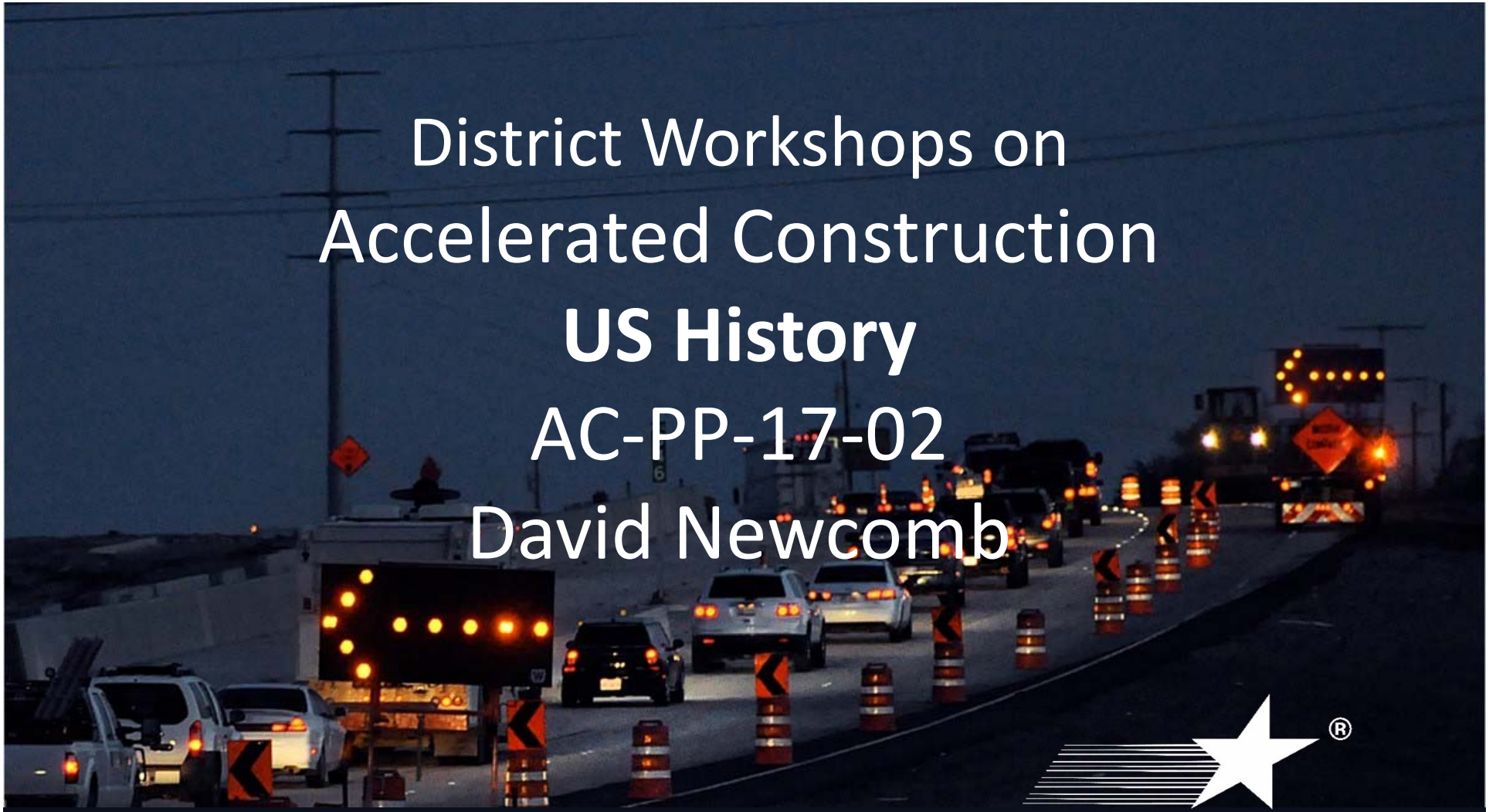
- Visibility to public
- Safety
- Economics

Introductions



District Workshops on

Accelerated Construction



District Workshops on Accelerated Construction

US History

AC-PP-17-02

David Newcomb

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

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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)

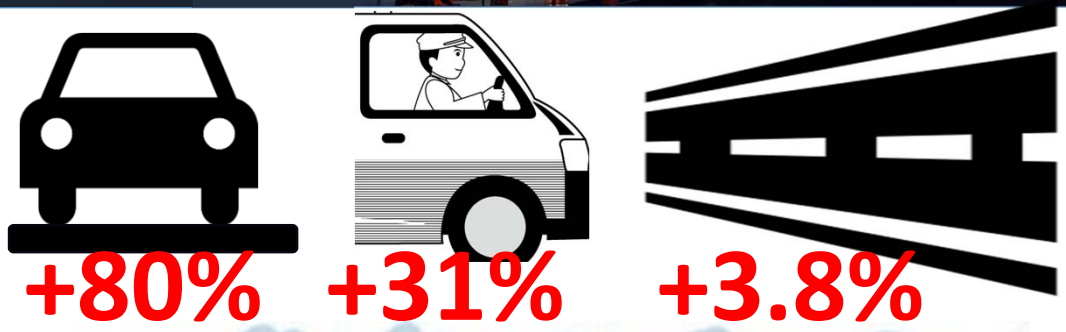
PROJECT PEGASUS

Transforming Our Downtown Freeways

1990's – 2000's Driving Forces

Increasing Demand (1980-2000)	
Vehicles Miles	+80 %
Drivers	+31 %
Lane Miles	+ 3.8%

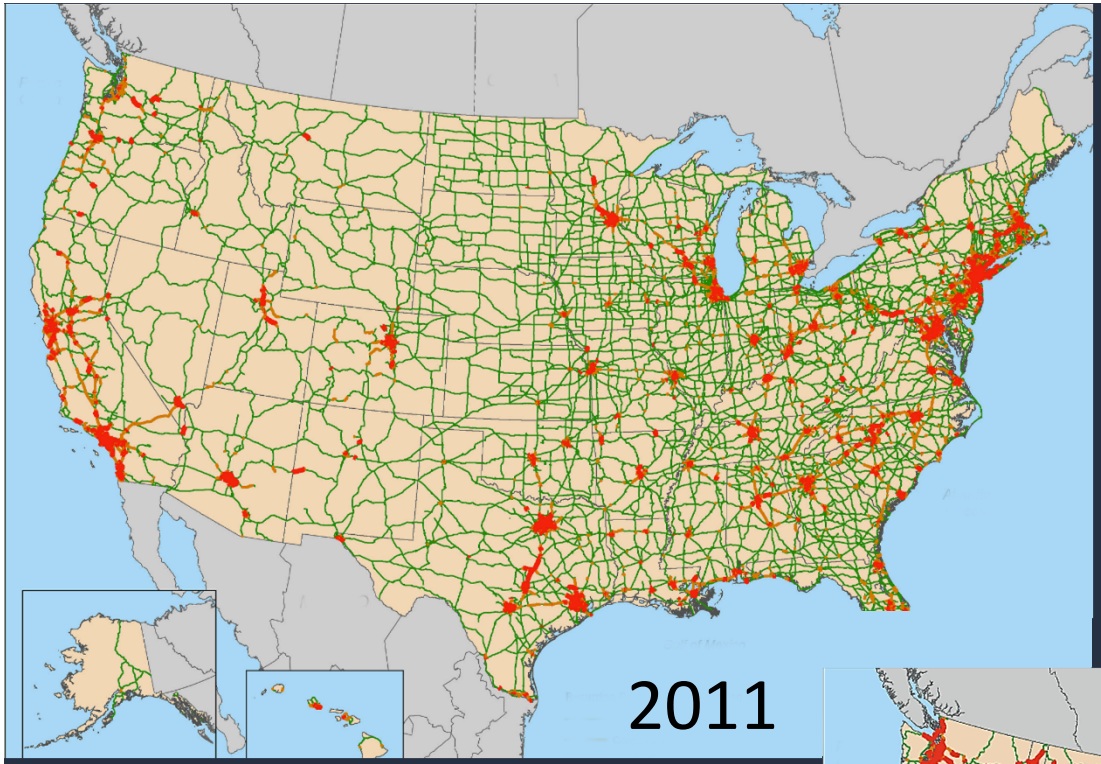
Aging System
40 % Bridges +40 Years Old
Pavements Exceeded Design Life

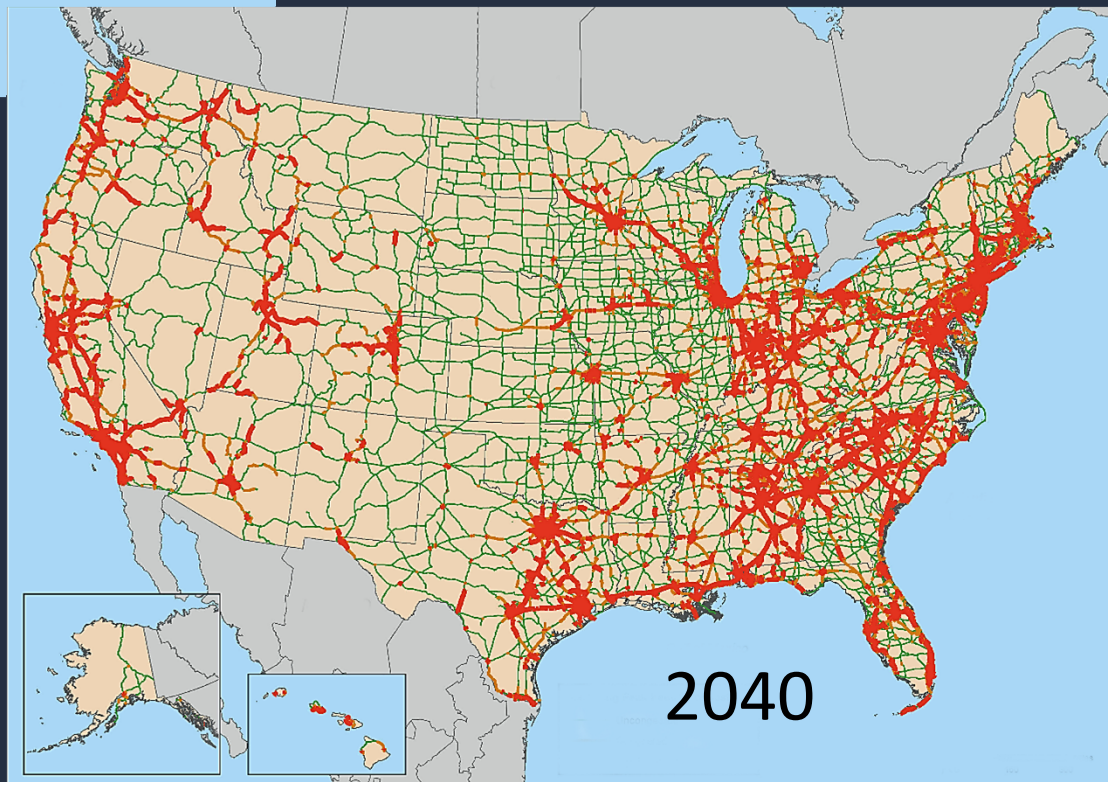


Accelerated Construction Skill Sets

• Financing	• Utilities	• Long Life Bridges
• Contracting	• ROW	• Long Life Pavements
• Work Zone	• Railroad	• Quality Control
• Mobility	• Communication /Outreach	• Modular/Prefab Construction
• Corridor Improvement	• Training	• Constructability
• Worker Health & Safety		

Peak-Period Congestion on NHS

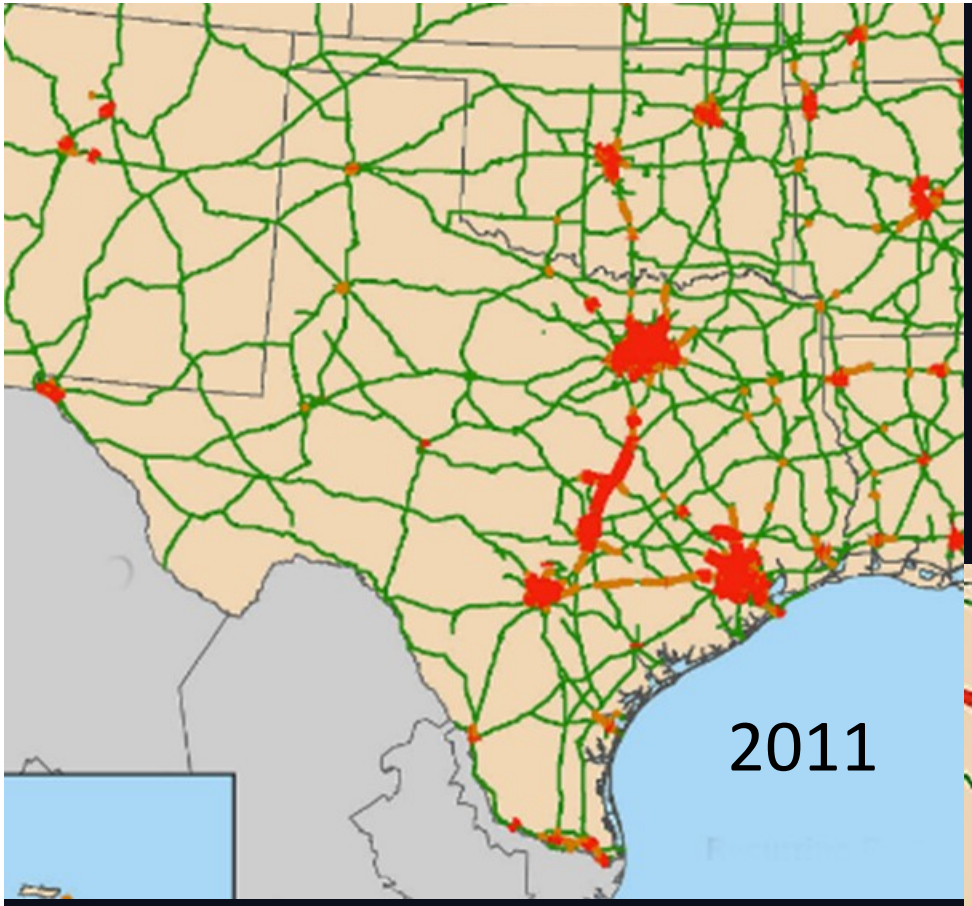


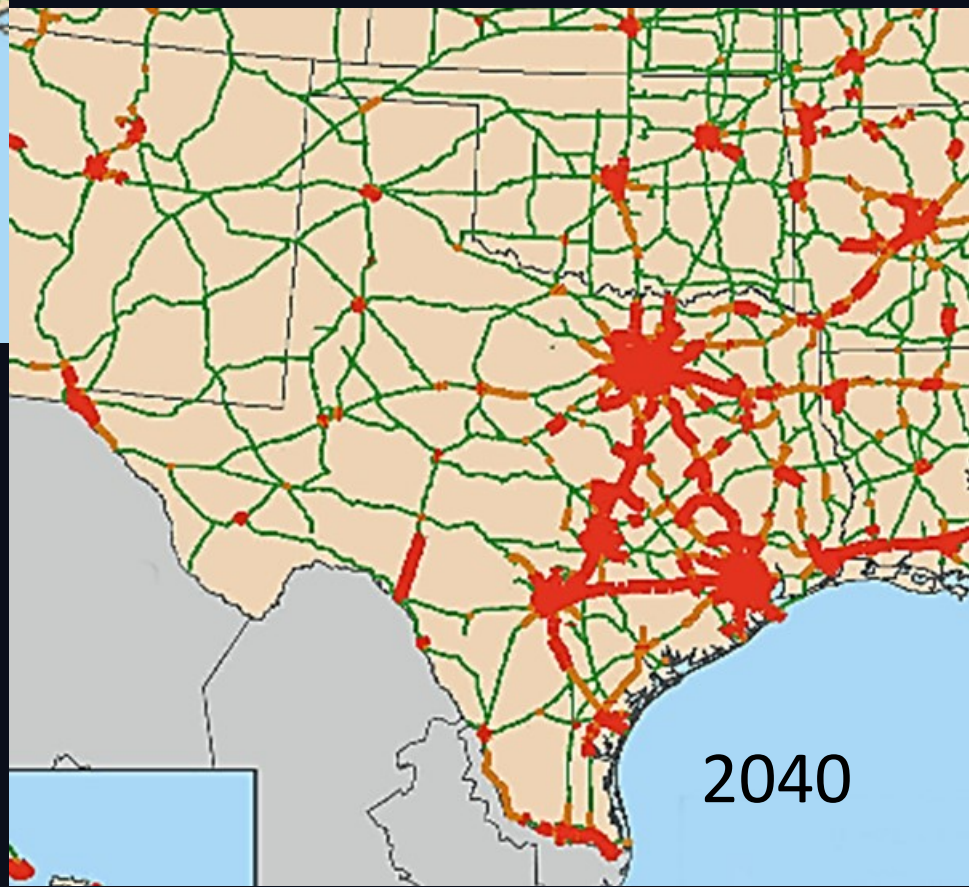


Recurring Peak-Period Congestion

- Uncongested
- Congested
- Highly Congested

Peak-Period Congestion on NHS





Recurring Peak-Period Congestion

- Uncongested
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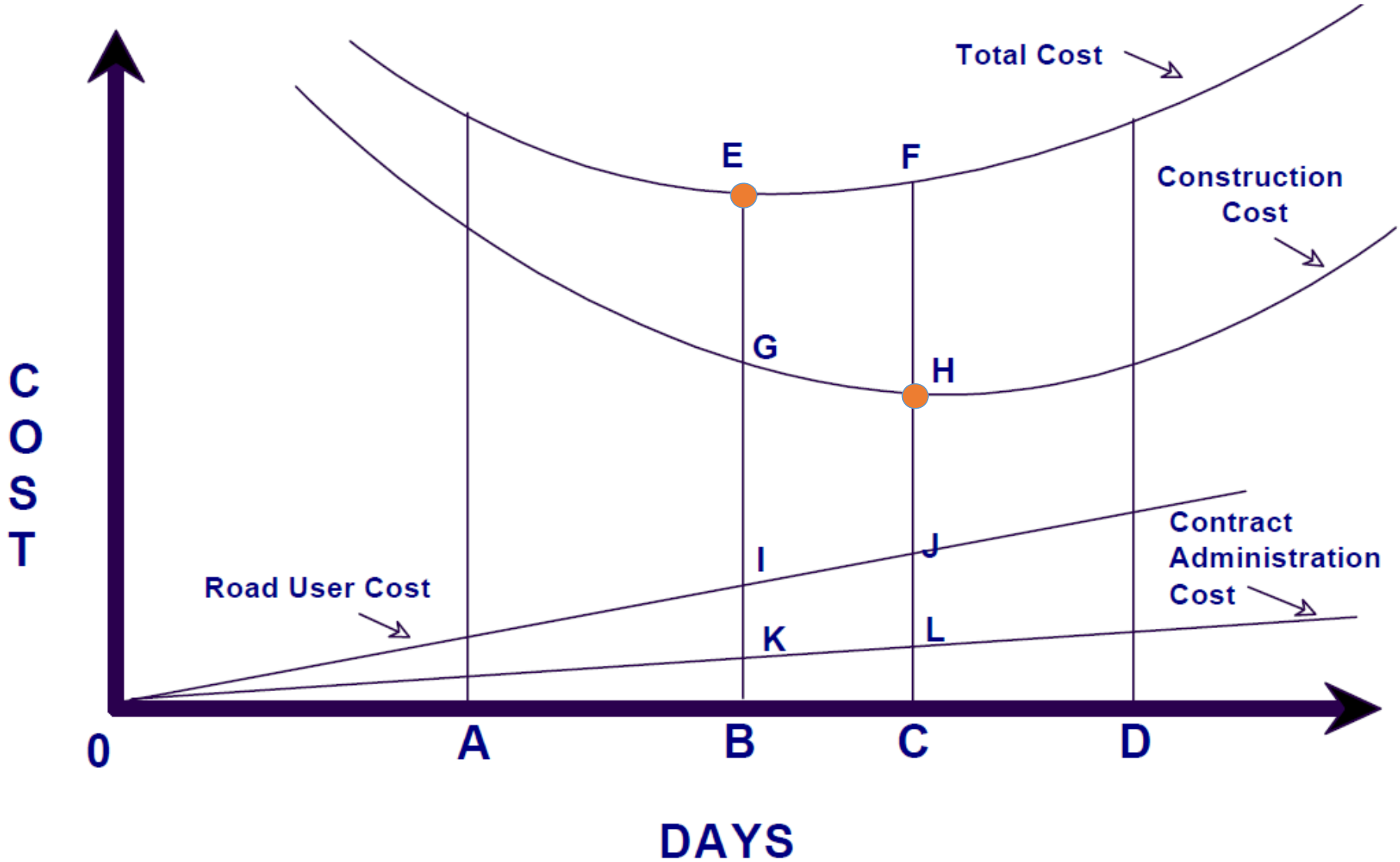
Project Costs by Type, Related to Duration



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

Photo: MaineDOT

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

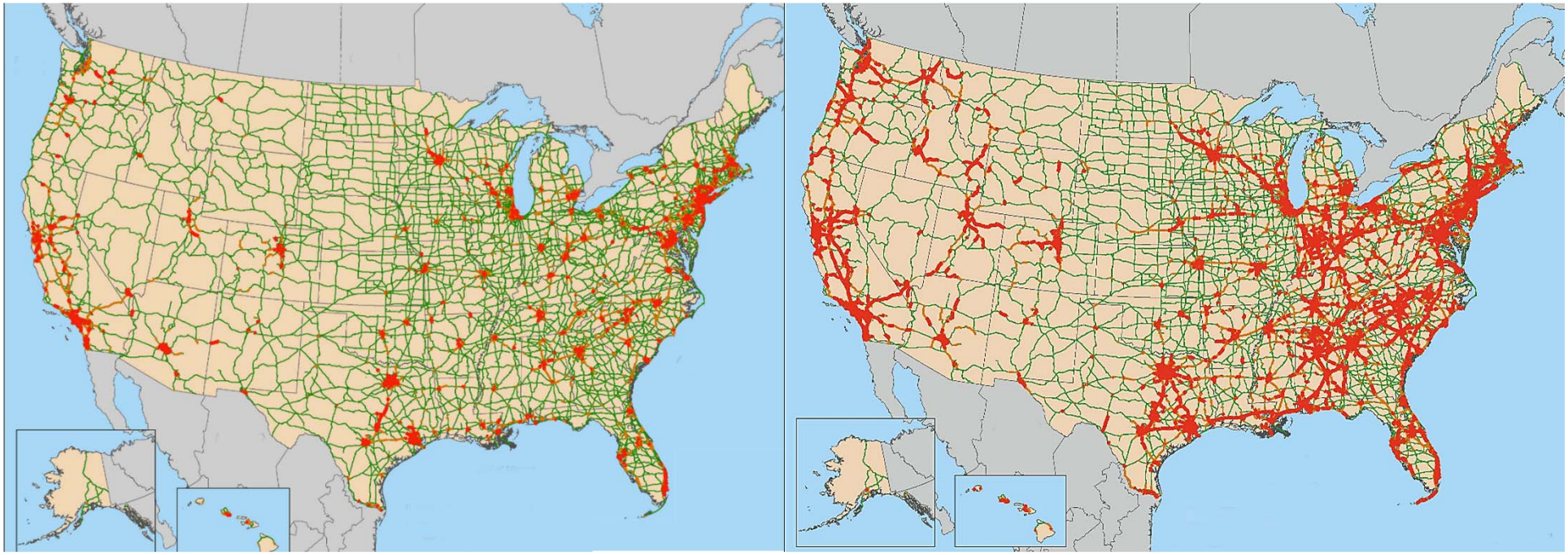
Austin Lamar Blvd. (Anderson et al. 2005)

- 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 Simple!



(a) Year 2011

(b) Year 2040

Recurring Peak-Period Congestion

Uncongested

Congested

Highly Congested

TxDOT Interest in Accelerated Construction

AC-PP-17-03

Randy Hopmann

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

Texas Department of Transportation

Texas A&M Transportation Institute

Outline

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

Project Delivery

Planning & Programming	Preliminary Design	Environmental	ROW Utilities	PS&E

• Need
• Scope
• Cost estimate
• Authorization
• Planning
• Funding
	Design Concept
	• Data Collection
	• Public meetings
	• Schematics
	  • Preliminary
	  • Geometric
	• Value Engineering
		• Preliminary
		• Interagency
		• Documentation
		• Public hearing
		• Clearances
			• Data Collection
			• ROW map
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			• Utility adjustment
				• Design details
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				• Roadway
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				• Bridge
				• Drainage
				• Misc structures
				• Traffic control
				• Review

Letting

Construction

Time

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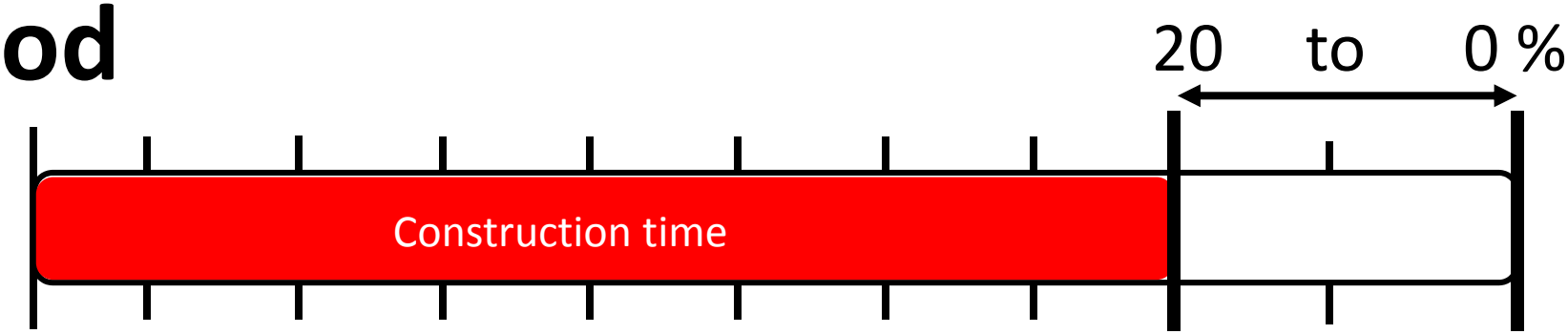
Economic Considerations-Examples

Project	Per Month Costs	Project Costs
Widen FM road from 2-lanes to 4-lanes (2.7 miles)	$ 96,000	$ 3.5M
Widen Freeway (2.6 miles)	$297,000	$17.8M
Interchange in urban area (1.5 miles)	$447,000	$ 5.1M

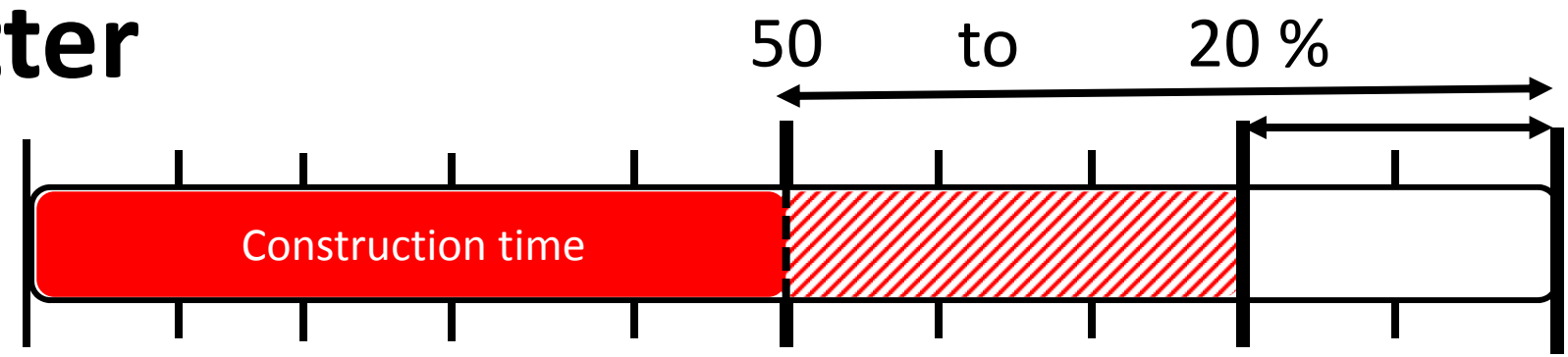
Acceleration Goals

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

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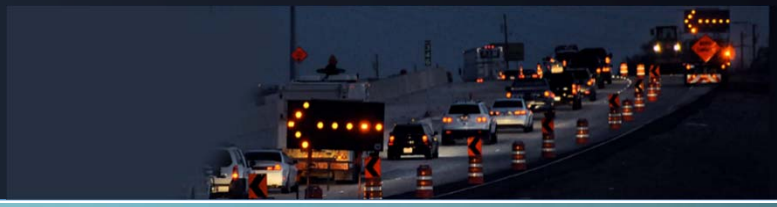

Not for every project

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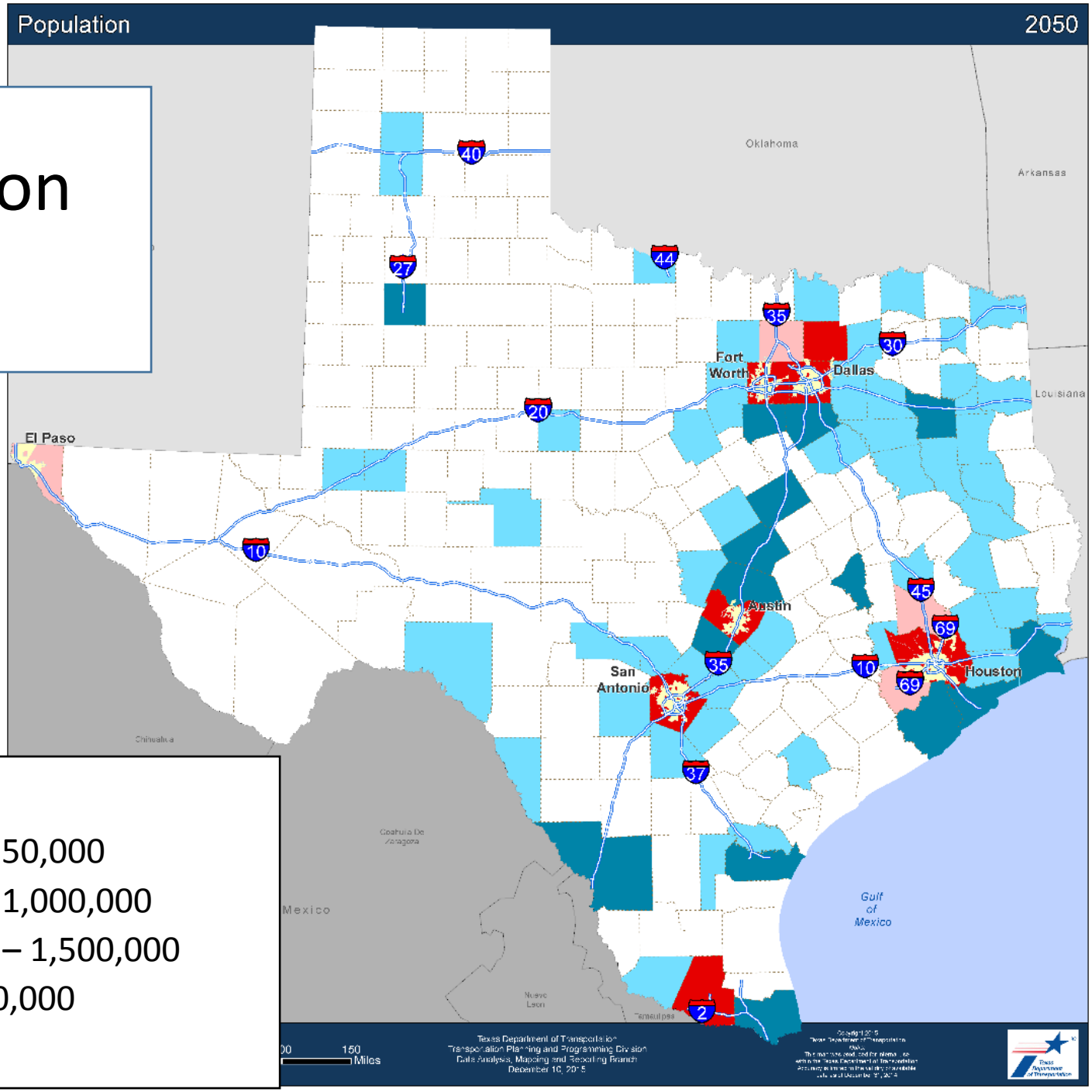
Population 2050



- 1 - 50,000
- 50,000 – 250,000
- 250,000 – 1,000,000
- 1,000,000 – 1,500,000
- Over 1,500,000

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2017 Unified Transportation Program (UTP)

2017–2026

Transportation Planning & Programming

Unified Transportation Plan

Texas A&M Transportation Institute

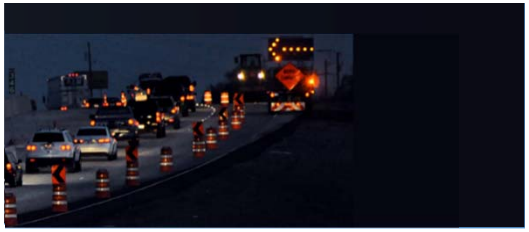
We Build Texas

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.



We
Build
Texas

Workforce

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Outline

- Background
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- **Texas History**
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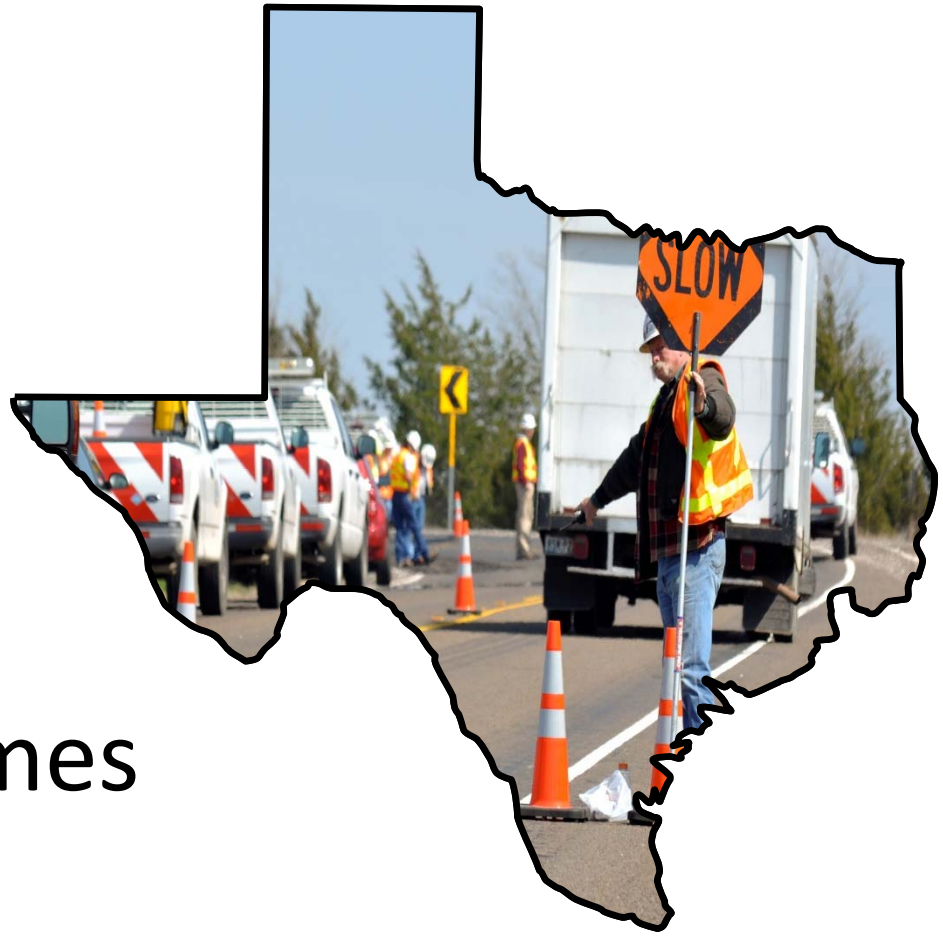
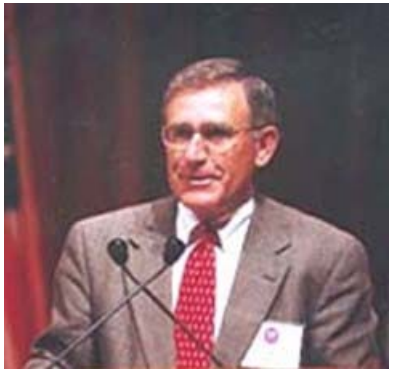


- 1998 – Heald
  - Legislators – TxDOT & User Costs for Liquidated Damage
  - Commission – Reduce Construction Time
  - Incentives/disincentives
- 2001 – Johnson's "Transportation Working Group"
  - Reduce project delivery time by 15% by 2006
  - Address cost of disruption of traffic
- 2002 – Saenz
  - Accelerated construction – Businesses & traffic flow impacted
  - Calendar day definition of working day
  - Milestones for incentives/disincentives
  - Lane rental
  - A+B



Wes Heald

- 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

Amadeo Saenz

Katy Freeway (IH-10)

- Traditional construction – 12 years
- Accelerated construction – 6 years

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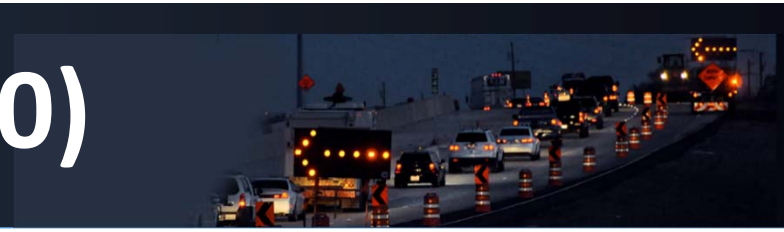
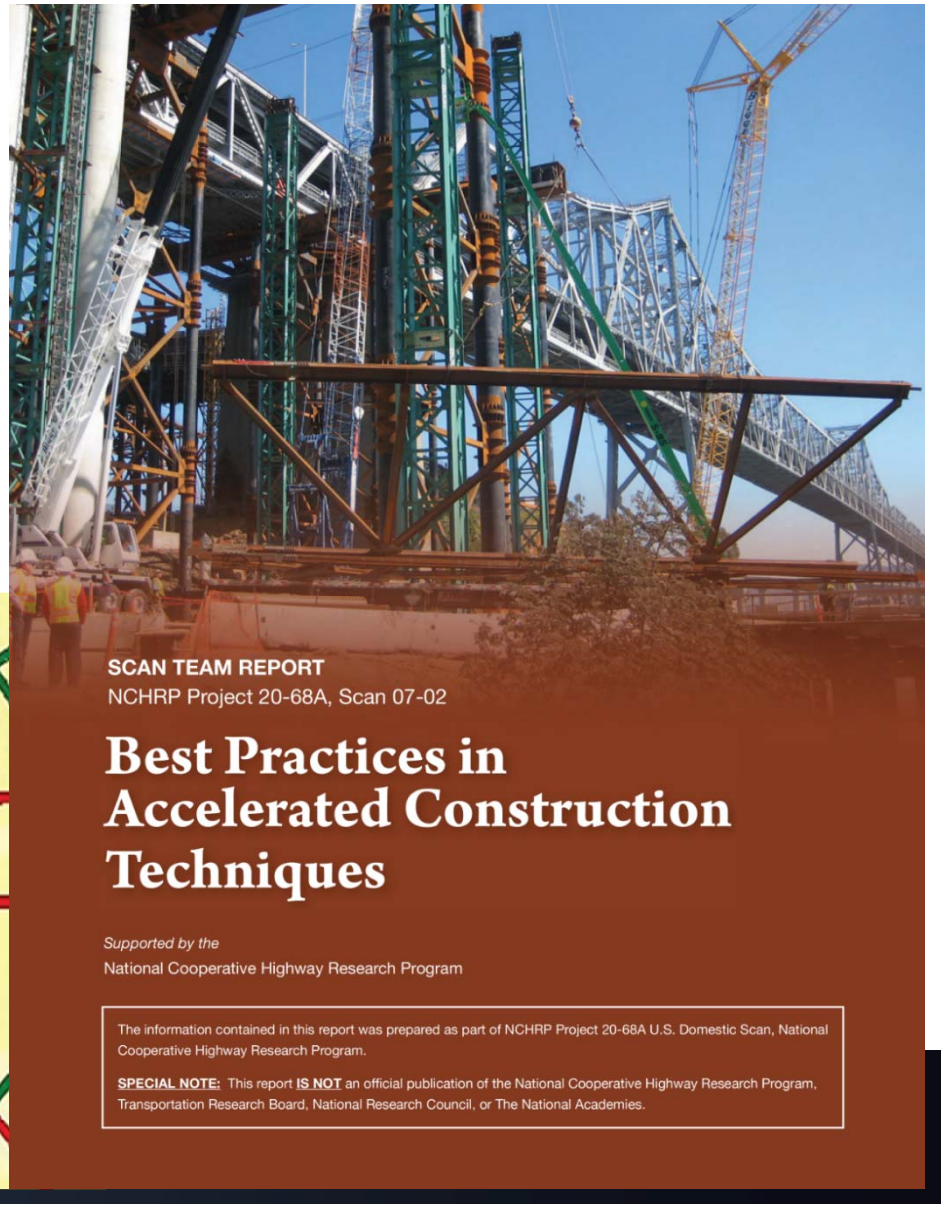
Katy Freeway (IH-10)



- 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

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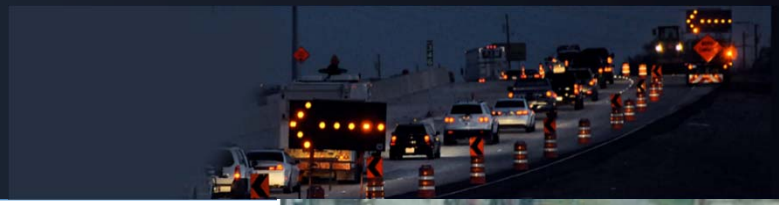
Materials



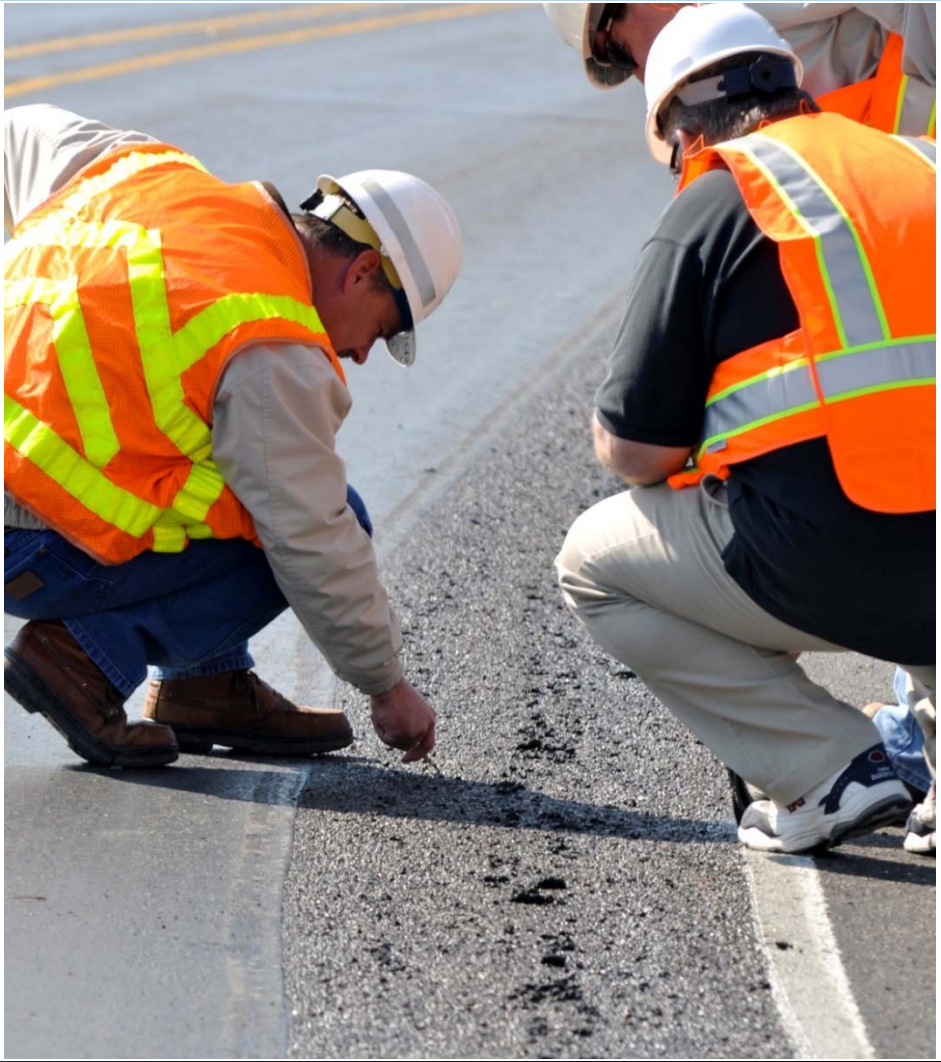
- Strength gain (time, temp)
- Removal
- Production
- Transportation
- Placement

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

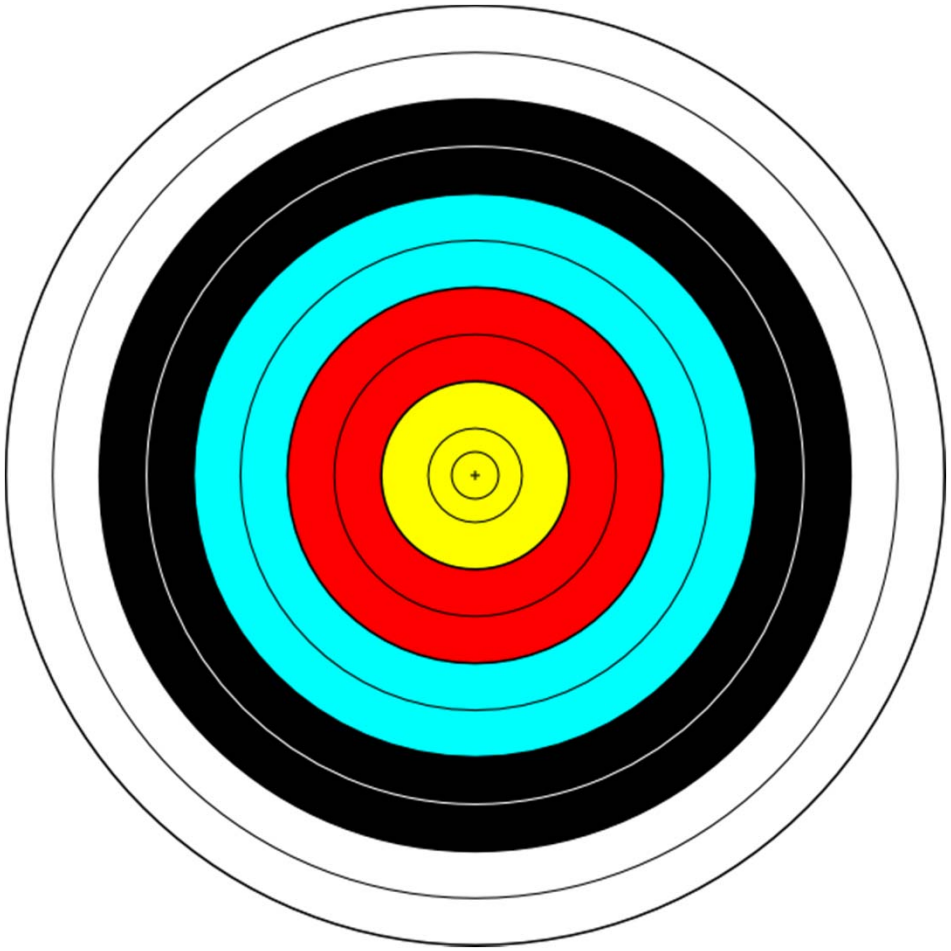
- Consider accelerated construction in planning stage
- Isolate construction work from traffic
- Reuse existing materials on site
- Maintain lane closure as long as possible
- Innovative approaches to traffic handling

Outline

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

Workshop Goals

- Information sharing
- Existing TxDOT "tools"
- Identify needed "tools" & "policies"



CAUTION

Not All Projects Are Suitable for Accelerated Construction

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District Workshops on
Accelerated Construction

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

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District Workshops on Accelerated Construction

Economic Screening Tools

AC-PP-17-04

David Ellis

Brianne Glover

Austin, San Antonio

Embassy Suites, San Marcos

August 1, 2017

Texas Department of Transportation

Texas A&M Transportation Institute

Project Level Economic Screening Tool

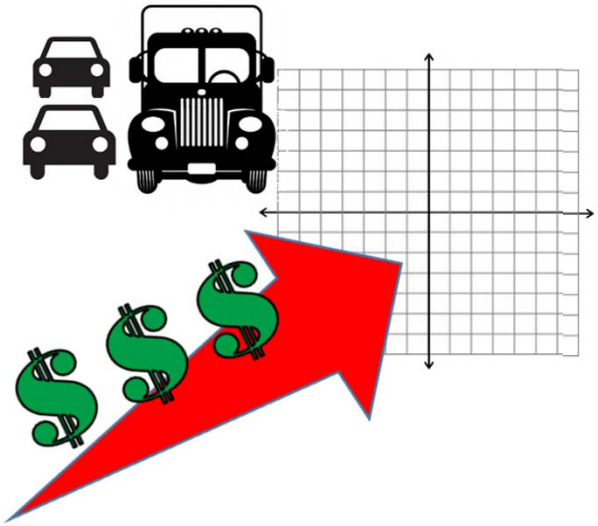
- Benefit-Cost tool
- Focus – road user costs and economic losses

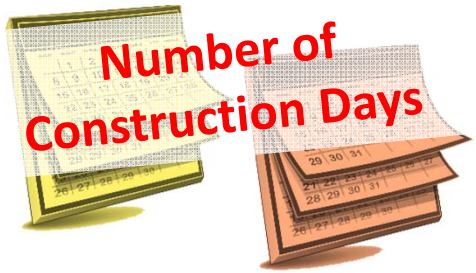
Economic Impact

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

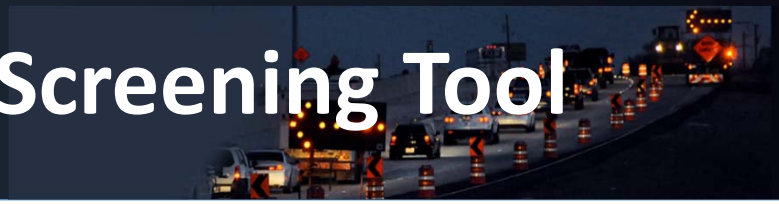
Suburban

- Areas adjacent to major metropolitan and urban areas

Rural

- Areas outside of urban and suburban areas

Project Level Economic Screening Tool



Preconstruction Conditions

Project Parameters	Values
Average Operating Speed	50
Segment Length (miles)	6.0
Pre Construction ADT	215,000
Percent Trucks	15%
Project Region	Urban
Retail (SQFT)	2,000,000
Travel Time per Trip (minutes)	7.2

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
Total Project Period (calendar days)	900
Percent of ADT that is Traveling During Peak Periods	75%

Accelerated Construction Parameters	Values
Added Cost of Accelerate Construction	$200,000,000
Added Cost of Incentives	
Total Project Period (calendar days)	365
Percent of ADT that is Traveling During Peak Periods	75%

Traditional Construction Scenario	Values
Automobile Travel Time Value	$331,828,313
Truck Travel Time Value	$102,219,084
Total Travel Time Value	**$434,047,397**
Automobile Operating Cost	$99,277,110
Truck Operating Cost	$78,576,480
Total Operating Cost	**$177,853,590**

Accelerated Construction Scenario	Values
Automobile Travel Time Value	$134,574,816
Truck Travel Time Value	$41,455,517
Total Travel Time Value	**$176,030,333**
Automobile Operating Cost	$40,262,384
Truck Operating Cost	$31,867,128
Total Operating Cost	**$72,129,512**

Preconstruction Conditions	
Project Parameters	**Values**
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Segment Length (miles)	6.0
Pre Construction ADT	215,000
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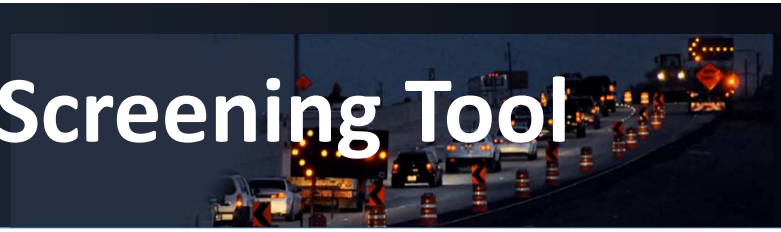
Project Level Economic Screening Tool



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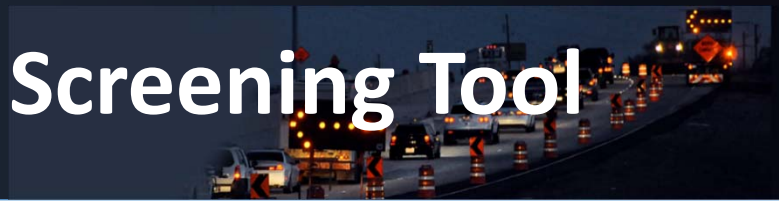
Project Level Economic Screening Tool



Construction Conditions

Traditional Construction Parameters	Values	Accelerated Construction Parameters	Values
Segment 1:		*Segment 1:*	
Days	450	Days	180
Segment Length	3	Segment Length	3
Average Operating Speed (Peak)	10	Average Operating Speed (Peak)	10
Average Operating Speed (Off-Peak)	45	Average Operating Speed (Off-Peak)	45
Percent of Traffic Diverted	20%	Percent of Traffic Diverted	20%
Segment 2:		*Segment 2:*	
Days	450	Days	185
Segment Length	3	Segment Length	3
Average Operating Speed (Peak)	10	Average Operating Speed (Peak)	10
Average Operating Speed (Off-Peak)	45	Average Operating Speed (Off-Peak)	45
Percent of Traffic Diverted	20%	Percent of Traffic Diverted	20%
Segment 3:		*Segment 3:*	
Days		Days	
Segment Length		Segment Length	
Average Operating Speed (Peak)		Average Operating Speed (Peak)	
Average Operating Speed (Off-Peak)		Average Operating Speed (Off-Peak)	
Percent of Traffic Diverted		Percent of Traffic Diverted	
Segment 4:		*Segment 4:*	
Days		Days	
Segment Length		Segment Length	
Average Operating Speed (Peak)		Average Operating Speed (Peak)	
Average Operating Speed (Off-Peak)		Average Operating Speed (Off-Peak)	
Percent of Traffic Diverted		Percent of Traffic Diverted	

Construction Conditions

Traditional Construction Parameters	Values
Segment 1	
Days	450
Segment Length	3
Average Operating Speed (Peak)	10
Average Operating Speed (Off-Peak)	45
Percent of Traffic Diverted	20%

Accelerated Construction Parameters	Values
Segment 1	
Days	180
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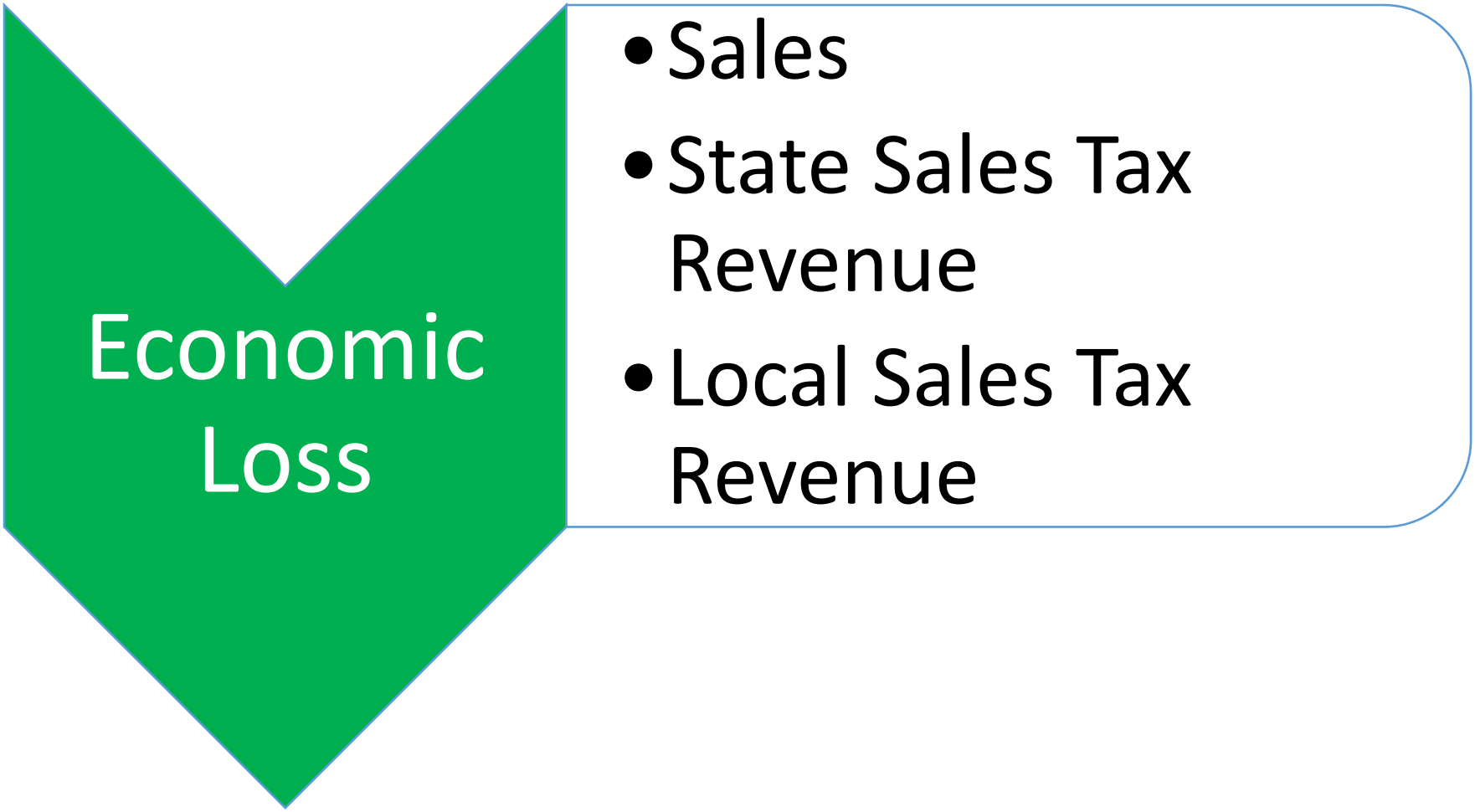
Average Operating Speed (Peak)	10
Average Operating Speed (Off-Peak)	45
Percent of Traffic Diverted	20%

Construction Conditions

Traditional Construction Parameters	Values
Segment 2	
Days	450
Segment Length	3
Average Operating Speed (Peak)	10
Average Operating Speed (Off-Peak)	45
Percent of Traffic Diverted	20%

Accelerated Construction Parameters	Values
Segment 2	
Days	185
Segment Length	3
Average Operating Speed (Peak)	10
Average Operating Speed (Off-Peak)	45
Percent of Traffic Diverted	20%

Project Level Economic Screening Tool



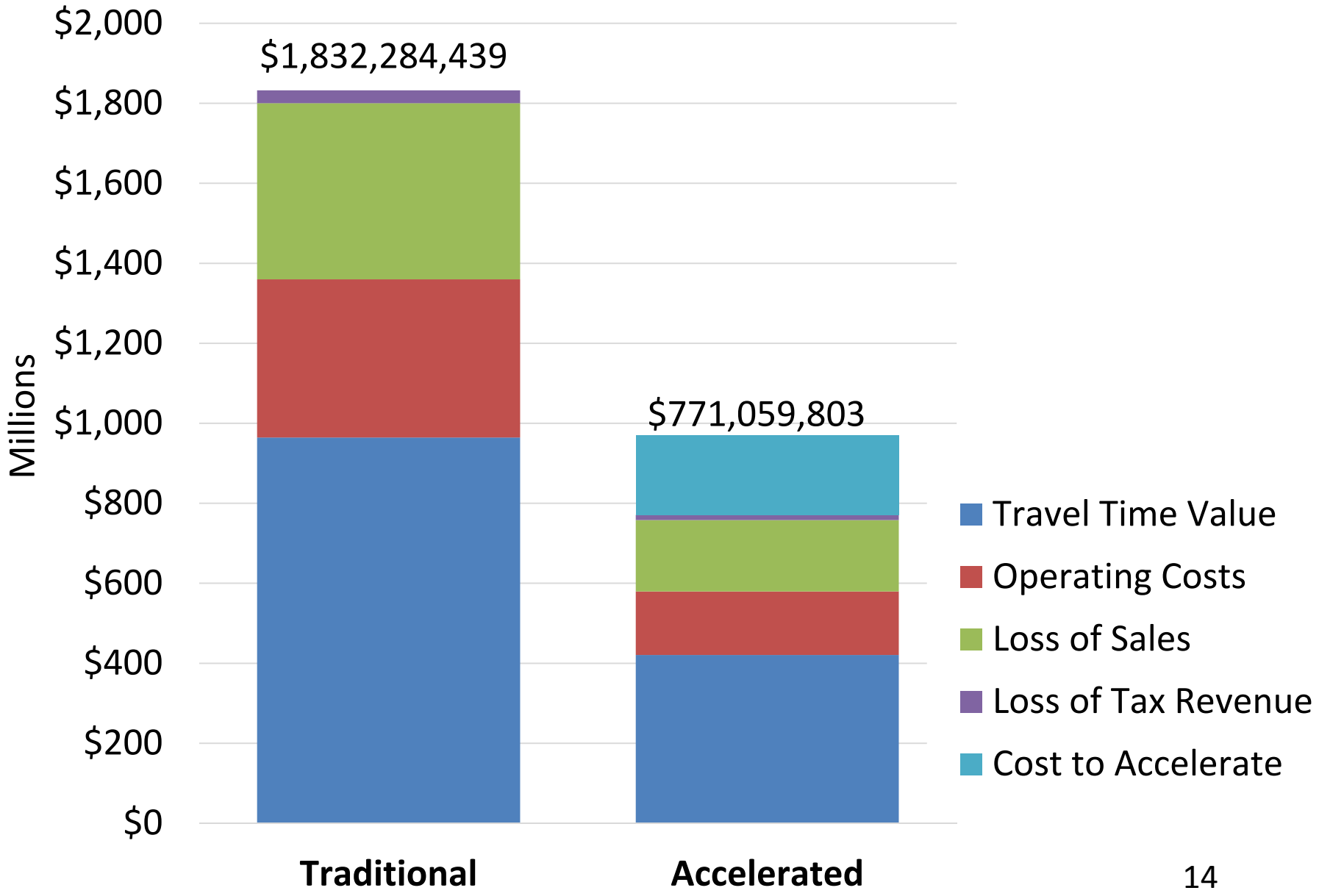
Results

Traditional Construction Tools	Values
Total Road User Costs and Economic Loss	$1,832,284,439

Accelerated Construction Tools	Values
Total Road User Costs and Economic Loss	$ 771,059,803

Traditional vs Accelerated	Values
Change in Road User Costs and Economic Loss	$1,061,224,636
Road User Cost and Economic Daily Cost	$ 1,983,597
B/C of Accelerated construction	5.31

Estimated User Costs and Economic Losses



District Workshops on
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Embassy Suites, San Marcos
August 1, 2017

Texas Department of Transportation

Texas A&M Transportation Institute

District Workshops on Accelerated Construction

Project Development

AC-PP-17-05

Tracy Cain

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

Texas Department of Transportation

Texas A&M Transportation Institute

OUTLINE

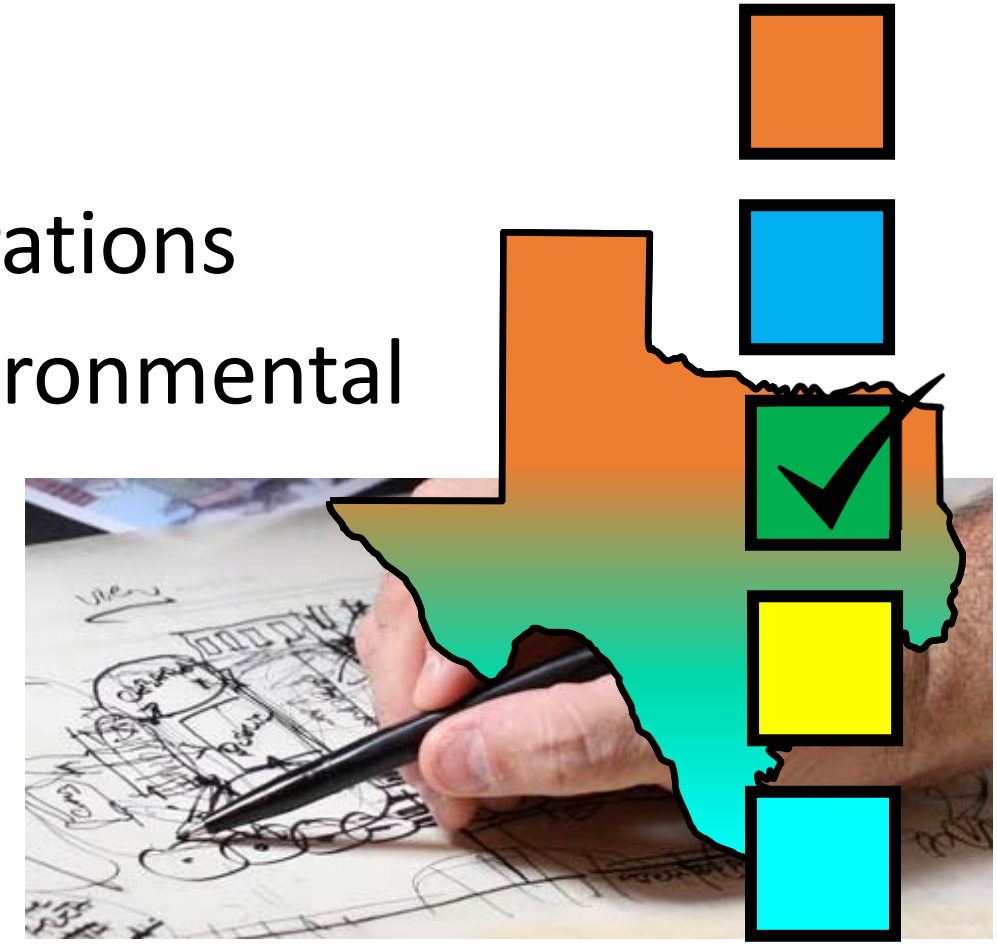
- Project Selection and Planning
- Contracting Methods
- Design
- Contractor Selection
- Involvement of Contractor
- Construction Considerations

TxDOT RESOURCES

- 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



PROJECT SELECTION & PLANNING

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

PROJECT SELECTION & PLANNING

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

PROJECT SELECTION & PLANNING

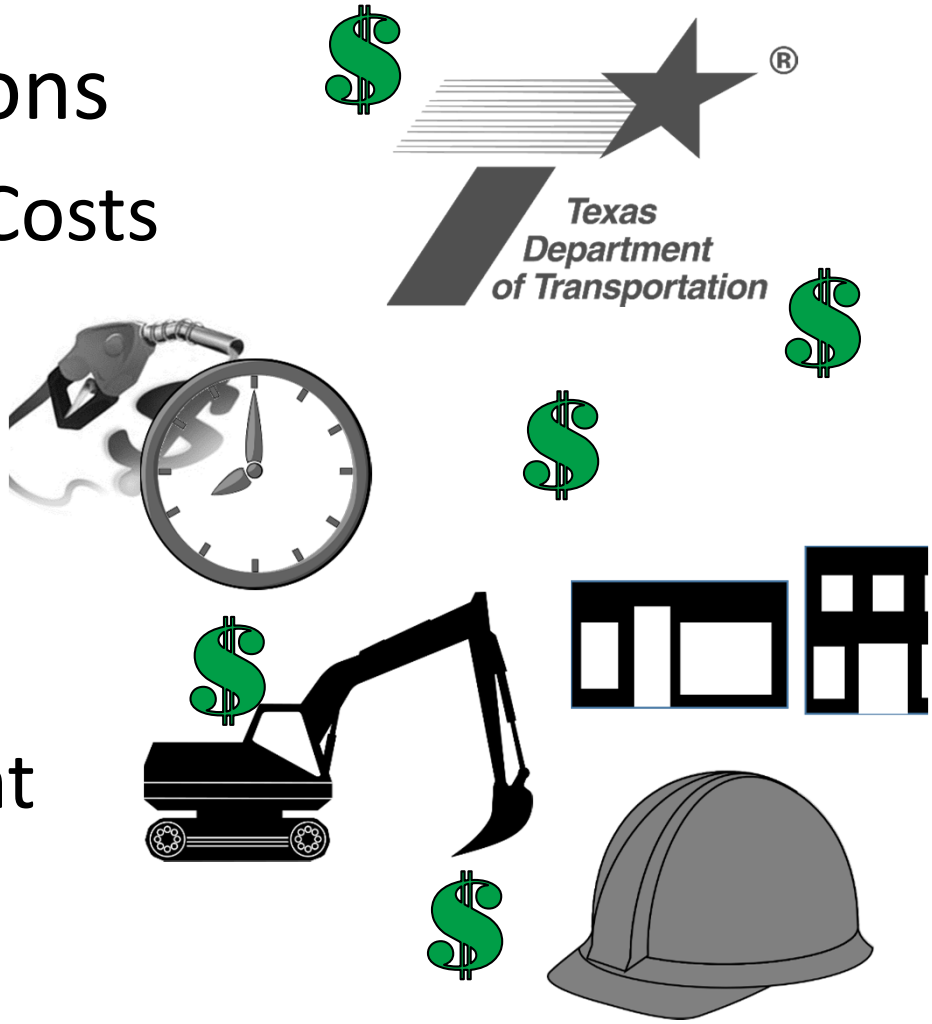
General Guidelines

- Rural areas
  - Impact on small towns traffic flow
  - Impact on small town businesses
  - Intersections
- Key transportation routes for major industries
  - Energy development
  - Agriculture
  - Mining

PROJECT SELECTION & PLANNING

Economic Considerations

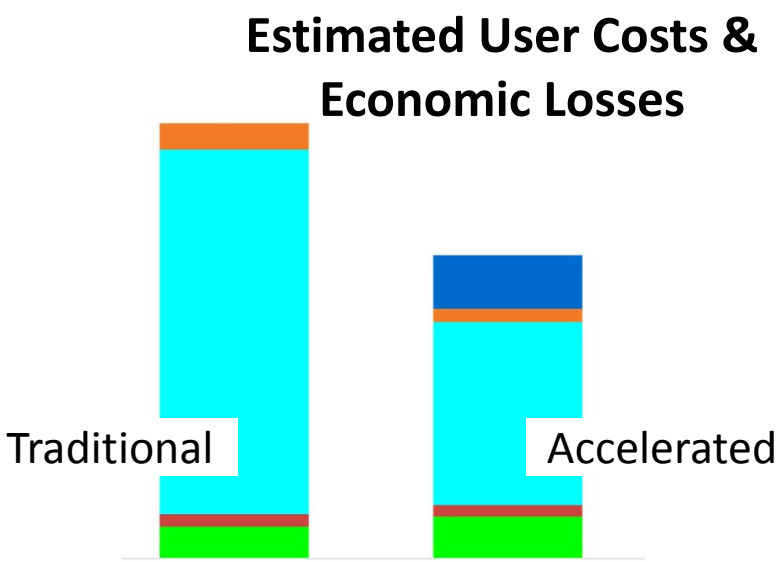
- Agency Administrative Costs
- Road User Costs
- Non-User Costs (adjacent businesses)
- Construction Costs
- Contractor Management Costs



PROJECT SELECTION & PLANNING

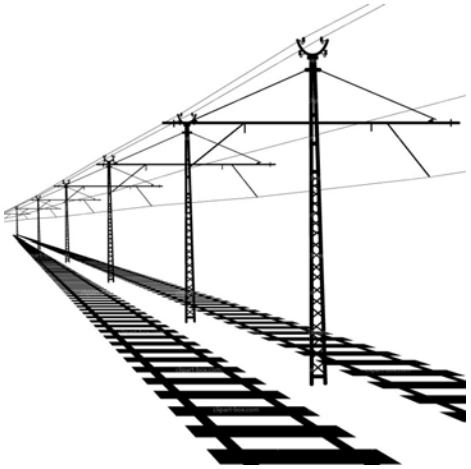
Calculation Tools

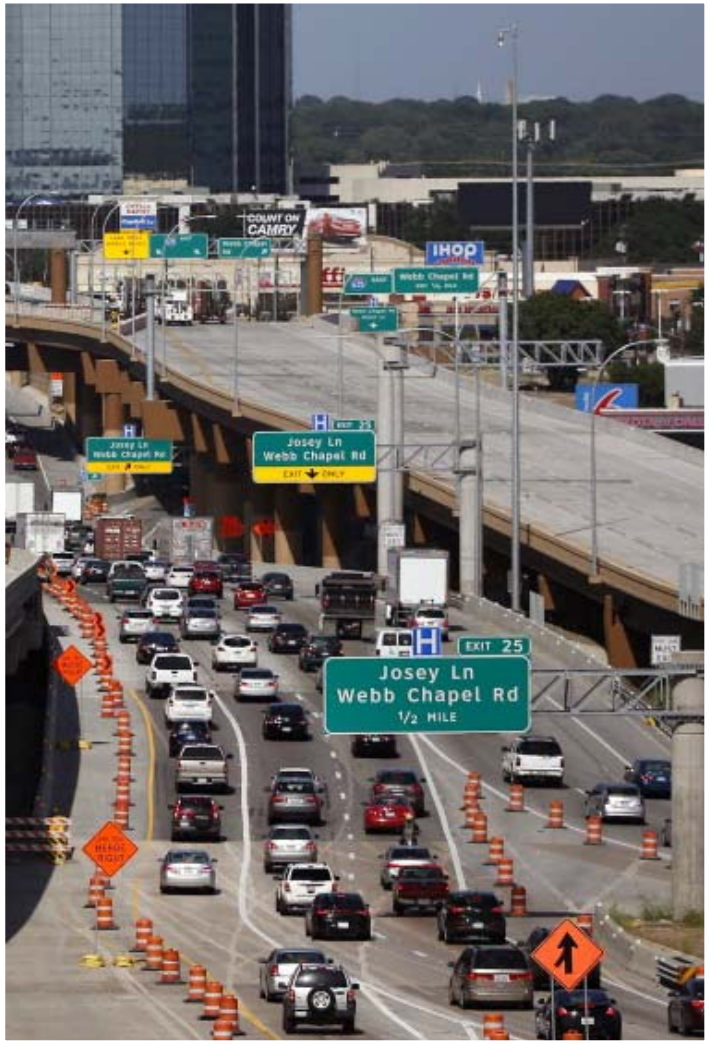
- TxDOT Road User Cost Calculator
- Project Level Economic Screening Tool



PROJECT SELECTION & PLANNING

- ROW
- Utilities
- Environmental
- Historical Preservation
- Archeology
- Railroad

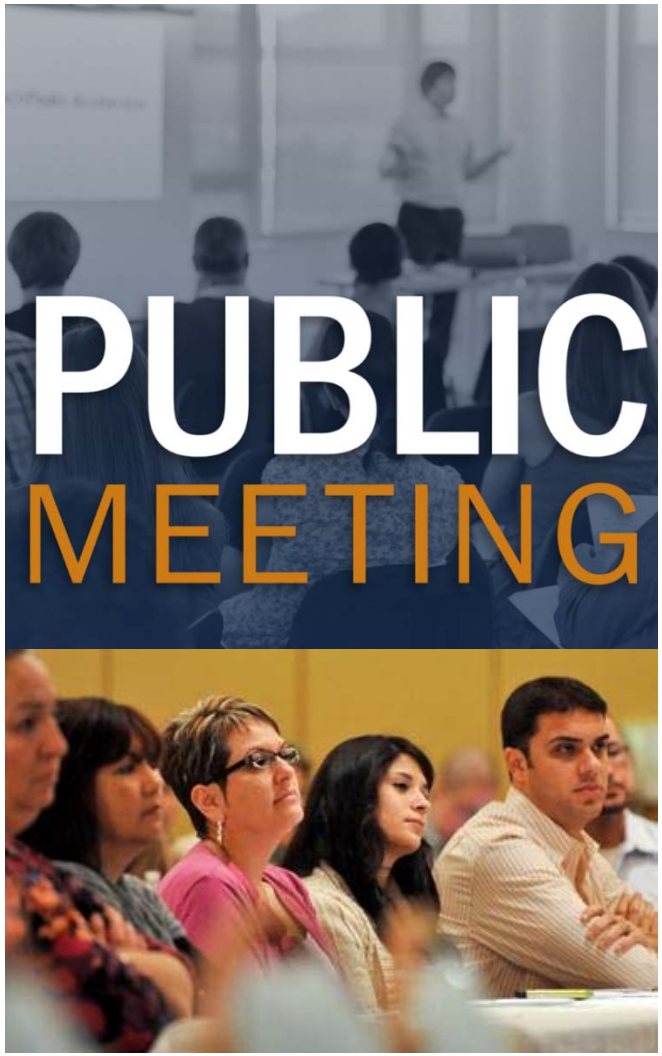




PROJECT SELECTION & PLANNING

Public Information

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



Contracting Methods

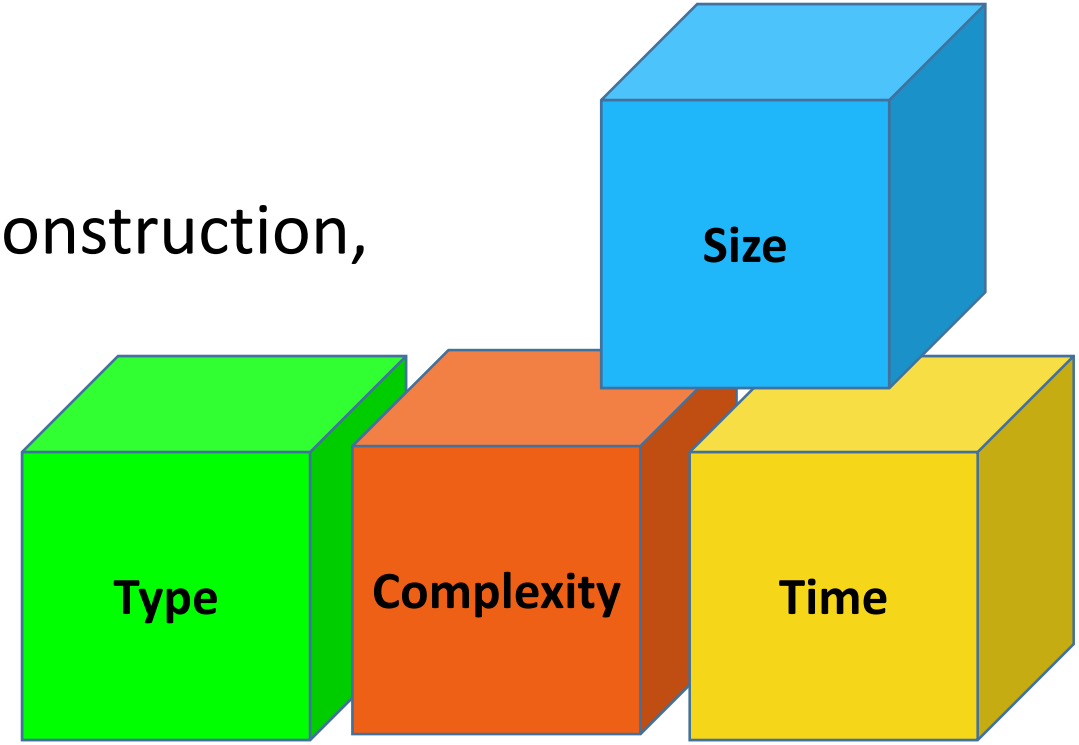
TxDOT Guides

- 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

Contracting Methods

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

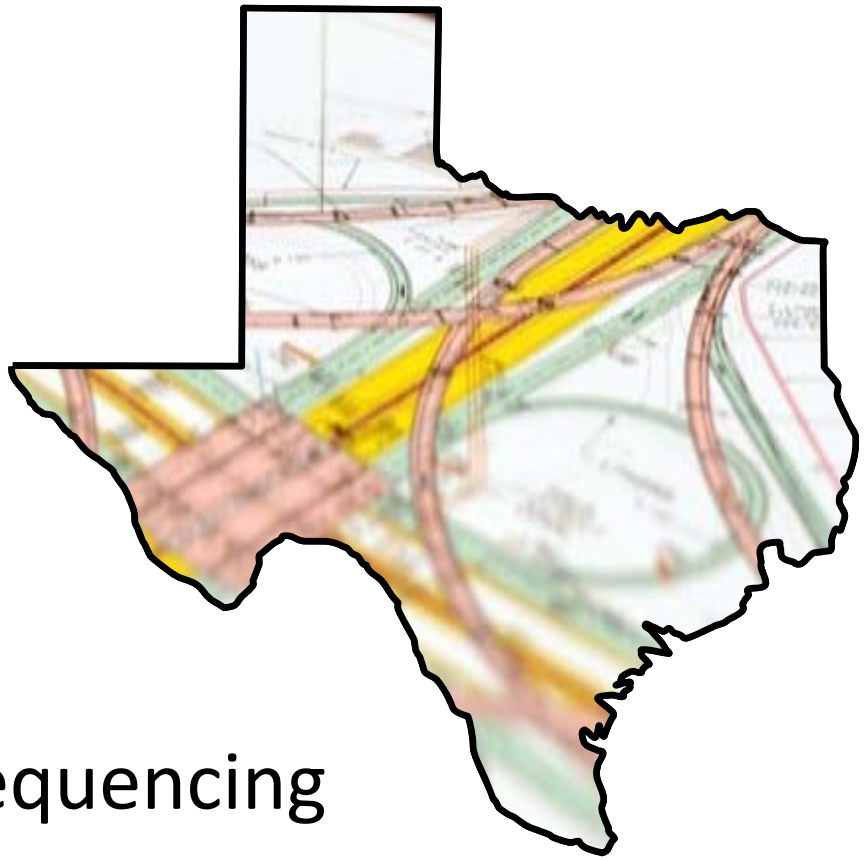
A+B Contracting

- 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

A + B

DESIGN

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



DESIGN

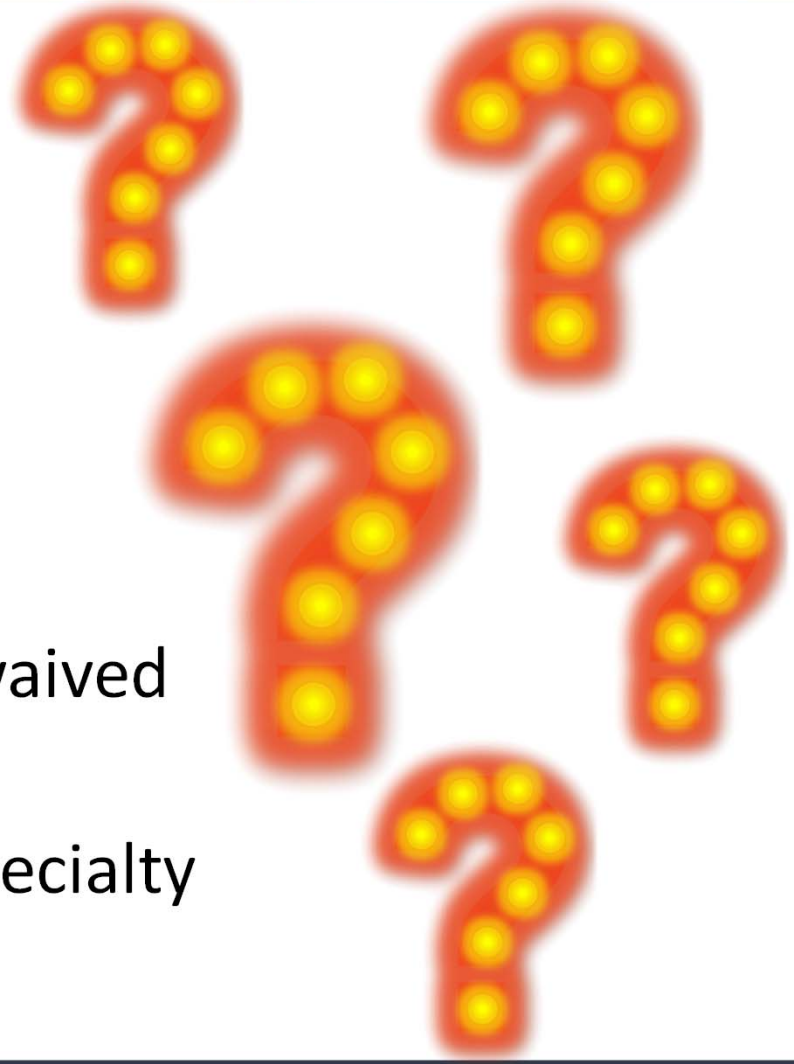
Traffic Control and Job Sequencing

- 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

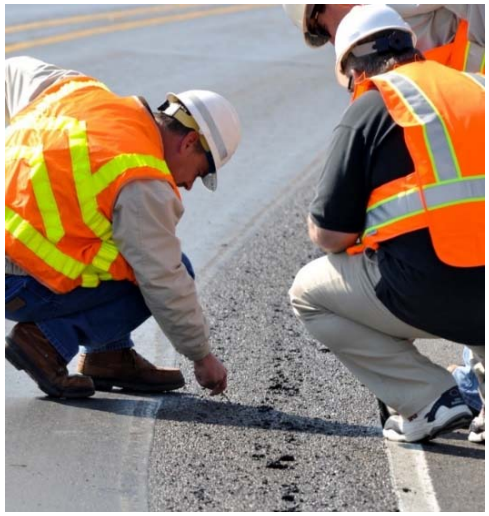
- Confidential Questionnaire
  - Audited financial statement
  - Completion of questionnaire
- Bidder's Questionnaire
  - Confidential questionnaire waived
  - Smaller projects, routine maintenance, emergency, specialty projects



Contractor Selection

Possible Future Considerations

- Quality
- Past performance
- Safety
- Special technical capabilities
- Key personnel



Involvement of Contractor

- Planning and Design Reviews
- Partnering
- Workforce

INVOLVEMENT OF CONTRACTOR

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

INVOLVEMENT OF CONTRACTOR

Partnering

- 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

INVOLVEMENT OF CONTRACTOR

Workforce

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

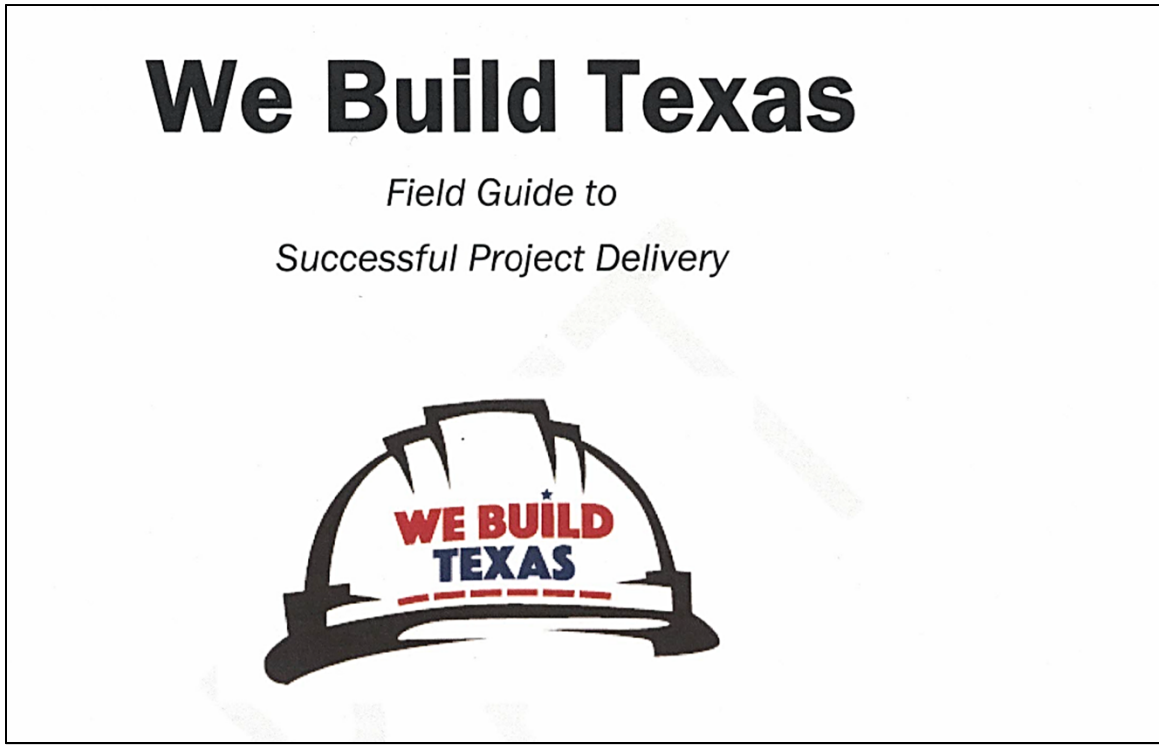
CONSTRUCTION CONSIDERATIONS

- 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



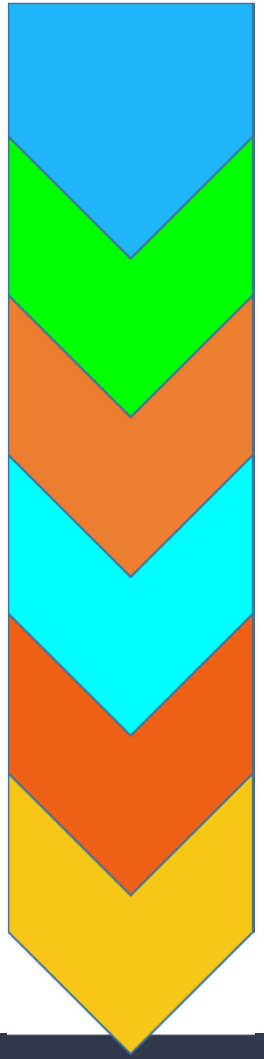
CONSTRUCTION CONSIDERATIONS

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
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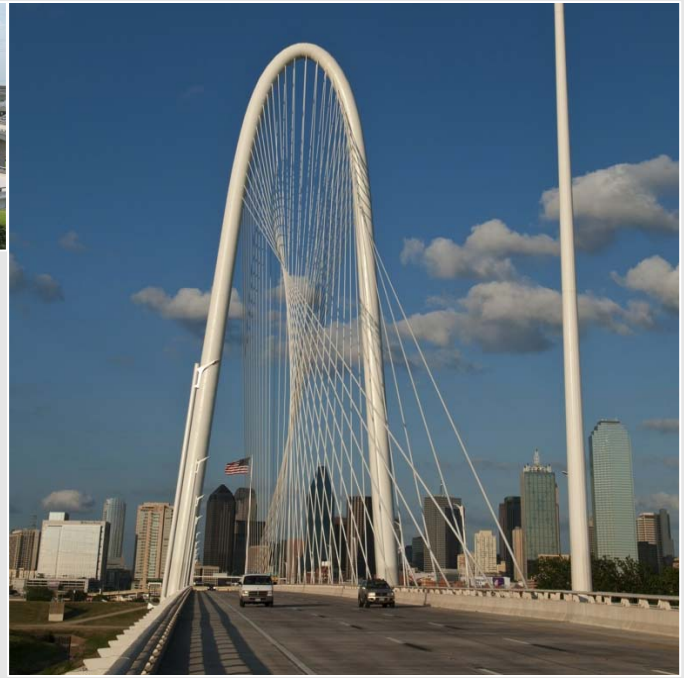
TEXAS DEPARTMENT OF TRANSPORTATION

ACCELERATED BRIDGE CONSTRUCTION IN TEXAS (AND BEYOND)



Gregg Freeby – Bridge Division

Eddie Reyes – San Antonio District

Accelerated Bridge Construction (ABC) Techniques

1. Prefabricated Elements
2. Self Propelled Modular Transporters (SPMTS)
3. Modular Units
4. Lateral Slide-in Bridge Construction-Single Shaft Foundations

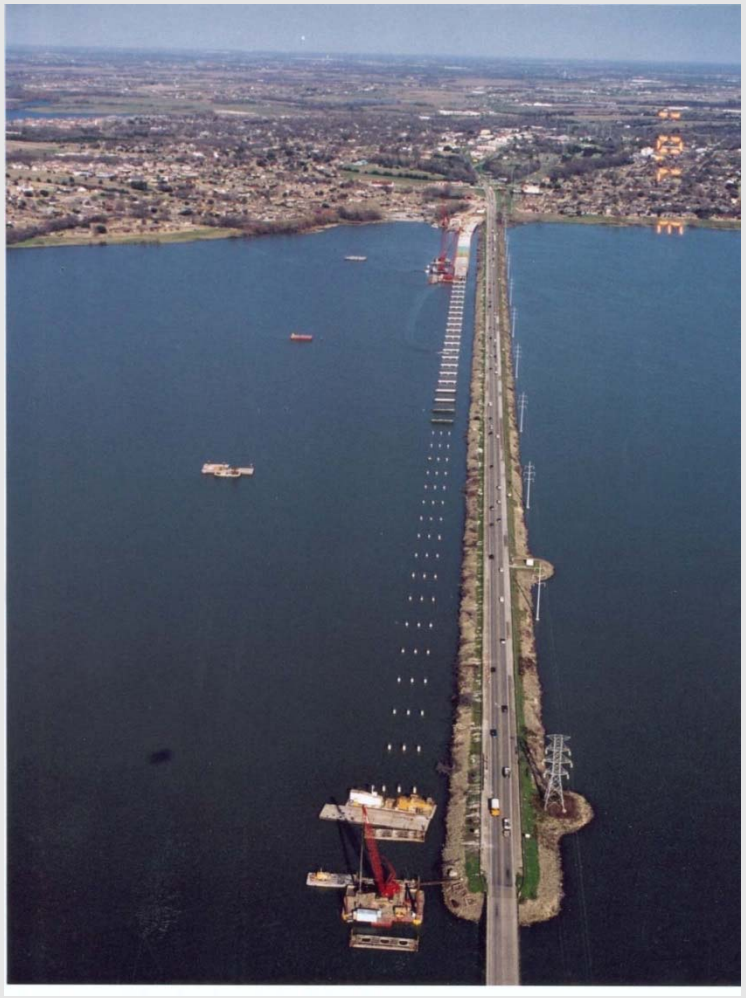
Photo Courtesy of FHWA

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

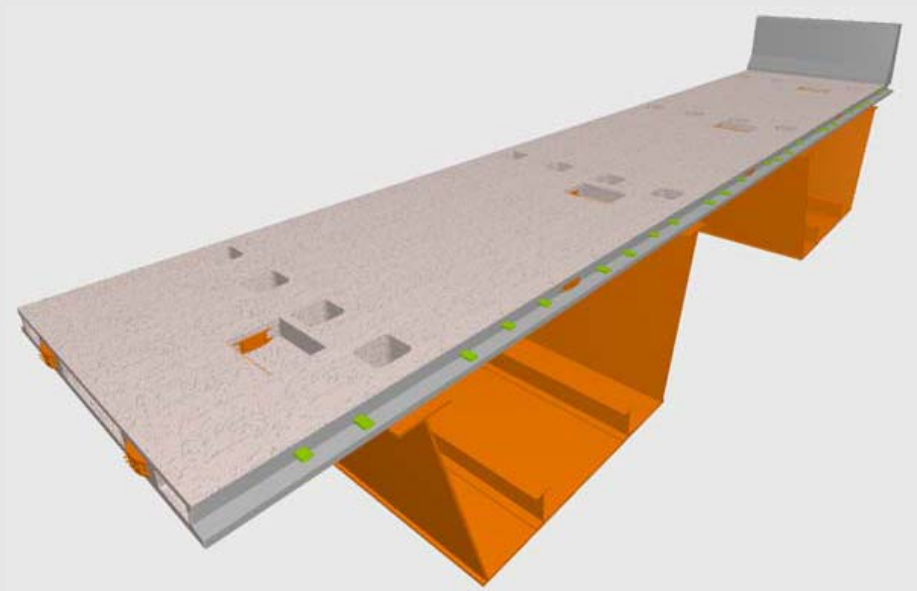
Moving Forward

- 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 typically do not really constitute “Accelerated Bridge Construction.”
- Now lets talk fast!

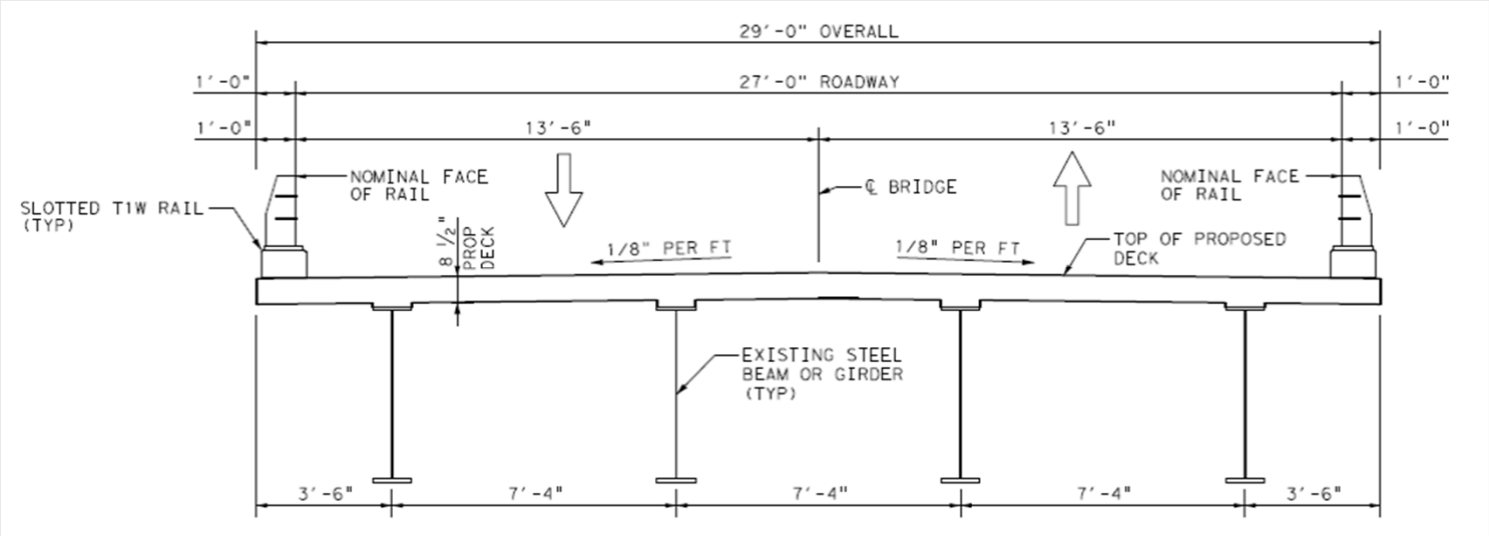
Decked Slab Beams

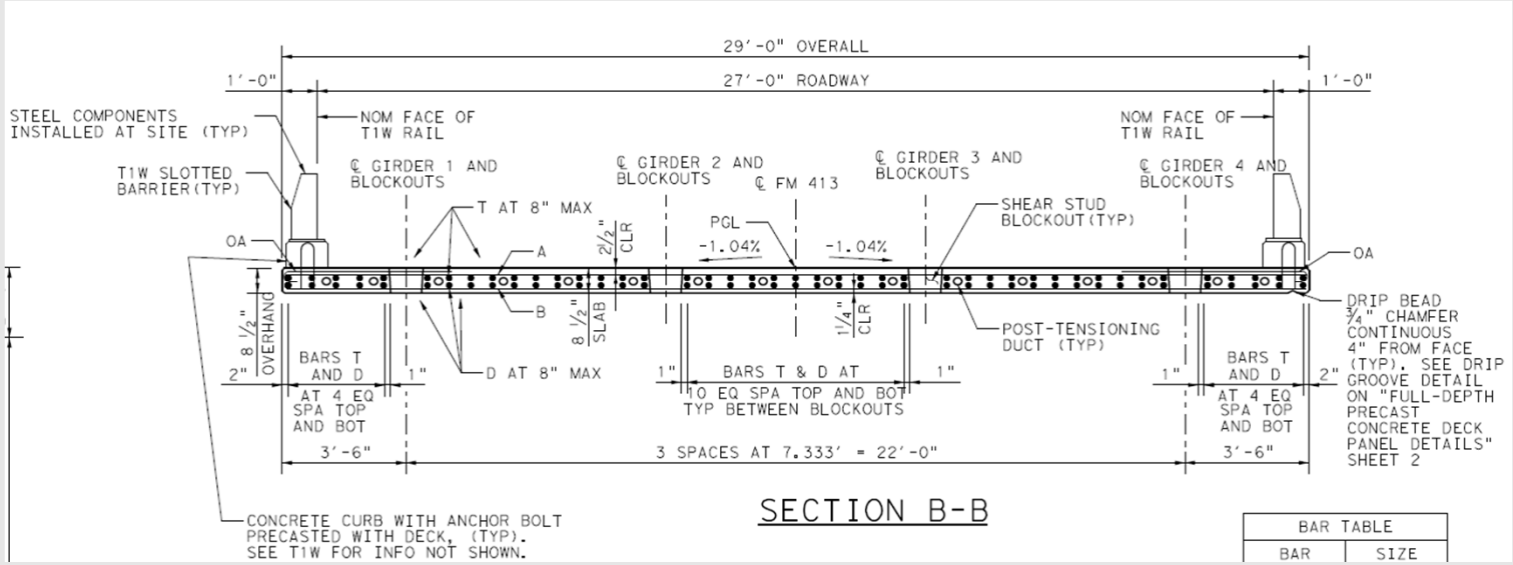
Decked Slab Beams: 6 – 10 Day Construction Projects

Full Width, Full Depth Panels



Full Width, Full Depth Panels – Upcoming Waco Project





Self Propelled Modular Transporters (SPMT)

Photos Courtesy of Heavy Equipment Guide

SPMT – Fort Worth West 7th Street Arches

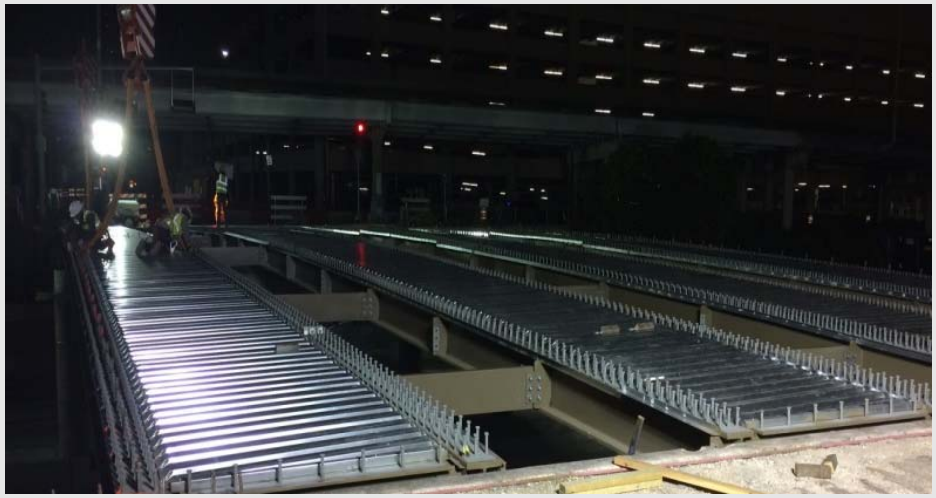
Modular Units

Modular Units – I-93 Fast 14 in Boston

Modular Units – I-93 Fast 14 in Boston

Modular Units (No Deck) – West Dallas St. in Houston

Modular Units – West Dallas St. in Houston

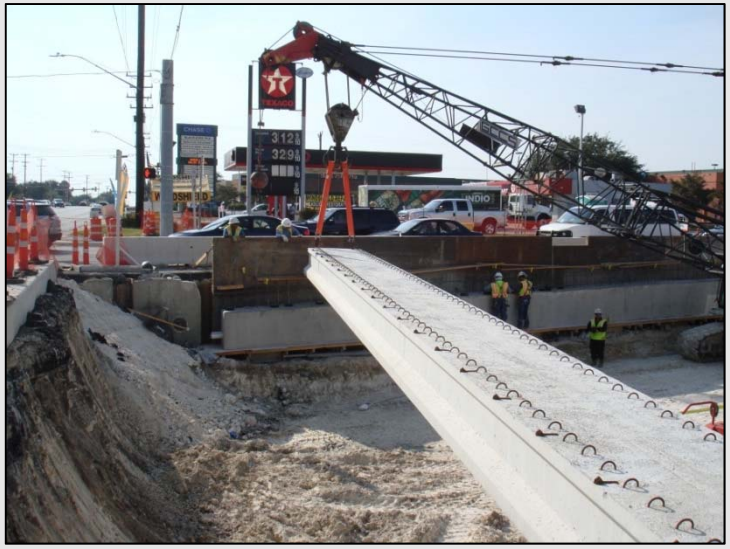


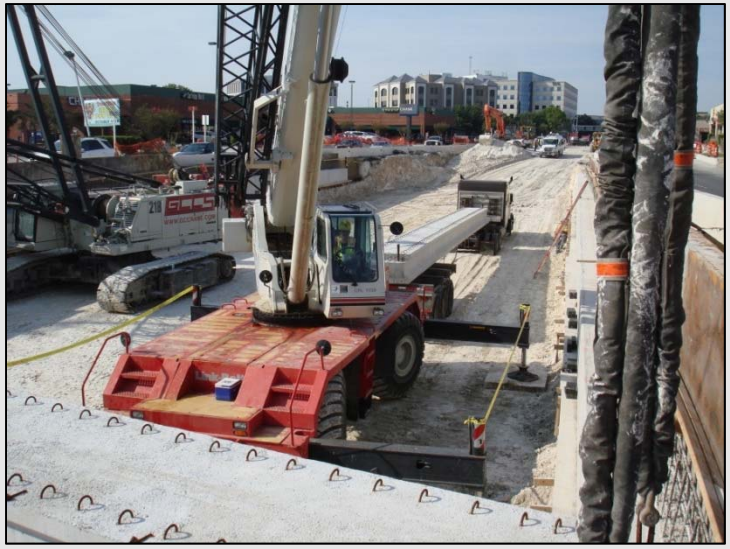
Modular Units – West Dallas St. in Houston

Lateral Slide-in

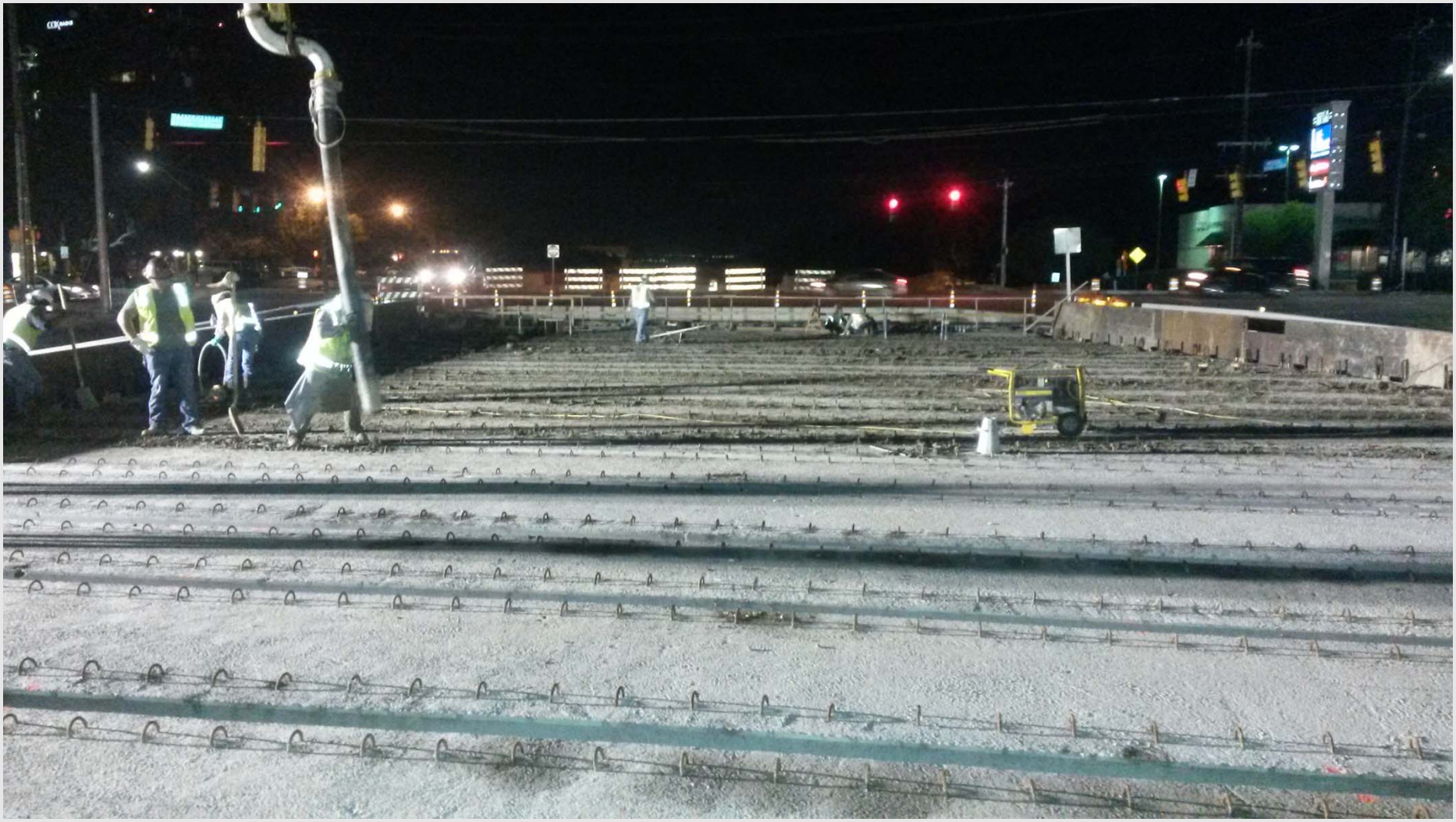
Lateral Slide-in – LP 345 (San Antonio)

Lateral Slide-in – LP 345 (San Antonio)

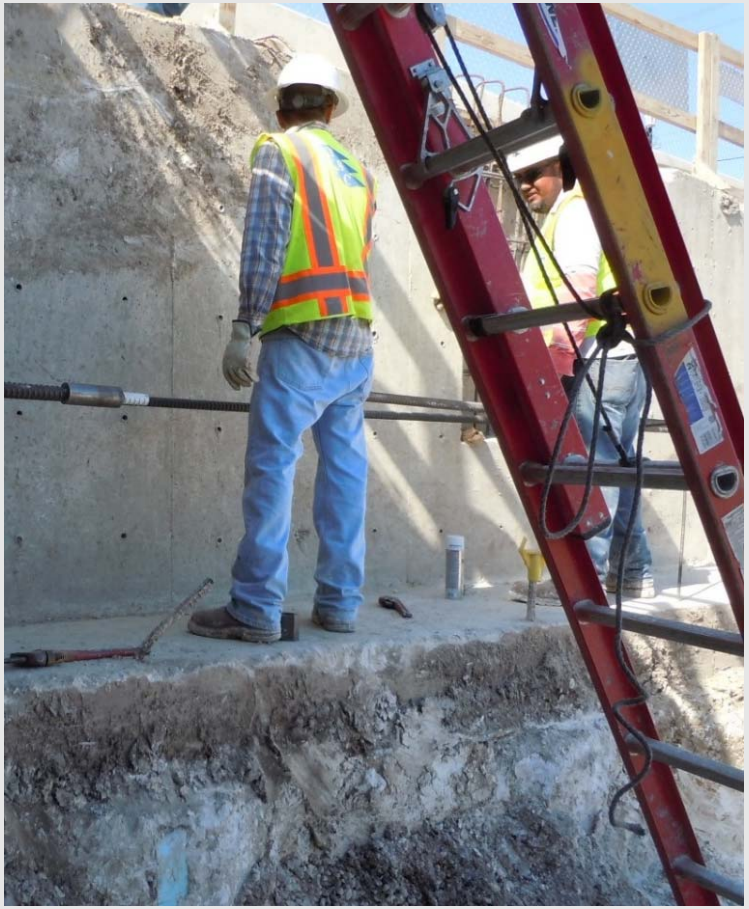




Lateral Slide-in – LP 345 (San Antonio)



Lateral Slide-in – LP 345 (San Antonio)



Lateral Slide-in – LP 345 (San Antonio)

Lateral Slide-in – LP 345 (San Antonio)

Lateral Slide-in – LP 345 (San Antonio)

Footing Construction LP 1604 (San Antonio)

Footing Construction LP1604(San Antonio)

120” Drill Shaft– LP 410 (San Antonio)

120” Drill Shaft- LP410 (San Antonio)

120” Drill Shaft- LP410 (San Antonio)

QUESTIONS?

Gregg Freeby – Bridge Division

Eddie Reyes – San Antonio District

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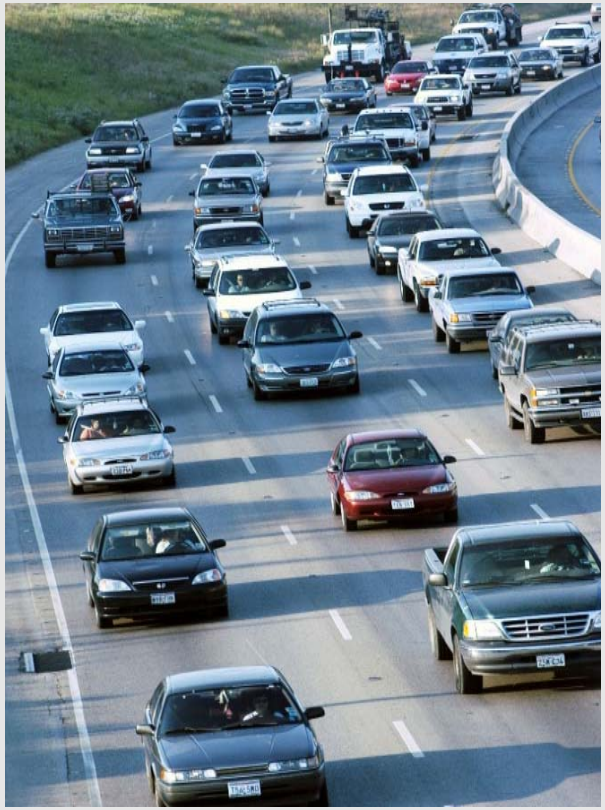
TEXAS DEPARTMENT OF TRANSPORTATION

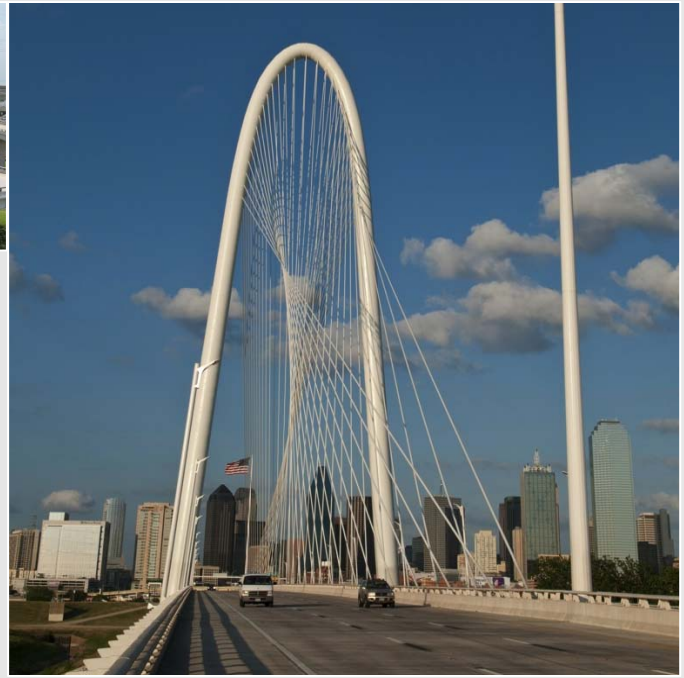
ACCELERATED CONSTRUCTION WORKSHOP



Austin – San Antonio Districts

August 1, 2017

TEXAS DEPARTMENT OF TRANSPORTATION



ACCELERATED PAVEMENT CONSTRUCTION

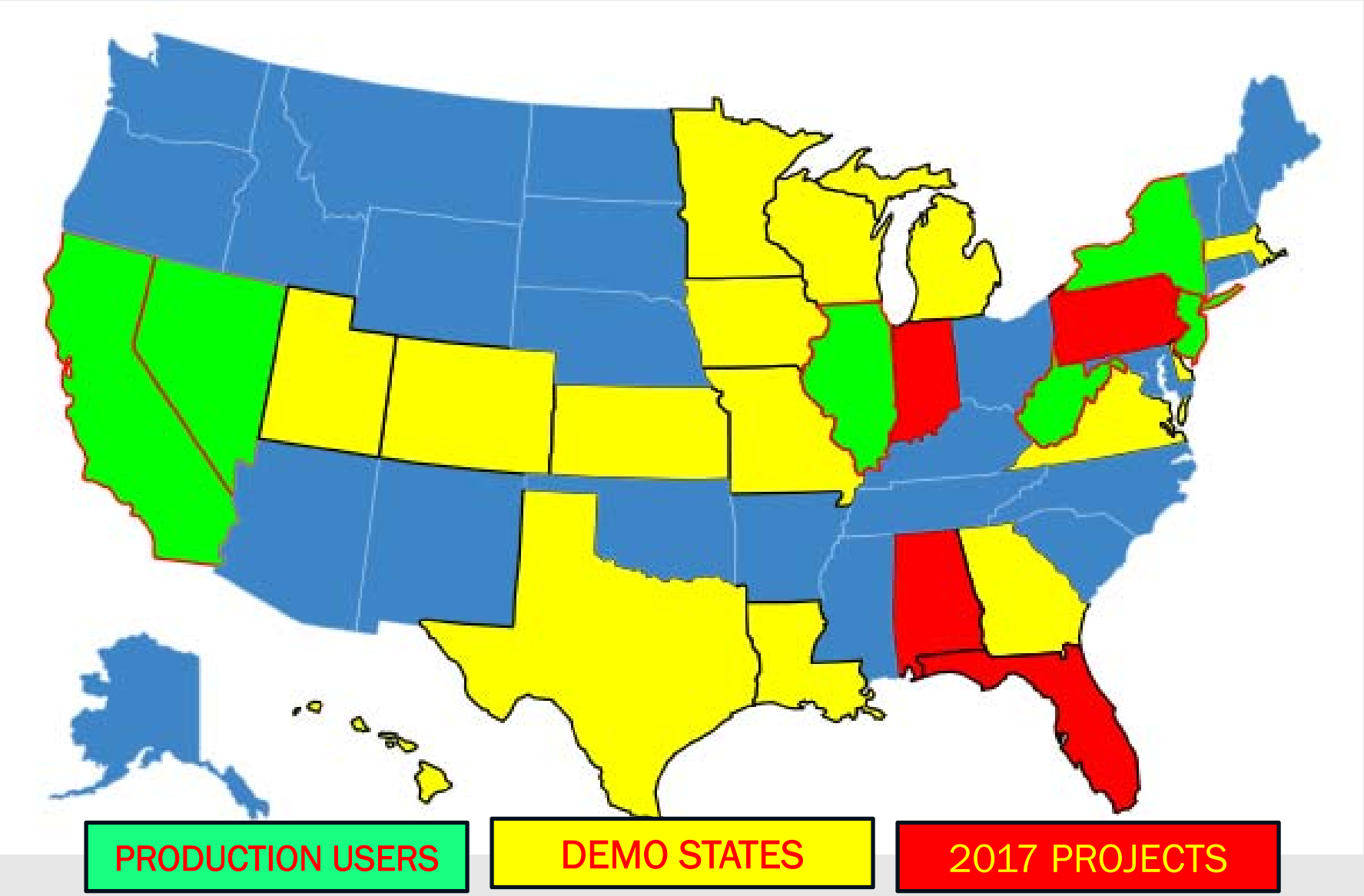
Andy Naranjo, P.E.

CST M&P– Rigid Pavement Branch Mgr.

Precast Concrete Pavement Background

- PCP is a recent technology – in use since 2001 (Started in Texas)
- Used primarily for RAPID repair & rehabilitation & longer-lasting treatments
  - Panels fabricated off-site, transported to project site & installed on a prepared foundation
  - Only minimal field curing time required
- Typically, night-time work & short work windows
- Typically, repair/rehab along a single lane
  - Multiple-lane repair/rehab possible based on site constraints

Who Uses Precast Pavements?



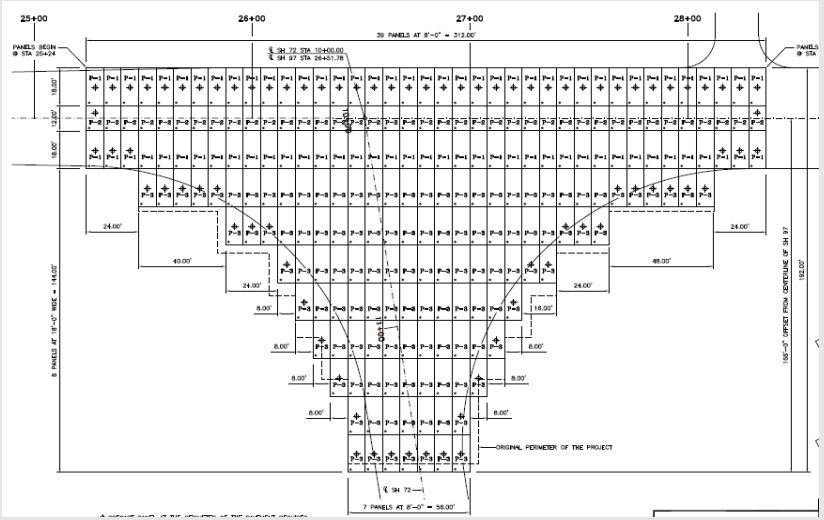
What Applications Have Precast Pavements Been Used In?

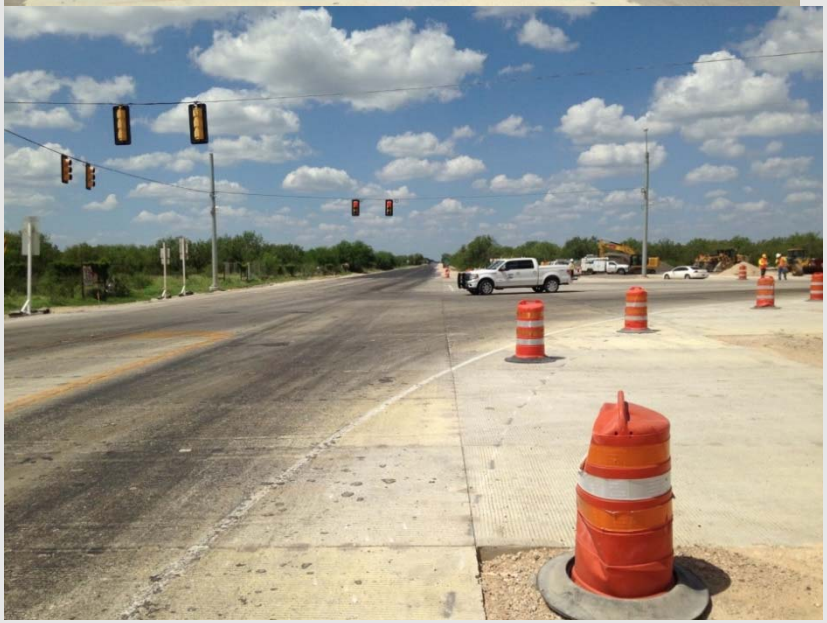
- Primary Applications (90%+ use)
  - Heavily-traveled main line interstate/primary system & urban roadways
  - Interstate/primary system & urban ramps - Often no alternative routes and heavy traffic
- Special Applications
  - Intersections - Where traffic needs to be maintained
  - Bridge approach slabs - A large no. of approach slabs across country need to be rehabilitated under traffic
  - Underpasses - Where height restrictions may limit rehab options
  - Bus pads - Where alternative bus stop locations are not acceptable, bus pads can be replaced overnight
  - Airfield Applications - A developing market
  - Utility "bridges" - Over failed drainage pipes & culverts

It All Started in Texas!

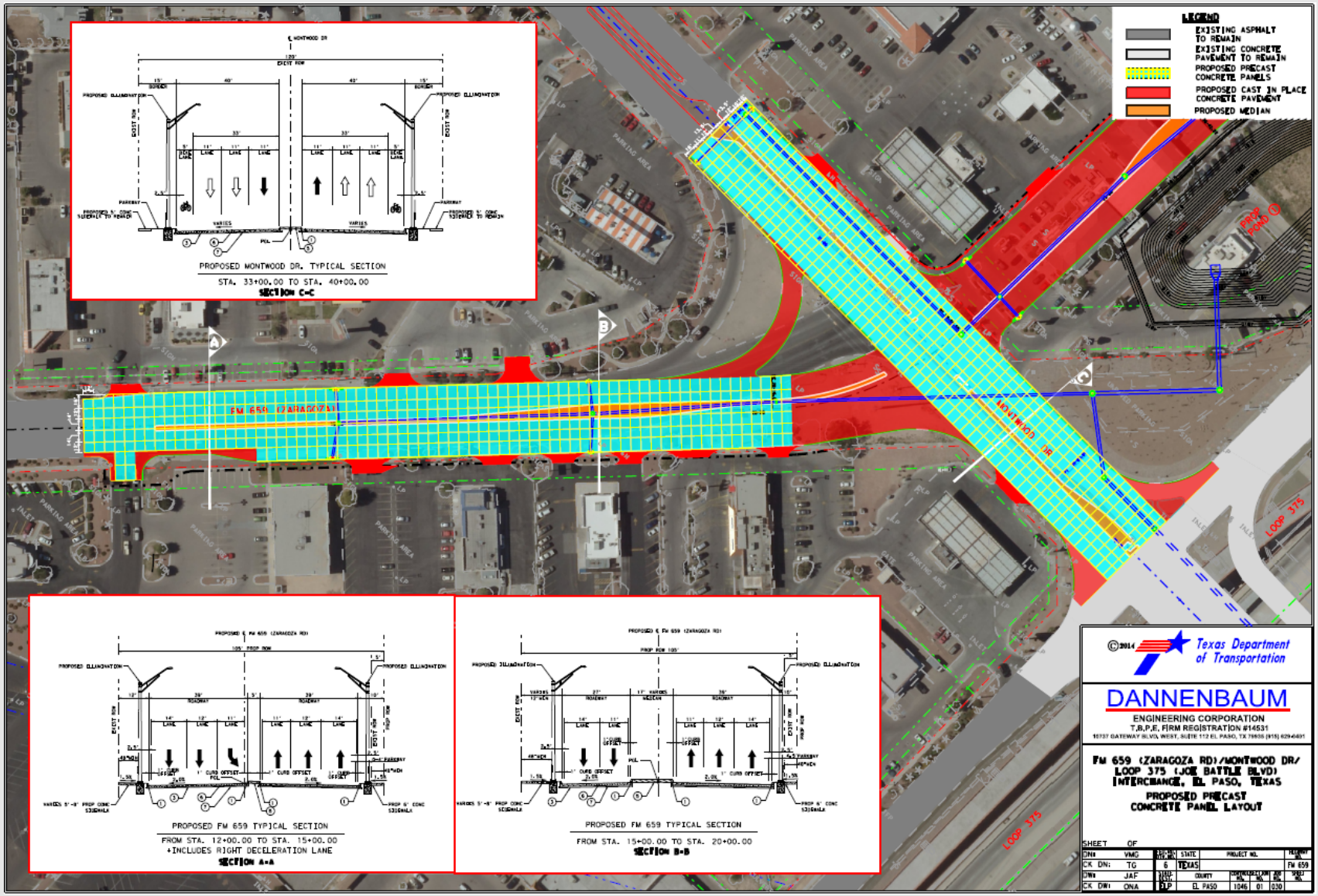
- I-35 frontage rd in Georgetown, TX
- Built in 2001
- Pre-stressed/post-tensioned panels
- Full-road-width and half-road-width panels
- Section still performing well.

Recent Project: SH97/SH72 Intersection (2016)





Future Projects: El Paso District Intersection (2018)



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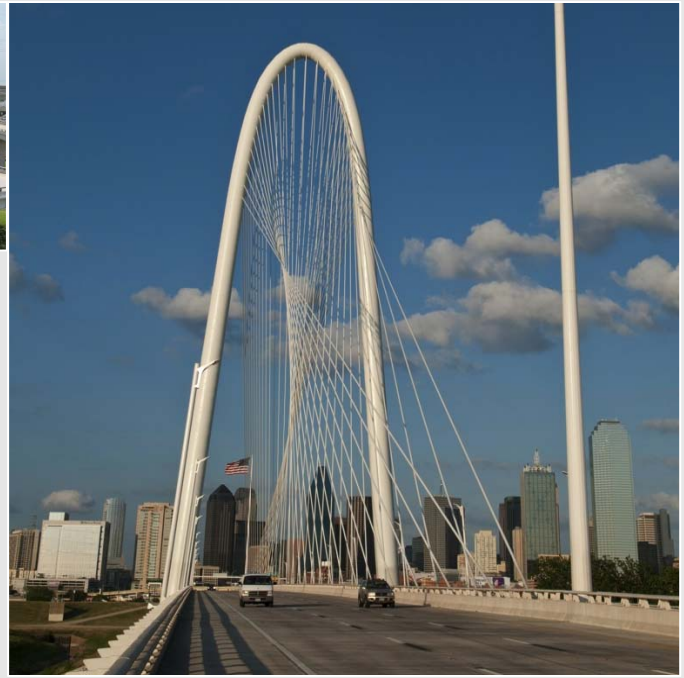


ACCELERATED PAVEMENT CONSTRUCTION

Mike Arellano, P.E.

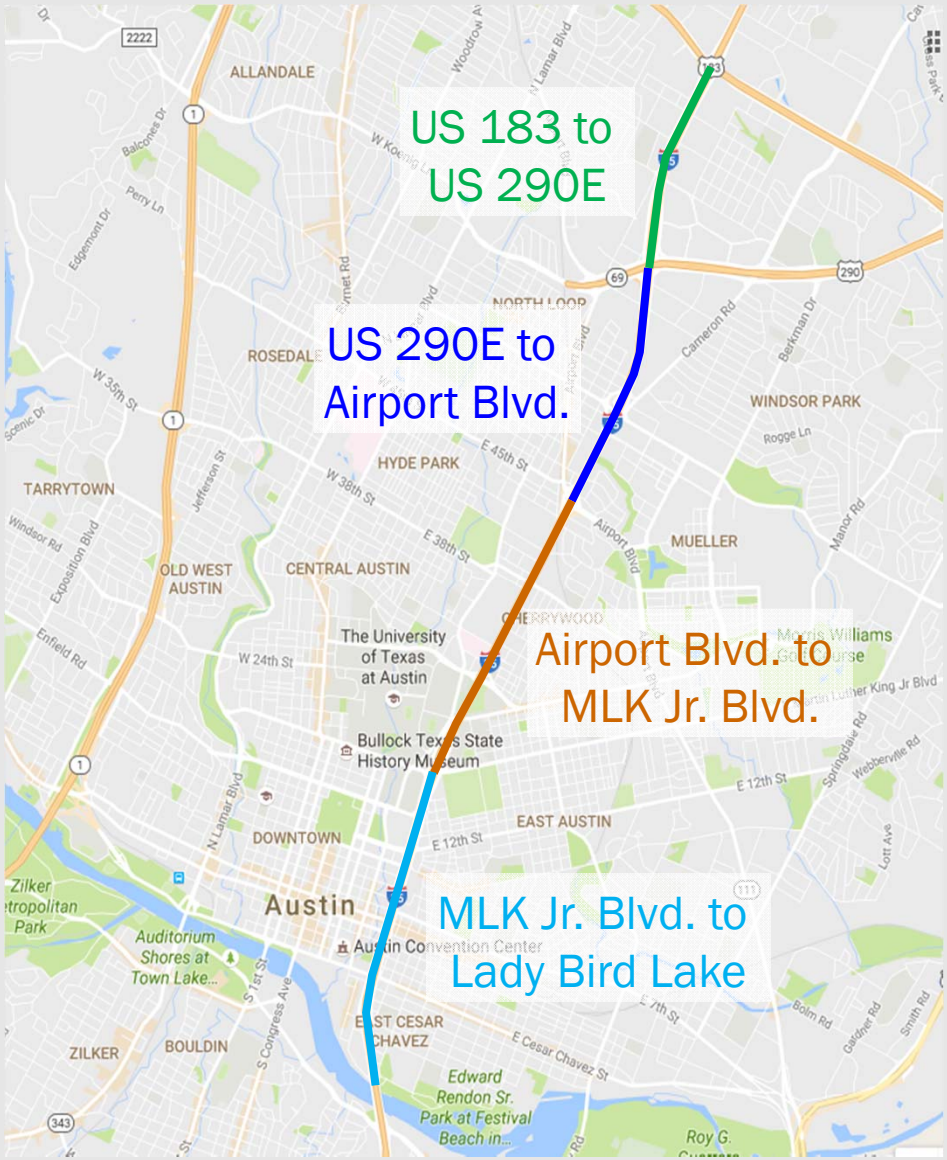
Austin District – Director of Maintenance

mobility CAPITAL AREA

INTERSTATE 35

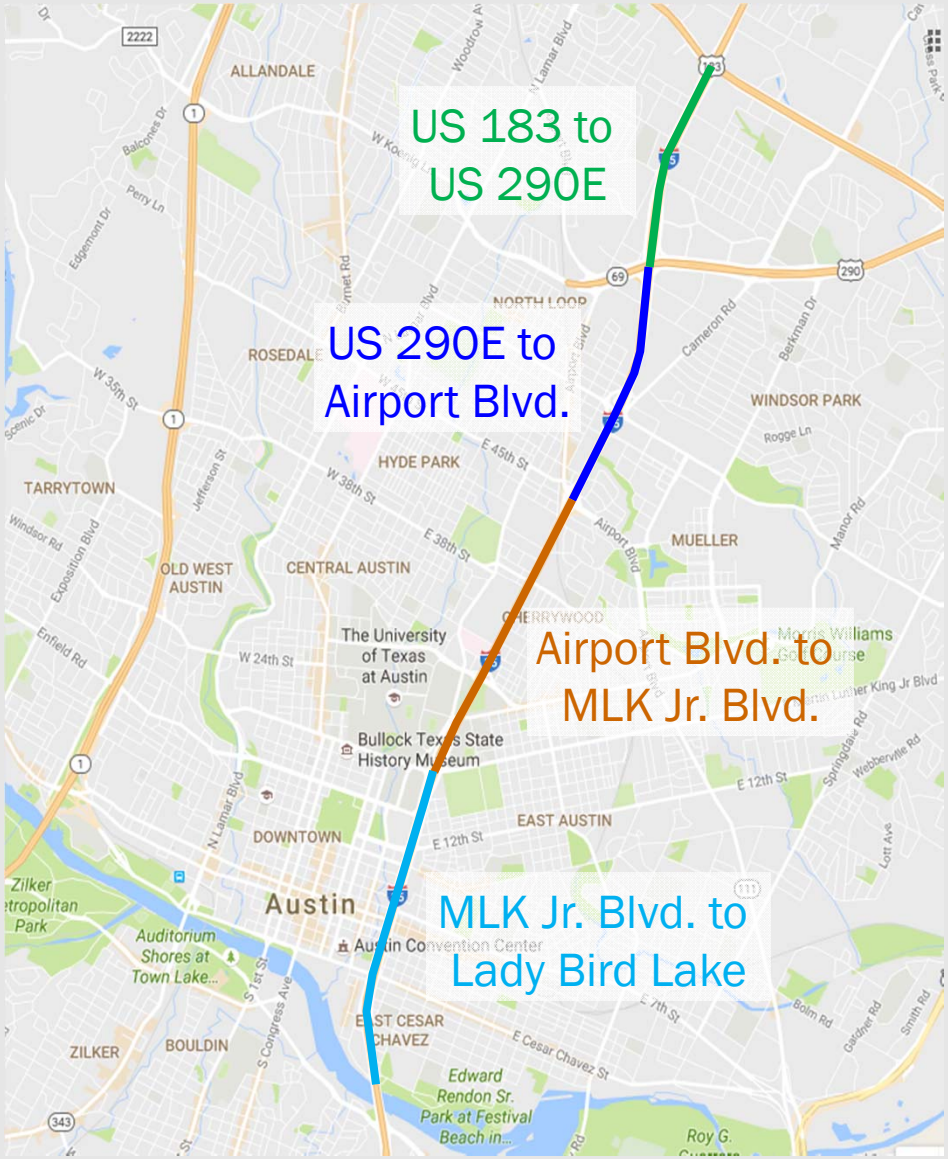
Mobility35 Pavement Alternatives Study: Overview and Objectives

- US 183 to Lady Bird Lake is the most congested and constrained portions of the I-35 corridor
  - #10 in the Nation
  - #2 in Texas
- Strategic portion of IH-35 corridor
  - Major freight corridor
  - State legislature & agencies
  - Federal agencies
  - Trauma Hospitals
  - City of Austin offices
  - University of Texas



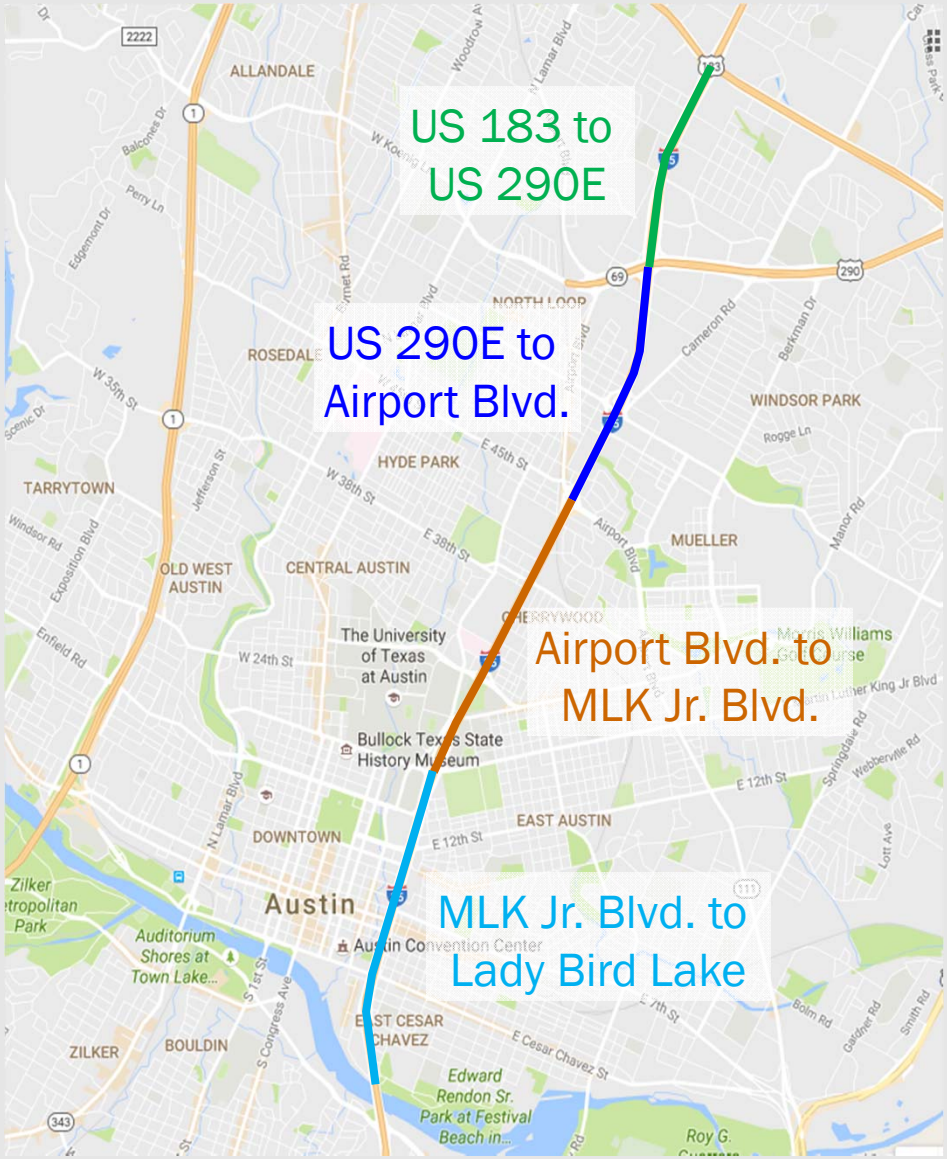
Mobility35 Pavement Alternatives Study: Overview and Objectives

- Primary Goals are:
  - To objectively analyze the fastest means to construct pavement structures
  - To preventing future closures due to maintenance by designing for a performance life of >30 years.
- Bottom line: Low pain tolerance for extended closures or restriction to traffic flow (No alternate routes or little ROW)
- In other words…<u>Get in, Get Out Quickly, and Stay out.</u>



Mobility35 Pavement Alternatives Study: Overview and Objectives

- Study pavement alternatives
  - Full-depth HMA
  - CRCP
  - Precast Concrete Pavement (PCP)
- Provide recommendations for four key segments (<u>Schematic Level</u>)
  - Segment 1: US 183 to US 290E
  - Segment 2: US 290E to Airport Blvd.
  - <u>Segment 3: Airport Blvd. to MLK Jr. Blvd.</u>
  - Segment 4: MLK Jr. Blvd. to Lady Bird Lake



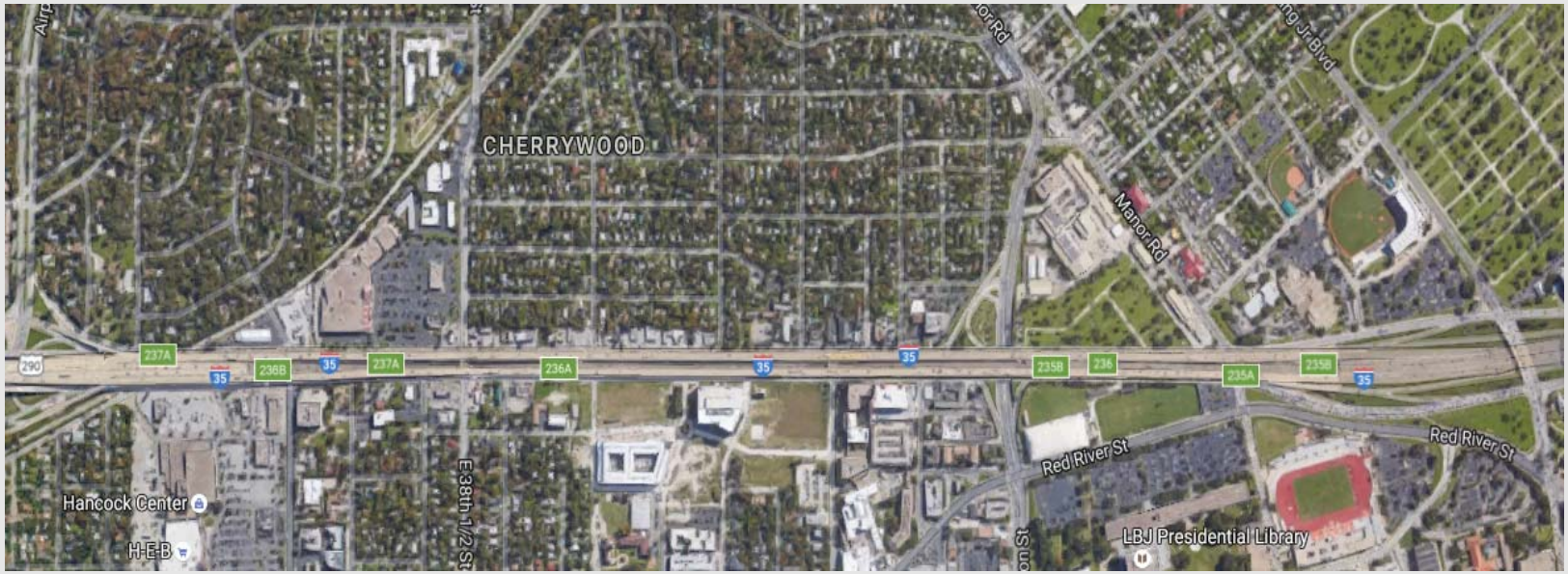
Mobility35 Pavement Alternatives Study: Analysis Approach

- Pavement alternatives analysis approach
  - Data collection (GPR, FWD, Cores, As-Builts, etc…)
    - Assessing disposition of existing pavement
  - Pavement design for three pavement types
    - HMA, CRCP, Precast Concrete Pavement
  - Life-cycle cost analysis
    - Economic analysis of pavement alternatives
  - Constructability evaluation
    - Addressing constructability challenges

PAVEMENT ALTERNATIVES SEGMENT 3 EXAMPLE

Airport Blvd. to MLK Jr. Blvd.

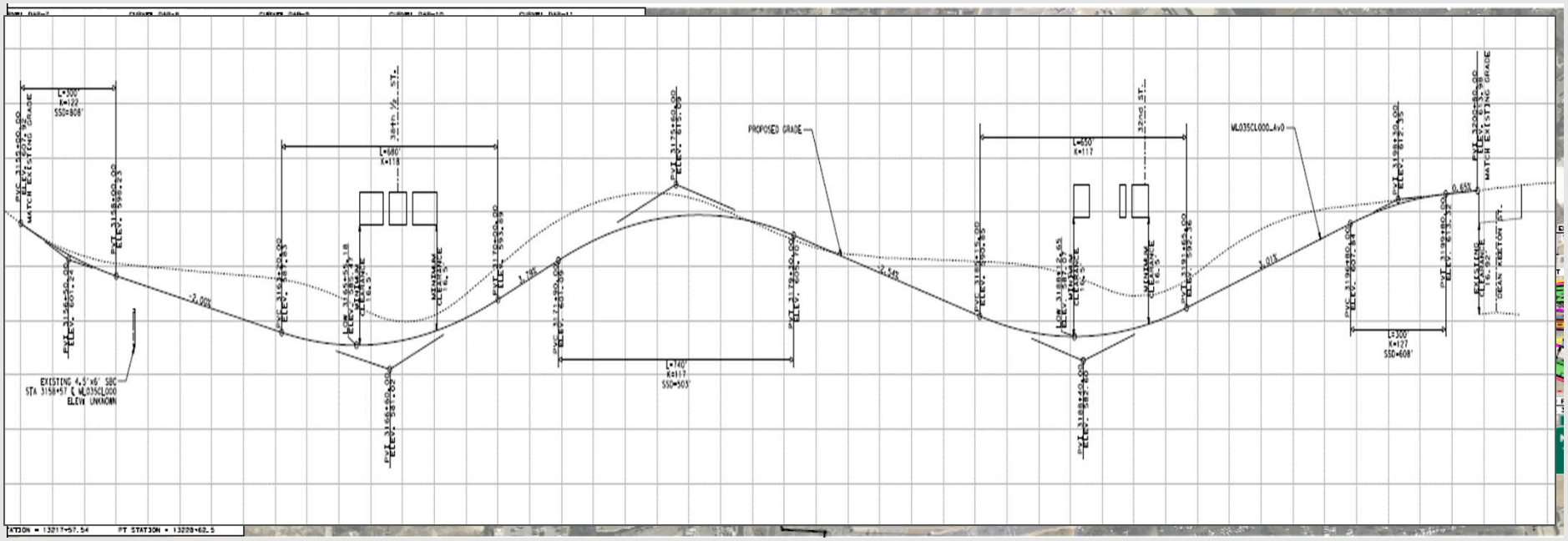
Segment 3: Overview



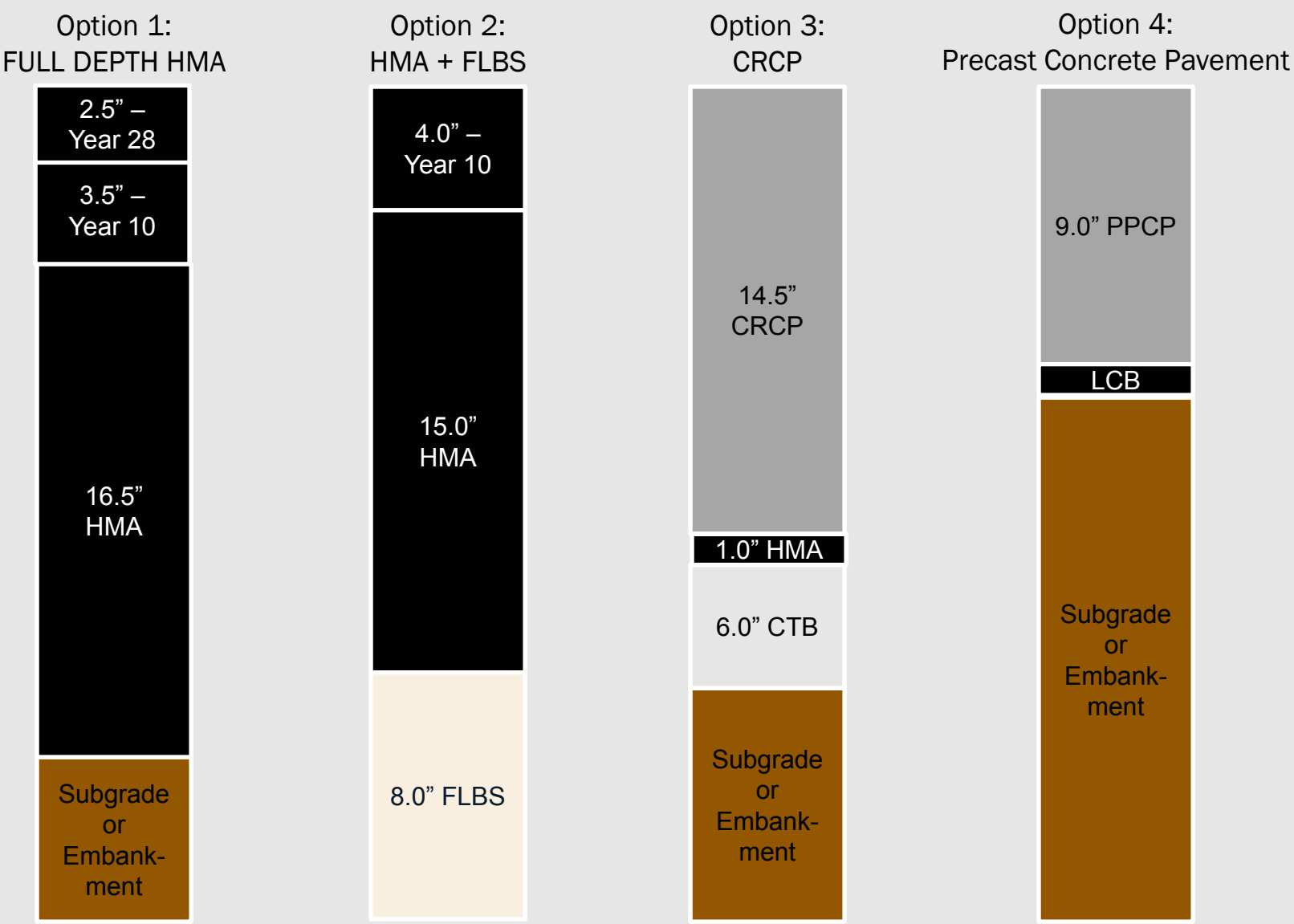
- Approx. 1.54 centerline miles (between Airport Rd. bridge and MLK Jr. overpass)
- Includes lower decks and short section south of upper/lower deck split (upper decks not analyzed)
- Majority of segment on tangent with a ~4,500 ft. radius curve near MLK Jr. Blvd.
- Numerous overhead clearance issues along the lower decks and at the MLK Jr. Blvd. overpass

Segment 3: Current Schematic Plan

Mainlanes in each direction	Mill and Overlay	Widening	Full-Depth Reconstruction	Grade Change
Varies between 2 and 4 (+1 future)**	Proposed for major portion of the segment for all mainlanes (upper deck excluded).	Proposed for major portion of the segment in each direction. Approx. 4,100 ft. (lower deck)[3].	Proposed for approx. 4,600 ft. (lower deck)[4], 2 lanes in each direction.	Grade changes up to 12 ft. (lower) have been proposed for this segment for approx. 4,600 ft. of the lower deck.



Segment 3: Pavement Design Alternative (30 Year Design Life)



Segment 3: Pavement Design Alternative (30 Year Design Life)

	HMA Full Depth	CRCP	PPCP
*Depth of Section	24 in.	21.5 in.	9 in.
Material Removal and Delivery	1.5-2 ft.	2-2.5 ft.	9 in.-1 ft.
Subgrade Stabilization Pavement Foundation	Compacted Subgrade	1in. HMA + 6 in. CTB + Compacted Subgrade	2-6 in. LCB-RS
* 30 year design life pavement section			

Mobility35 Pavement Alternatives Study: Construction Workshop

- Construction Time to Opening

	HMA Full Depth	CRCP	PCP
*Construction Time Requirements (per mile)	8 days/24 hour closure	13 days/24 hour closure	11 nights/9p-5a closure (500 ft./night)
Width of Work Zone	2 Lanes	2 Lanes	2 Lanes
Lane Closure Requirements	1 lane (3 lanes open, narrow width)	1 lane (3 lanes open, narrow width)	2 lanes (1-2 lanes open)
Time Before Traffic on Pavement	6-8 days (if traffic permitted on base course)	13 days	Immediate
Total Time from Start Construction to Open	14-16 Days	26 Days	11 Days
Value of Time/Road User Costs	LCCA Results	LCCA Results	LCCA Results
* Unable to perform CRCP or Full Depth HMA during overnight enclosure			

Life Cycle Cost Analysis (LCCA)

	Annualize Pavement Maintenance Cost	20 Year Total
Routine Maintenance	$666,975.90	$13,339,517.92
Preventative Maintenance	$3,715,170.98	$74,303,419.56
Total PM/RM	$4,382,146.87	$87,642,937.48

Maintenance Costs (Current Flexible Pavement)

- Control Section (0015-13) = 18.5 centerline miles
- Historic cost from DCIS and Compass
- Costs are present value costs.
- Cost to maintain high level of service (Condition Score > 90)

Life Cycle Cost Analysis (LCCA)

	Annualize Pavement Maintenance Cost	20 Year Total
Routine Maintenance	$903.00	$12,272.06
Preventative Maintenance	$0.00	$0.00
Total PM/RM	$903.00	$12,272.06

Maintenance Costs (Current Rigid Pavement)

- Control Section (0015-13) = 1.8 centerline miles
- Historic cost from DCIS and Compass
- Costs are present value costs
- Cost to maintain high level of service (Condition Score > 90)

Long-Term Performance

I-10, Los Angeles
PPCP Project

(AADT = 220,000)

Segment 3: Life Cycle Cost Analysis (LCCA)

- Costs are for new construction only as indicated by current schematics; not include rehabilitation activity.
- PCP costs assumed $350/SY at the time of analysis (very conservative).
- Currently the projection is approx. $225-300/SY or initial cost of around $2000 initial cost.

Segment Limits	Pavement Alternative	Initial Construction Cost ($1000)	Total Maintenance and Rehabilitation Cost[1]	Total Agency Cost	User Cost[2]	Total Cost LCCA[3]
Airport Blvd. to MLK Jr. Blvd.	HMA	$727	$673	$1,101	$4,722	$5,823
	CRCP	$723	$167	$796	$8,833	$9,680
	PCP	$2,983	$119	$2,938	$1,745	$4,683

All cost shown (in $1000) are for one lane-mile, except where indicated, in Present Value.
1. Total sum of maintenance and rehabilitation costs for 30 years in present value.
2. User cost was calculated by RealCost2.5 based on 24 hour road closure for HMA & CRCP; 9PM–5AM road closure for PCP.
3. Total cost was calculated by RealCost2.5 based on initial construction costs and maintenance and rehabilitation costs.

Conclusions

- Based on the high-level analysis of the study:
  - Full Depth HMA is the better option in segments with widening of existing flexible pavement and mill and overlay, such as Segment 1 (US 183 to US 290).
    - Assumes 8-10 year M&O cycle.
    - Assumes existing lanes are structural adequate for future 30 year ESALs
  - Precast pavement provides the most efficient pavement section (in terms of existing pavement removal and new materials).
  - Precast Concrete Pavement is a feasible option for accelerated construction in segments with grade changes, limited ROW and no alternative routes.
  - Precast pavement may provide benefit for other areas:
    - Accelerated intersection construction
    - Ramp reconstruction (if ramp needs to be kept open during construction)

Next Steps: Project Level Pavement Design

District 8 HVS Testing on PJCP
2005-2006 – Fontana, CA

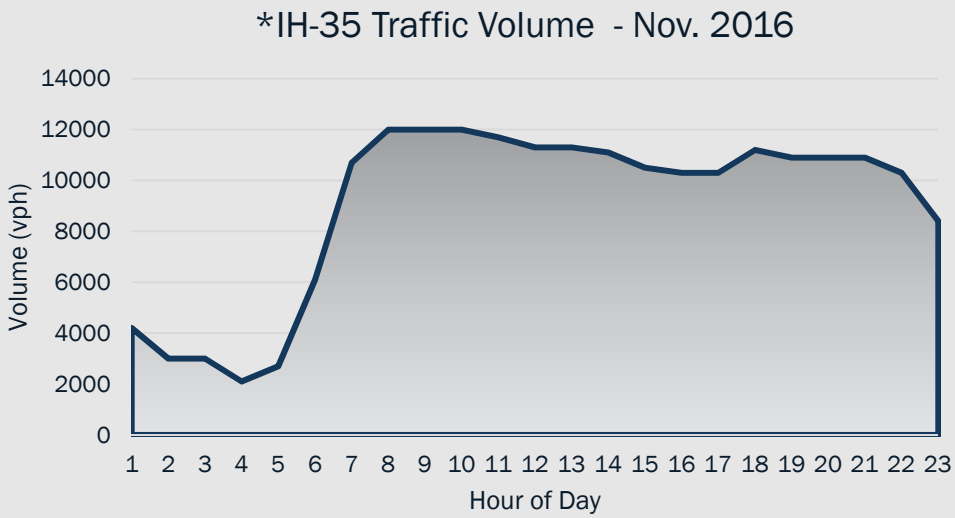
Courtesy, Kirsten Stahl

- Study ESALs estimates:
  - 20 YR (FLEX) = 60 MESALs
  - 20 YR (RIGID) = 81 MESALs
  - 30 YR (RIGID) = 137 MESALs
- Actual ESALs reported by TPP
  - 20 YR (FLEX) = 80 MESALs
  - 20 YR (RIGID) ~ 106 MESALs
  - 30 YR (RIGID) ~ 179 MESALs

> 150,000,000 ESALs – No Failed Slabs

Next Steps: More Resolution on User Delay Costs

- User delay costs in the study relied on many assumptions
- I-35 at full volume capacity
  - 2000: 11 hour per 24 hour day
  - 2016: 17 hour per 24 hour day
- Estimated user delay costs on IH-35 by CTR:
  - $405,000 (3 hour closure)
  - $810,000 (5 hour closure)
- Need to include cost impact on re-routing to other State and local roadways



* Traffic Station N. of Lady Bird Lake

Next Steps: Impact of New Material Delivery

- Estimate number of truck trips per-lane-mile of pavement construction required to deliver material
- Lower number of trucks:
  - Increases the certainty of production (lower construction time & costs)
  - Reduce the construction footprint and user delay time and costs

Pavement Type	*Pavement Thickness (in.)	Volume (CY)	Weight (TONs)	No. of Panels	No. of Trucks
HMA	22.5	-	8910	-	446
CRCP	14.5	2836	-	-	284
**PCP	9.0	-	-	211	**53 MA5
* Based on 30 years pavement design life					
** Panels can be stockpile on the ROW; Only two-four flat bed trucks required during installation.					

Slide 27

MA5 Do you agree?
Miguel Arellano, 7/22/2017

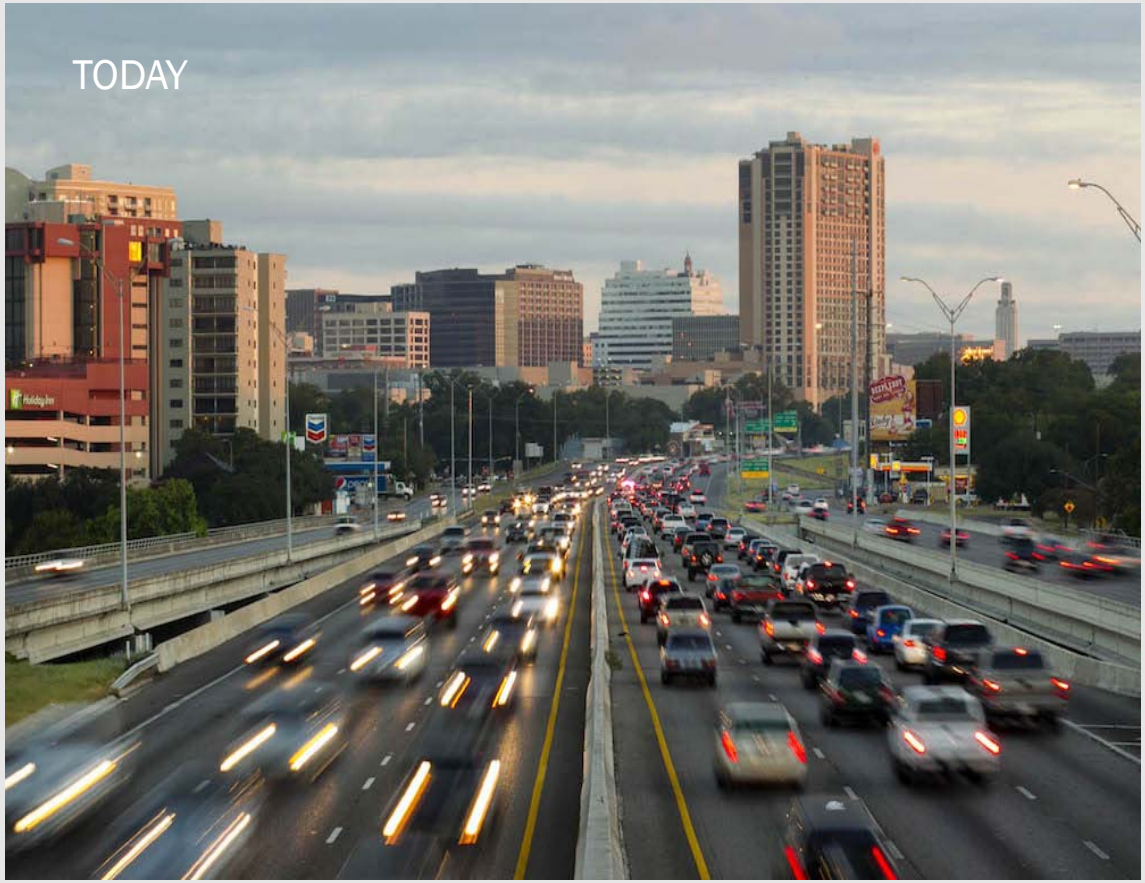
Next Steps

- Detailed project-level assessment
  - Lane closure restrictions
  - Impact on traffic control and flow based on new material delivery
  - Segment-specific requirements
- Final project-level design (with project level traffic ESALs)
- Determine final, project level cost savings in construction time and user delay cost with accelerated option
- Re-analyze LCCA with project-level assessment
  - Refined user delay and construction costs
- Hold another construction workshop with industry for project level assessment
- Determine if alternates are a viable option.

Next Steps

- If PCP is selected:
  - Design
    - Select precast concrete pavement system
    - Precast pavement layout
    - Thickness and pre-stress design
    - Geometric considerations
  - Specification/special provision development
    - Contractor qualifications
  - Construction
    - Pre-bid workshop
    - QC plan requirements
    - Precast shop drawing review
    - Construction inspection requirements
    - Final acceptance requirements

QUESTIONS



Mike Arellano, P.E. | Director of Maintenance
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Phone: (512) 832-7030 | Email: miguel.arellano@txdot.gov

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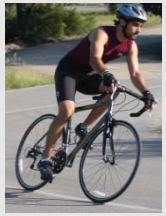
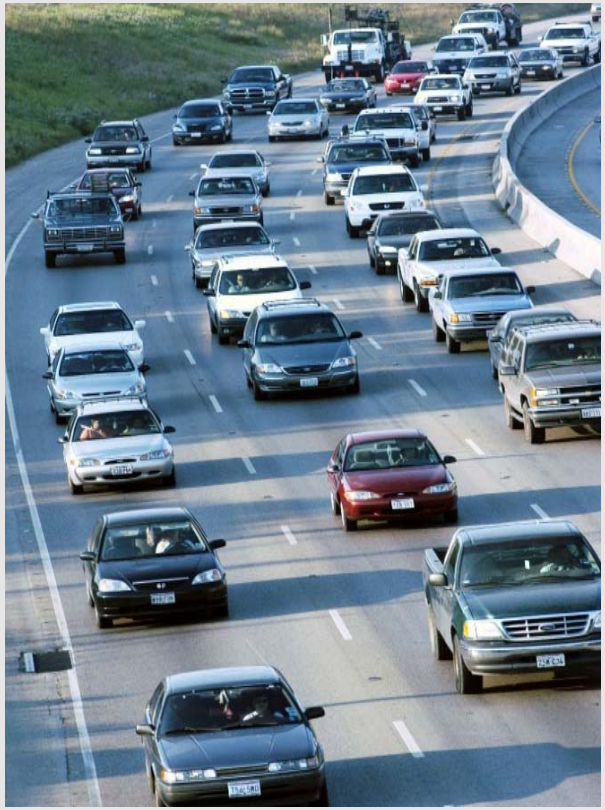


ACCELERATED CONSTRUCTION STRATEGIES TRAFFIC AND SAFETY

August 1, 2017



Agenda

- Accelerated Construction and Safety Considerations
- Strategies to mitigate
- Questions

Accelerated Construction and Safety Concerns

- Could time based construction incentives inadvertently compromise safety?
  - Possible downsides to accelerated construction
    - Long shifts
    - 7 day a week construction schedules
    - Public Safety

Strategies to Mitigate

– Consider “scheduled” vacations

U.S. estimates of work-related all-cause injury incidence (per 100 workers) by usual daily sleep

Usual Hours Slept / Day	Number of Workers (NHIS 2004-08)	Percent of Workers	Number of est. Work-related Injuries Annually	Number of est. Workers Annually	Est. Annual Injury Incidence per 100 Workers[1]
≤ 4.99 h	1,431	1.9	83,730	1,061,759	7.89
5 - 5.99 h	4,407	5.9	172,462	3,310,950	5.21
6 - 6.99 h	17,251	22.9	469,756	12,988,074	3.62
7 - 7.99 h	25,950	34.5	448,458	19,774,245	2.27
8 - 8.99 h	22,604	30.0	413,942	16,571,317	2.50
9 - 9.99 h	2,361	3.1	39,101	1,759,342	2.22
> 10 h	1,267	1.7	41,694	883,551	4.72
Total	75,271	100.0	1,669,142	56,349,239	2.96

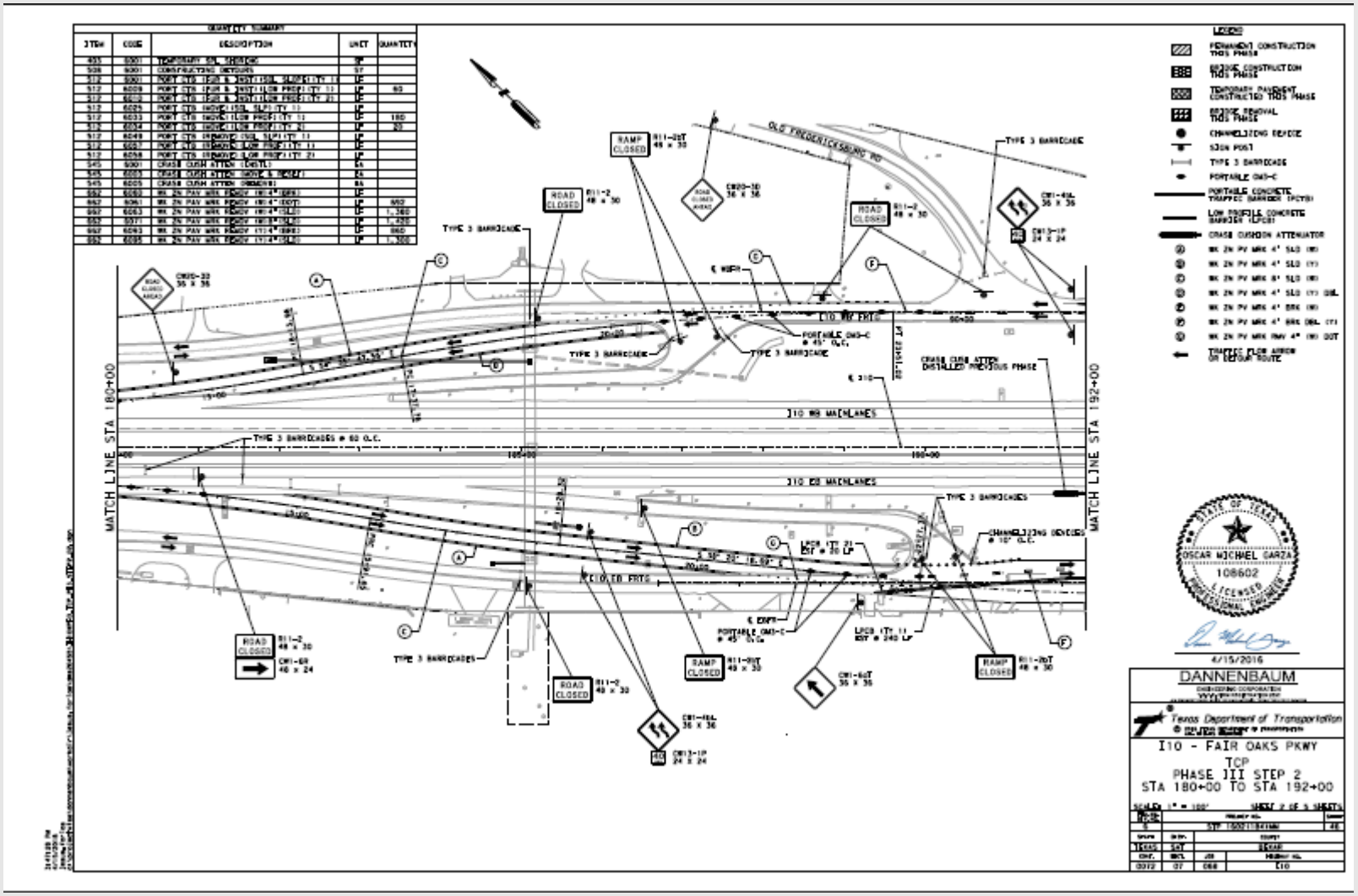
[1]Includes individuals reporting employment at a job or business and those who had reported usual sleep hours.

(Source: Lombardi DA, Folkard S, Willets JL. Smith GS. Daily sleep, weekly working hours, and risk of work-related injury: US National Health Interview Survey (2004-2008). Chronobiol Int, 2010 Jul; 27(5):1013-30.

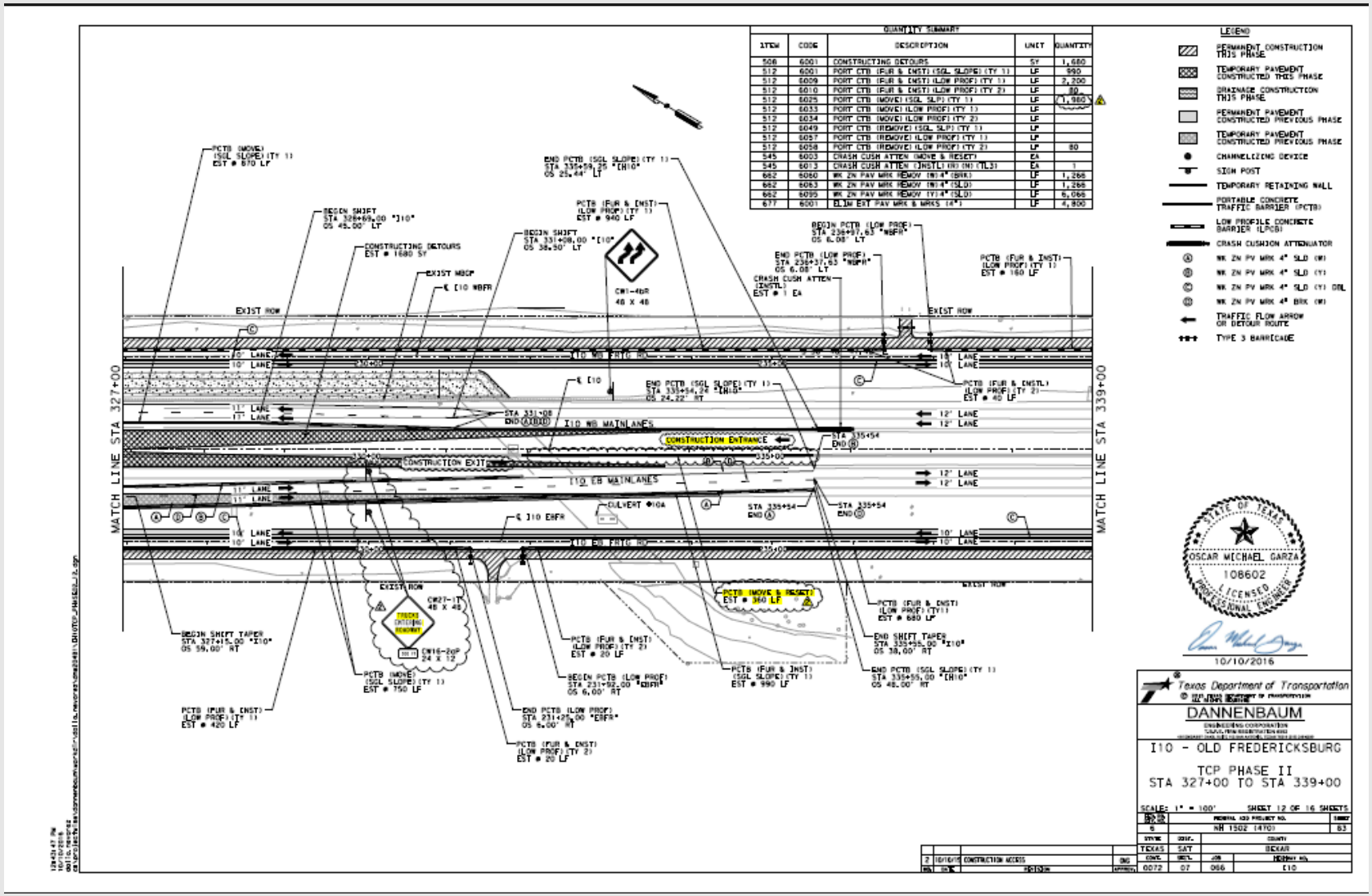
15

What we do now

- Typical SAT Strategies for Accelerated Construction
  - RUC disincentive to keep lanes open in peak traffic times
  - Use Positive Barrier
  - Milestone key project components
  - Transverse rumble strips at flagger stations
  - PRECON agenda modified to focus on project issues and safety
  - Phasing in TMS first to allow us to utilize during construction
  - TCP added temporary 2 lane exit and entrance ramps to utilize when main lanes closed


QUANTITY SUMMARY
ITEM
CODE
DESCRIPTION
UNIT
QUANTITY
MATCH LINE STA 180+00
MATCH LINE STA 192+00
OLD FREDERICKSBURG RD
TYPE 3 BARRICADE
ROAD CLOSED
RAMP CLOSED
PORTABLE CMS-C
TYPE 3 BARRICADES
CHANNELIZING DEVICES
I10 WB MAINLANES
I10 EB MAINLANES
LEGEND
PERMANENT CONSTRUCTION THIS PHASE
BASIC CONSTRUCTION THIS PHASE
TEMPORARY PAVEMENT CONSTRUCTED THIS PHASE
BASIC REMOVAL THIS PHASE
CHANNELIZING DEVICE
SIGN POST
TYPE 3 BARRICADE
PORTABLE CMS-C
PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)
LOW PROFILE CONCRETE BARRIER (LPCB)
CRASH CUSHION ATTENUATOR
TRAFFIC FLOW ARROW OR DETOUR ROUTE
STATE OF TEXAS
OSCAR MICHAEL GARZA
108602
LICENSED
PROFESSIONAL ENGINEER
4/15/2016
DANNENBAUM
Texas Department of Transportation
I10 - FAIR OAKS PKWY
TCP
PHASE III STEP 2
STA 180+00 TO STA 192+00
SHEET 2 OF 5 SHEETS

Planning for site access



Strategies to Mitigate

Illumination for night work

Strategies to Mitigate

– Control worker access to site

Strategies to Mitigate

– Include material delivery and site access as part of overall safety plan

Internal Traffic Control Plans

Safety Within the Work Zone: Internal Traffic Control Plan

- Control the flow of equipment traffic to minimize backing within the work zone.
- Establishes procedures for entering and exiting the work zone.
- Distance to change lanes and decelerate into the work zone.
- Distance to accelerate into high speed traffic when leaving the work zone.
- Restrict access points into work areas.
- Design buffer spaces to protect pedestrians from errant vehicles or work zone equipment.
- Provide signs within the work zone to direct and guide pedestrians and equipment operators.

21

Strategies to Mitigate

– Require backup plans for incidents or unusual flow

Other Considerations

- Tow truck
- Police crossover outs
- Lane for emergency only

Strategies to Mitigate

– Safety issues addressed and integrated with constructability review

Other things to consider

– Require a site specific safety plans as bid item

Other things to consider

Use Technology to reduce risk

Other things to consider

Use Technology to convey information

– Queing tech in Austin

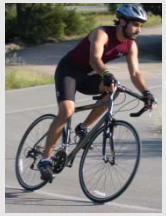
– Work Zone Intrusion

– Smart barrels

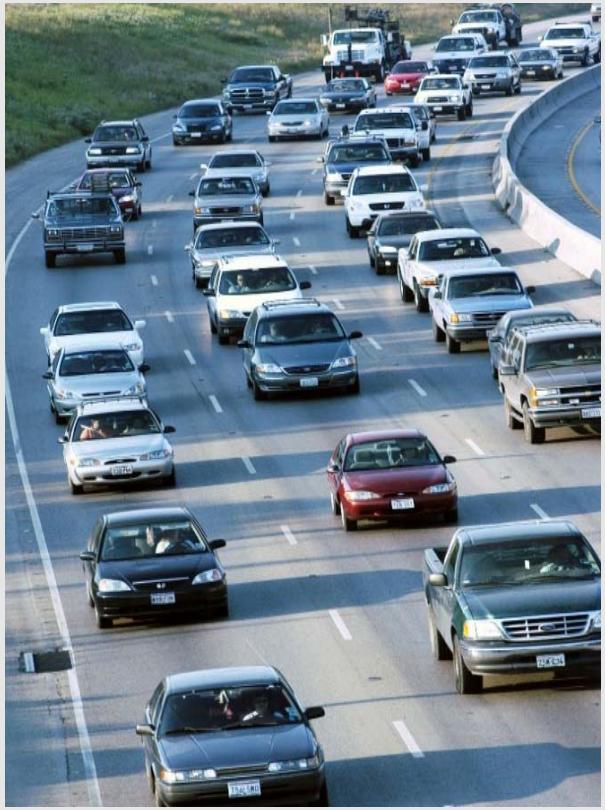
Work Zone Intrusion Net

QUESTIONS?

TEXAS DEPARTMENT OF TRANSPORTATION



ACCELERATED CONSTRUCTION AND PUBLIC INFORMATION



Diann Hodges
8/1/2017

Public Involvement and Accelerated Construction

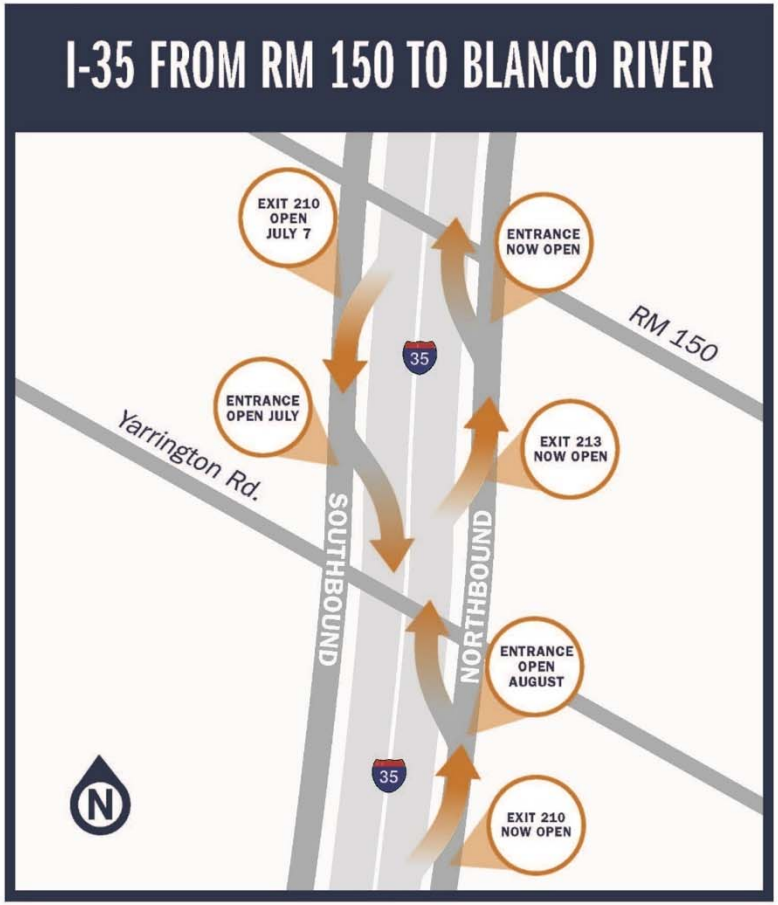
- While traffic impacts may be more substantial during accelerated construction, with utilization of the right public involvement tools, drivers and other stakeholders are generally supportive of this type of construction
- Involvement of the public in planning and project implementation is key to forging positive and cooperative relationships with the community
- Providing early, continuous, transparent and effective access to project information and schedules is the best means of soliciting public support
- Strive to be transparent regarding project issues and take reasonable steps to address concerns
- Successful public involvement seeks to develop the project with the community

Outreach Techniques

- Know your stakeholders
  - Understand, appreciate and consider community and stakeholder values and needs
  - Strive to incorporate or address stakeholder values in the evolution of the project
- Be responsive and consistent when distributing information and when establishing and building community trust
- Be a good neighbor during disruptive construction
- Use the right tools to meet objectives
  - Develop outreach correspondence and detour maps for distribution to stakeholders that will be impacted during construction
- Use on-road tools when available
  - Smart work zones

Tools For Success

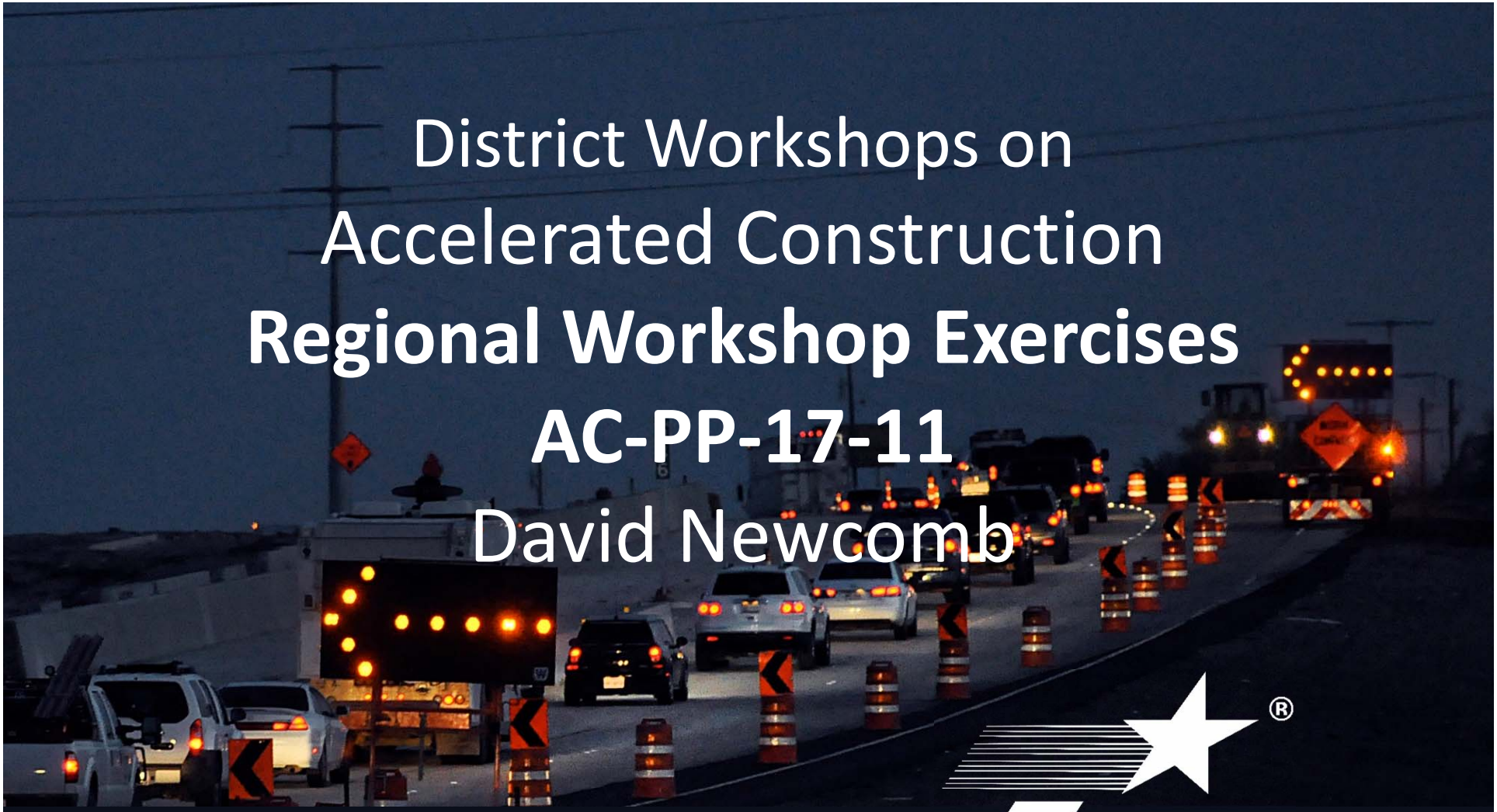
- Provide early and often communication regarding traffic impacts to the media and general public
- Develop and provide easy to understand detour maps
- Coordinate with on-road traffic management systems, if available (i.e. dynamic messaging system, smart work zones, etc.)
- Coordinate with emergency and traffic management services
- Coordinate with sister agencies (i.e. transit and regional mobility authorities) in preparation for potential service impacts
- Share information on highway advisory radio



MY35CONSTRUCTION.ORG / 512.366.3229 / @TXDOTAUSTIN

Important Information To Keep In Mind

- Whatever you say, whatever you write, whatever you do, make sure to communicate these four points:
  - There *is* a serious problem or opportunity ***that has to be addressed.***
  - You are ***the right entity*** to be addressing the problem. Given TxDOT's mission, it would be ***irresponsible*** not to address the problem.
  - The means by which you are addressing and approaching the problem are ***reasonable, sensible, and responsible.*** You ***are*** listening and you ***do*** care. If what you're proposing is going to ***hurt*** someone, ***it's not because you don't care; it's not because you're not listening.***



District Workshops on Accelerated Construction

Regional Workshop Exercises

AC-PP-17-11

David Newcomb

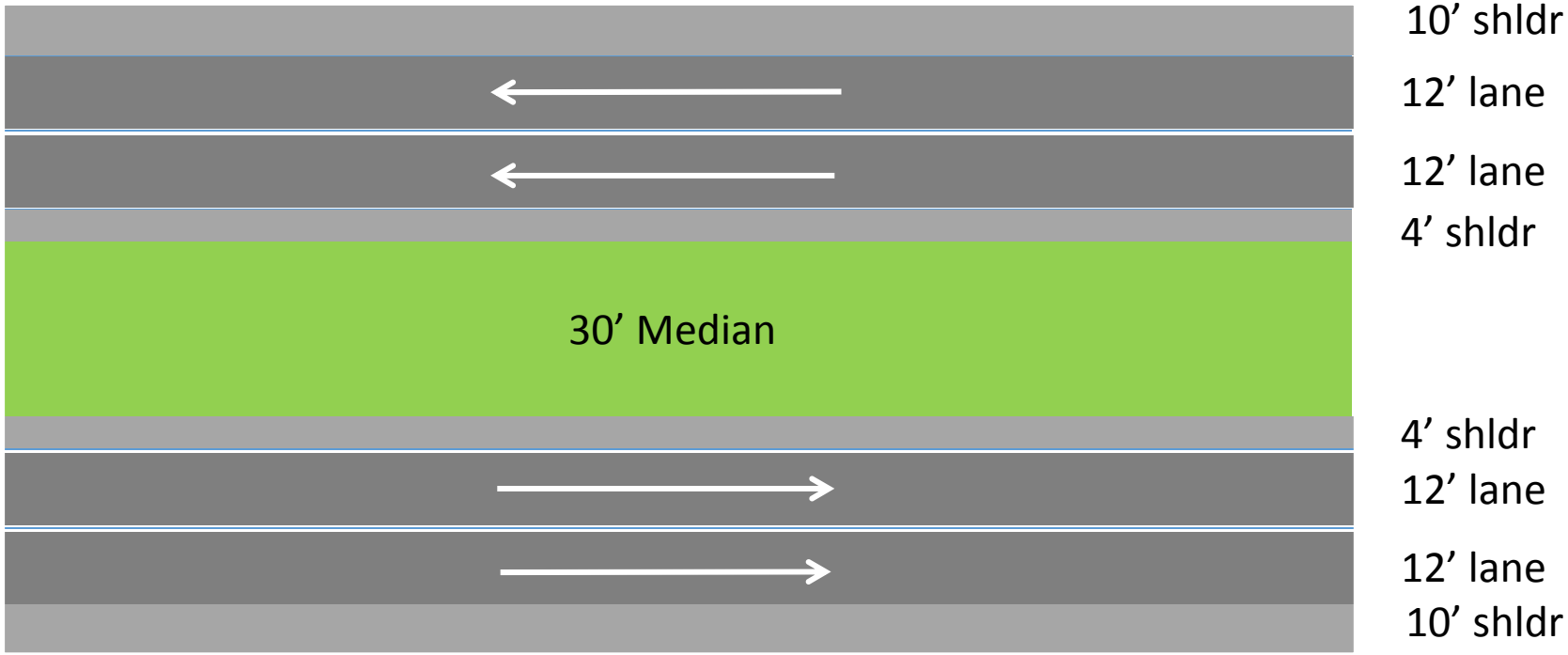
Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

Texas Department of Transportation
Texas A&M Transportation Institute

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

Exercise A: Pavement Strengthening



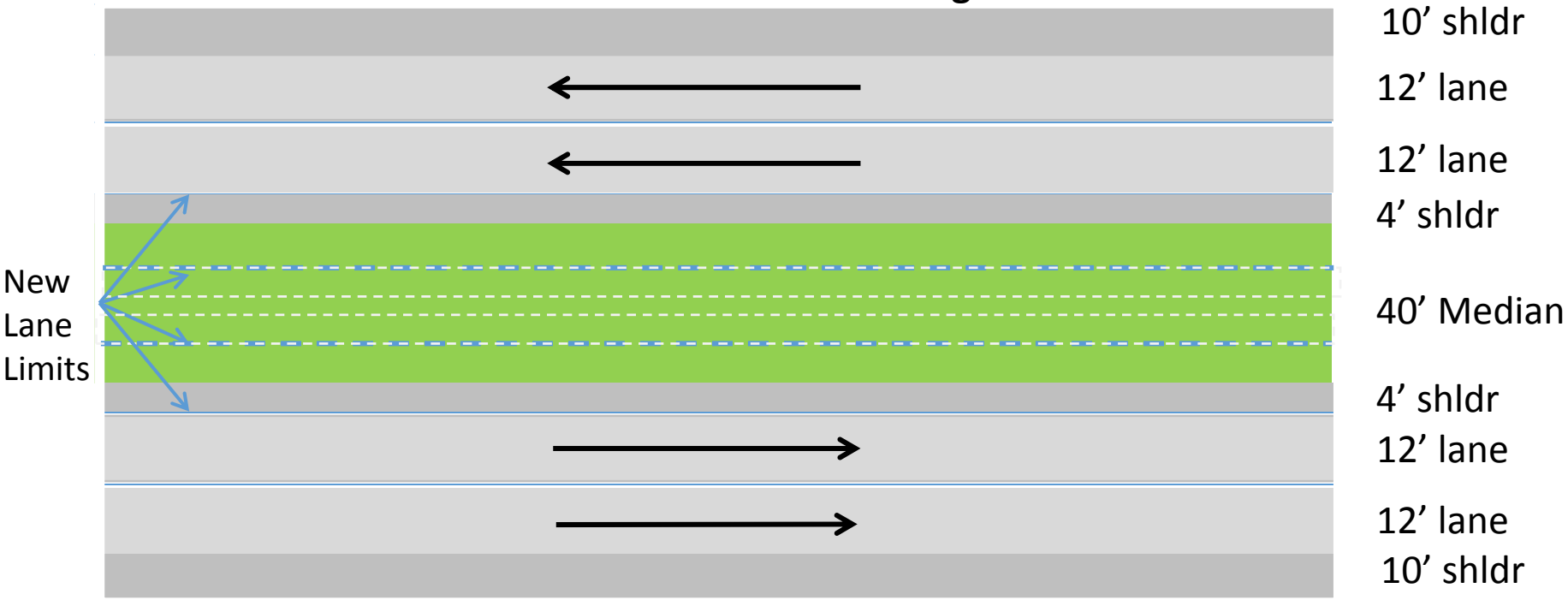
Project Details:

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

Exercise B: Pavement Widening



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

Possible Detours:

Frontage road requires strengthening, ramps @ 1.5 mi. interval

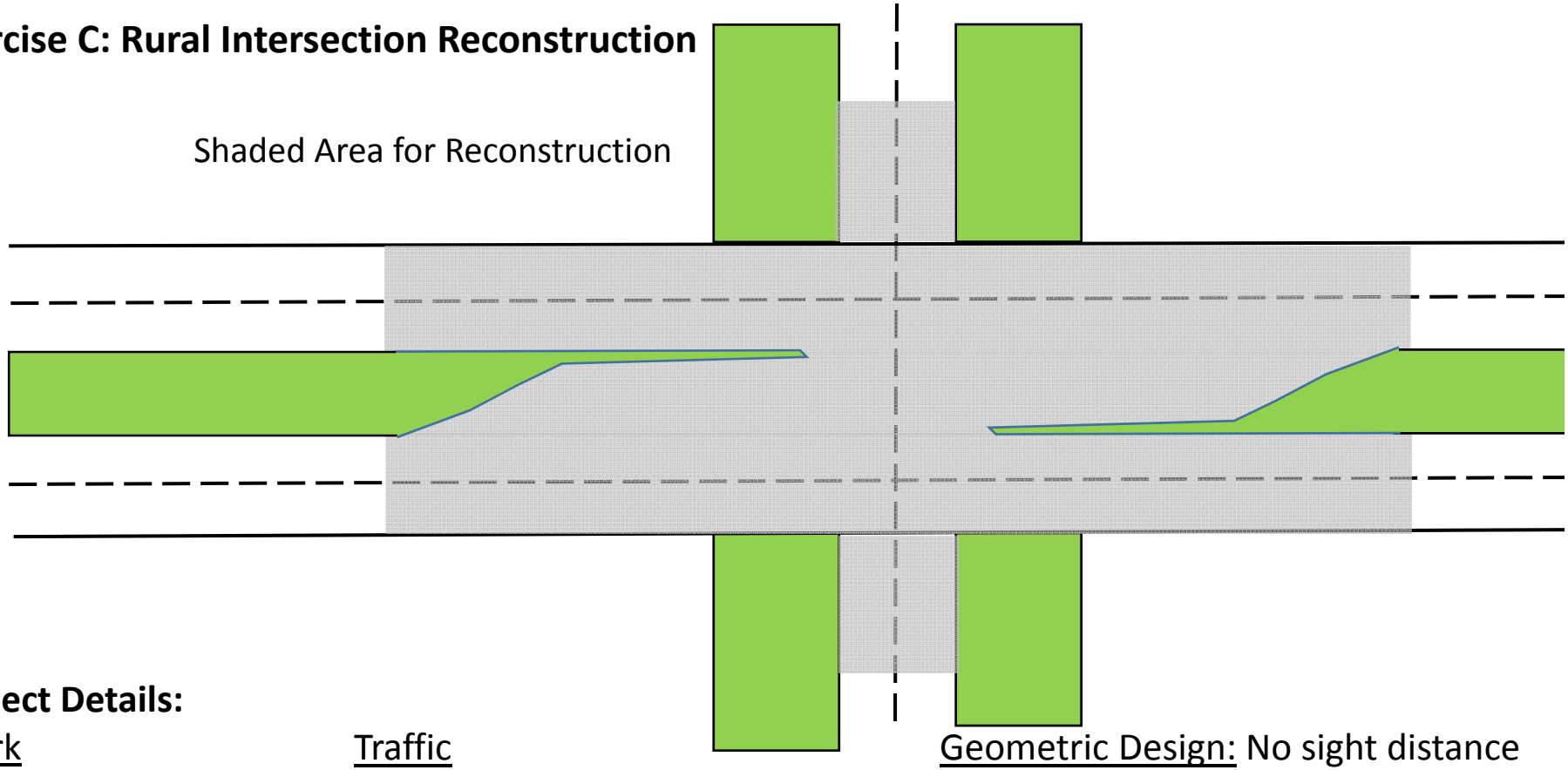
Geometric Design: High speed freeway design

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 C: Rural Intersection Reconstruction



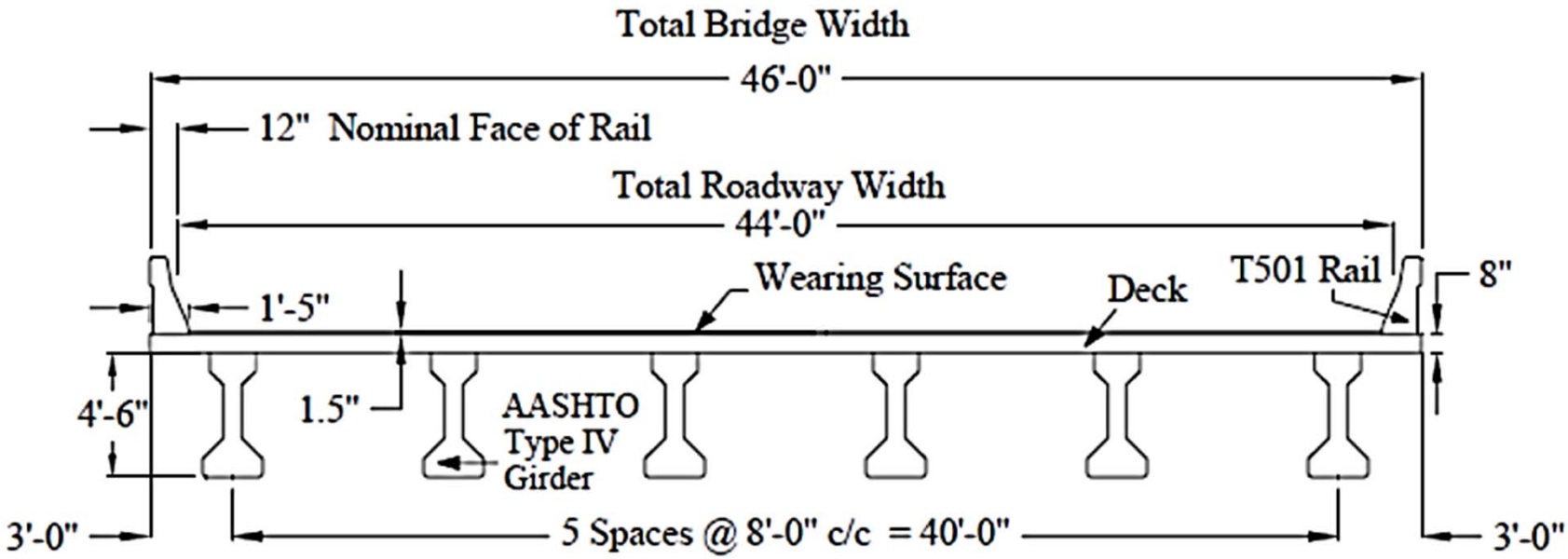
Project Details:

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



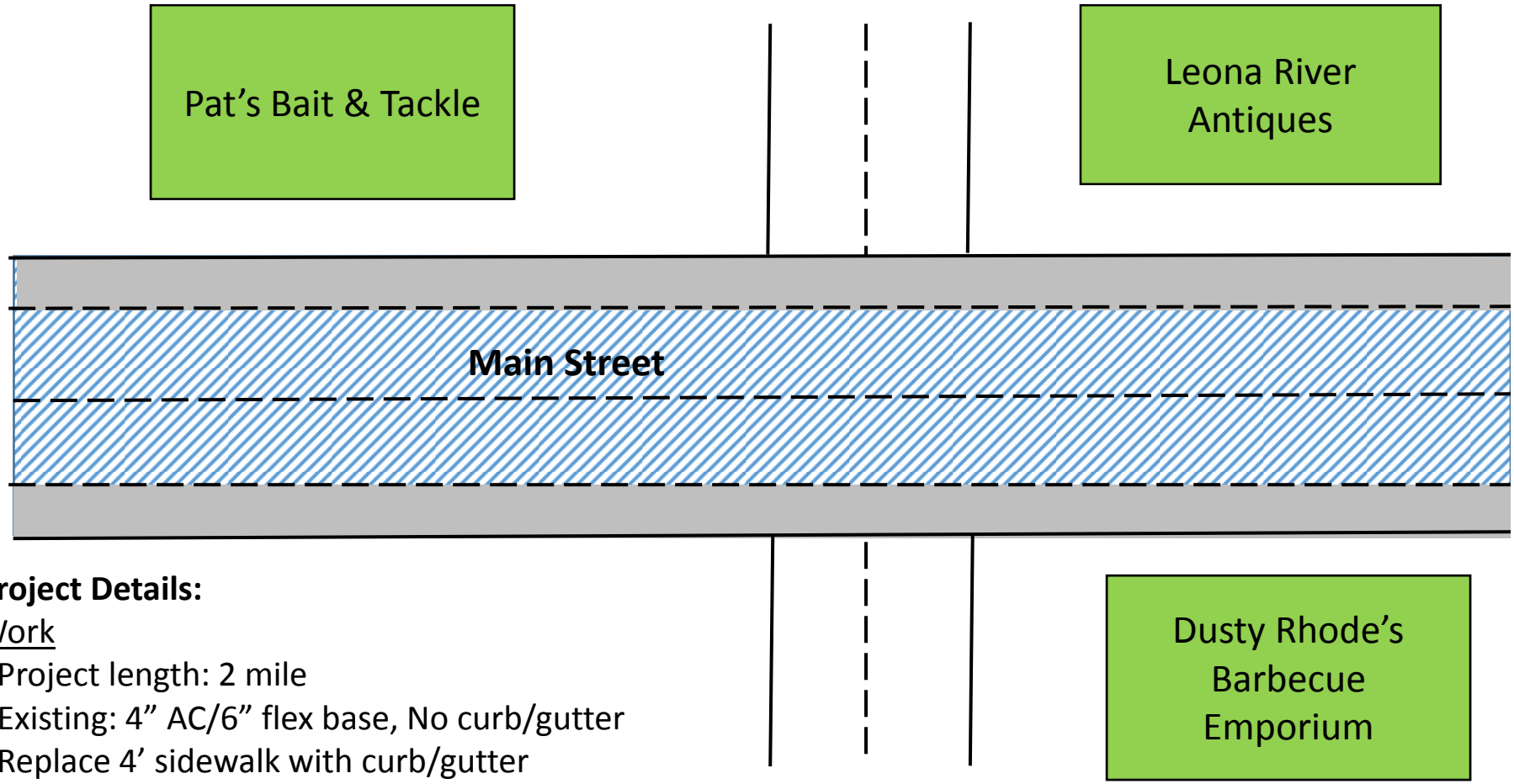
Project Details

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

Exercise E: Small Town Main Street



Project Details:

Work

- Project length: 2 mile
- Existing: 4" AC/6" flex base, No curb/gutter
- Replace 4' sidewalk with curb/gutter
  - 6' Shldr. Widening
  - 2" Overlay
- Soil: Expansive clay

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.)

Geometric Design: Tangent section, 10 cross roads

Drainage: Install storm drains

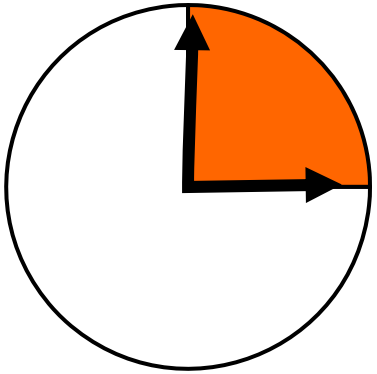
Utilities: Relocate cable, install electrical for lighting

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

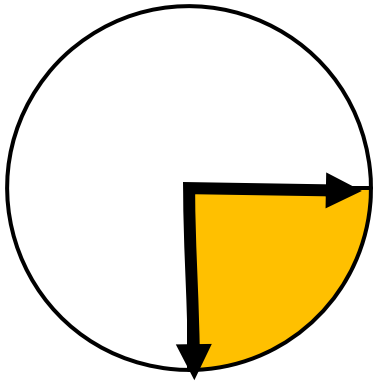
Items to Consider

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

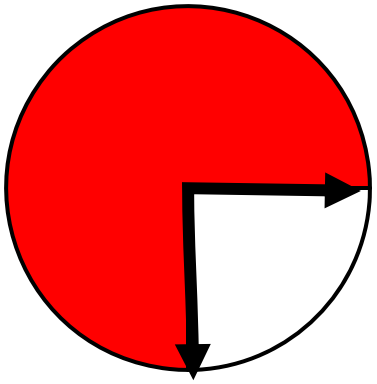
Suggested Time Utilization



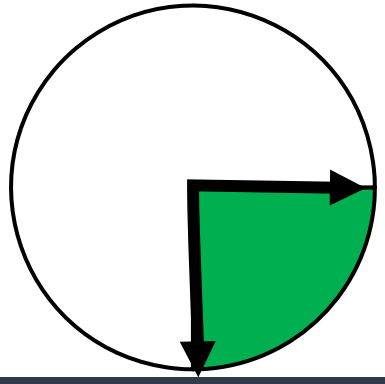
- General project discussion – 15 min



- Items to consider – 15 min



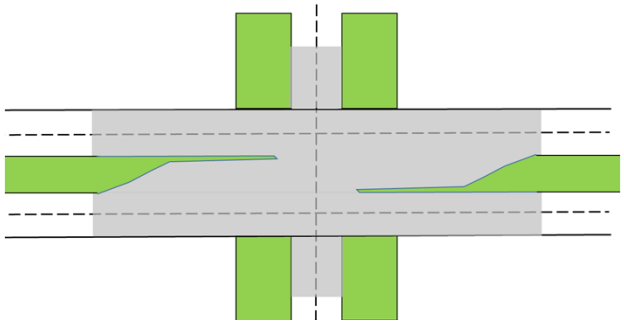
- Top five challenges – 45 min



- Information needs – 15 min

Facilitator Report

- Briefly describe project
- Top 5 challenges
- Information needs



1. _____
2. _____
3. _____
4. _____
5. _____

Exercise	Room	Facilitator	Recorder
A-Pavement Strengthening	Chatauqua A	Victor Vargas	Carlos Arcila
B-Pavement Widening	Chatauqua B	Lea Jacobson	Brenda Guerra
C-Rural Intersect. Reconstruction	River A	Bobby Ramthun	Diana Schulze
D-Bridge Widening	River B	Jose Mendez	William Semora
E-Small Town Intersection	Veramendi J (here)	Cathy Kratz	Hector Siller

Guidelines for Breakout Groups

District Workshops on
Accelerated Construction

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

Texas Department of Transportation

Texas A&M Transportation Institute

District Workshops on Accelerated Construction

Workshop Summary

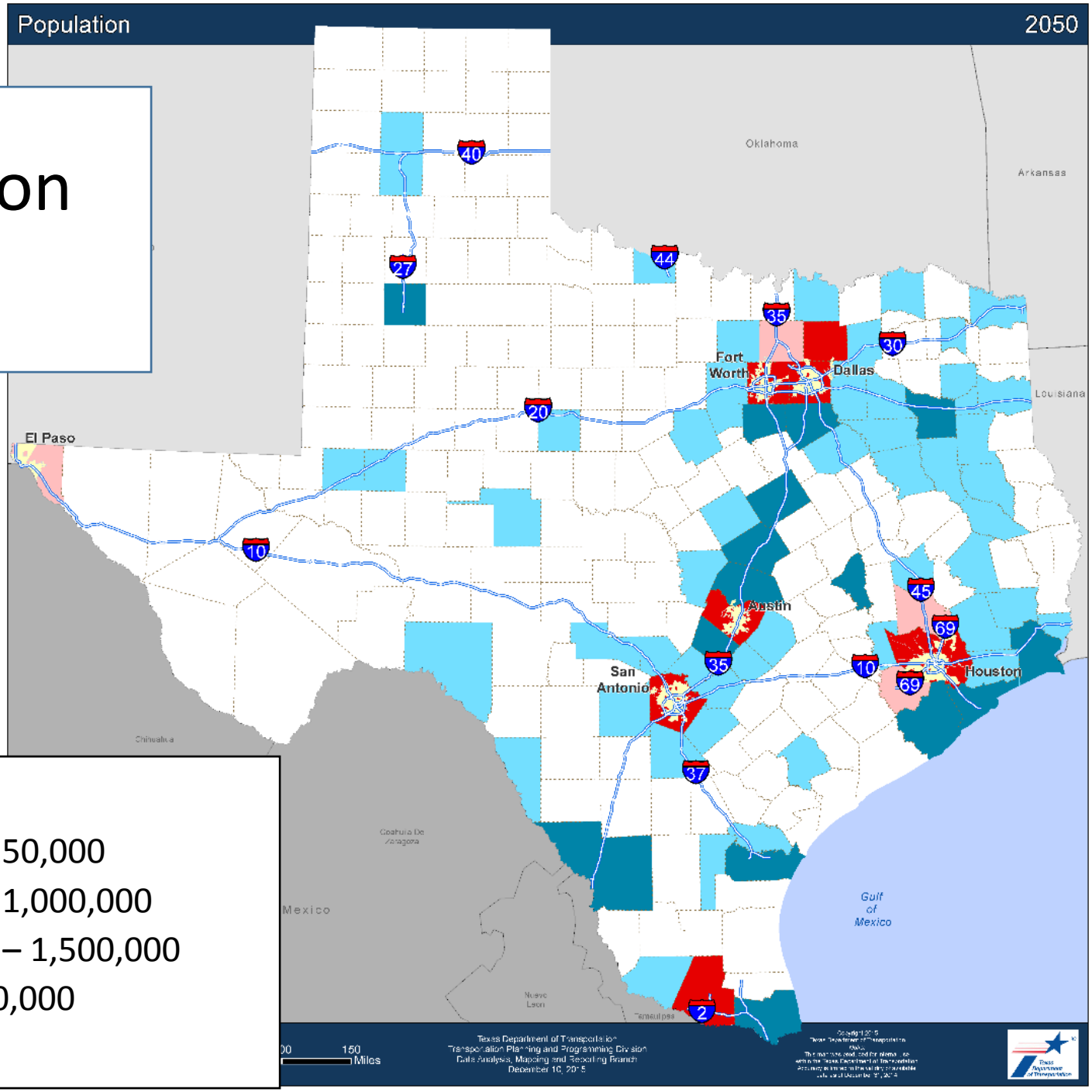
AC-PP-17-14

Jon Epps

Austin, San Antonio
Embassy Suites, San Marcos
August 1, 2017

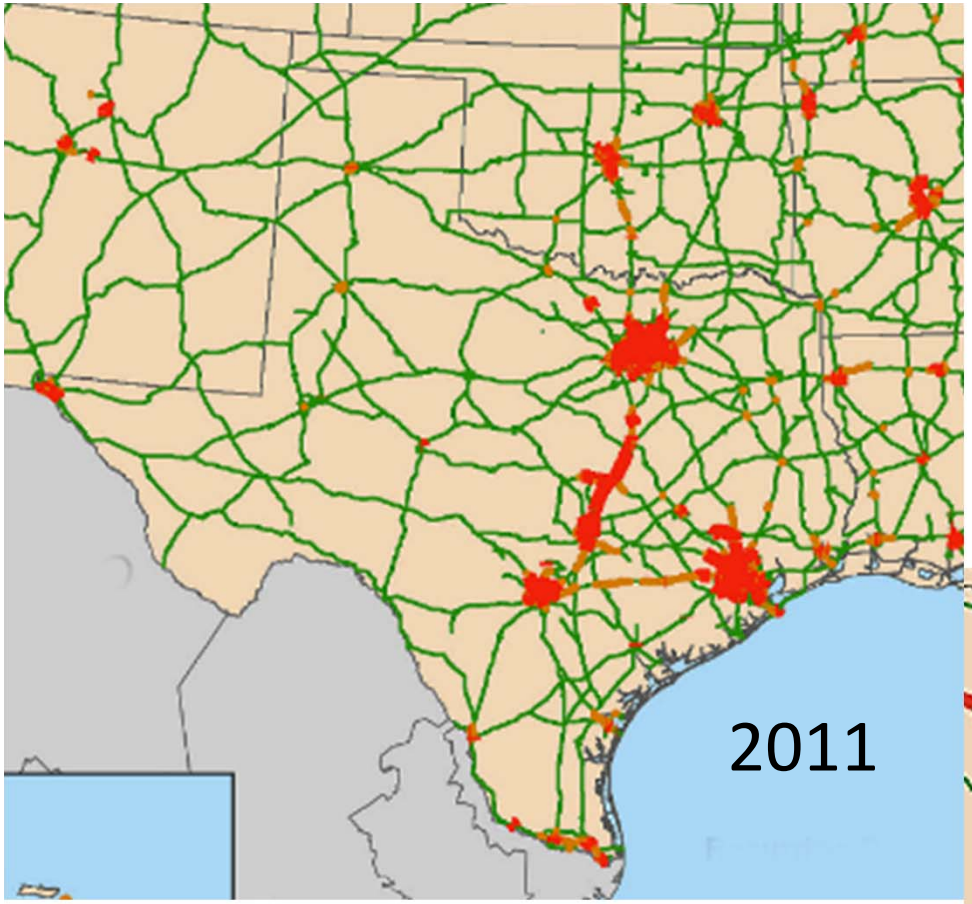
Texas Department of Transportation
Texas A&M Transportation Institute

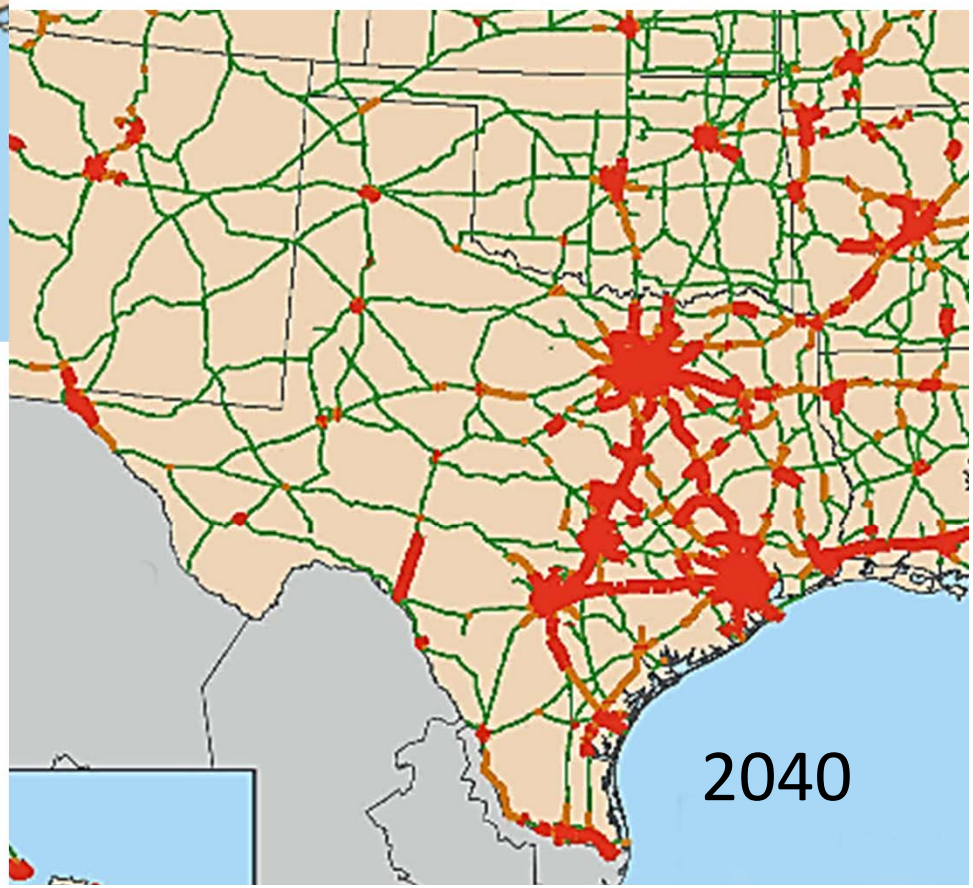
Population 2050



- 1 - 50,000
- 50,000 – 250,000
- 250,000 – 1,000,000
- 1,000,000 – 1,500,000
- Over 1,500,000

Peak-Period Congestion on NHS





Recurring Peak-Period Congestion

- Uncongested
- Congested
- Highly Congeste

Texas Department of Transportation

2017 Unified Transportation Program (UTP)

2017–2026

Transportation Planning & Programming

Unified Transportation Plan

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.

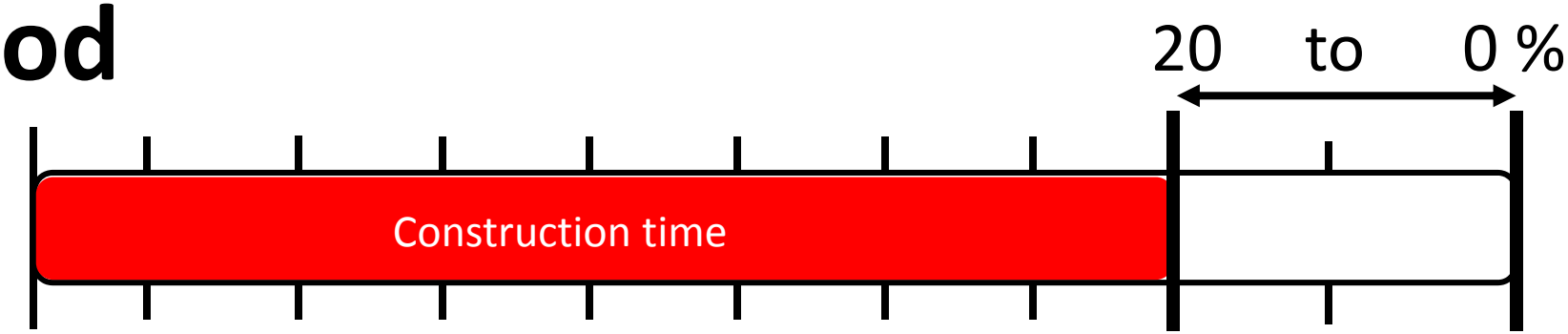
We Build Texas

Interest in Construction

- Visibility to public
- Safety
- Economics

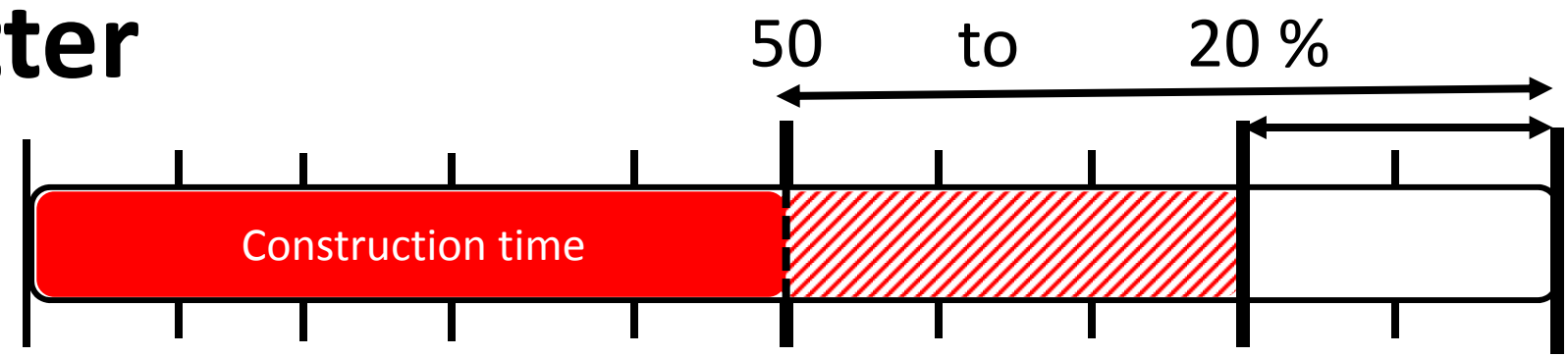
Acceleration Goals

Good



reduction in time to complete project

Better



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

Planning & Programming	Preliminary Design	Environmental	ROW Utilities	PS&E

• Need
• Scope
• Cost estimate
• Authorization
• Planning
• Funding
	Design Concept
	• Data Collection
	• Public meetings
	• Schematics
	  • Preliminary
	  • Geometric
	• Value Engineering
		• Preliminary
		• Interagency
		• Documentation
		• Public hearing
		• Clearances
			• Data Collection
			• ROW map
			• Appraisals
			• Acquisition
			• Utility adjustment
				• Design details
				• Final alignment & profiles
				• Roadway
				• Operational
				• Bridge
				• Drainage
				• Misc structures
				• Traffic control
				• Review

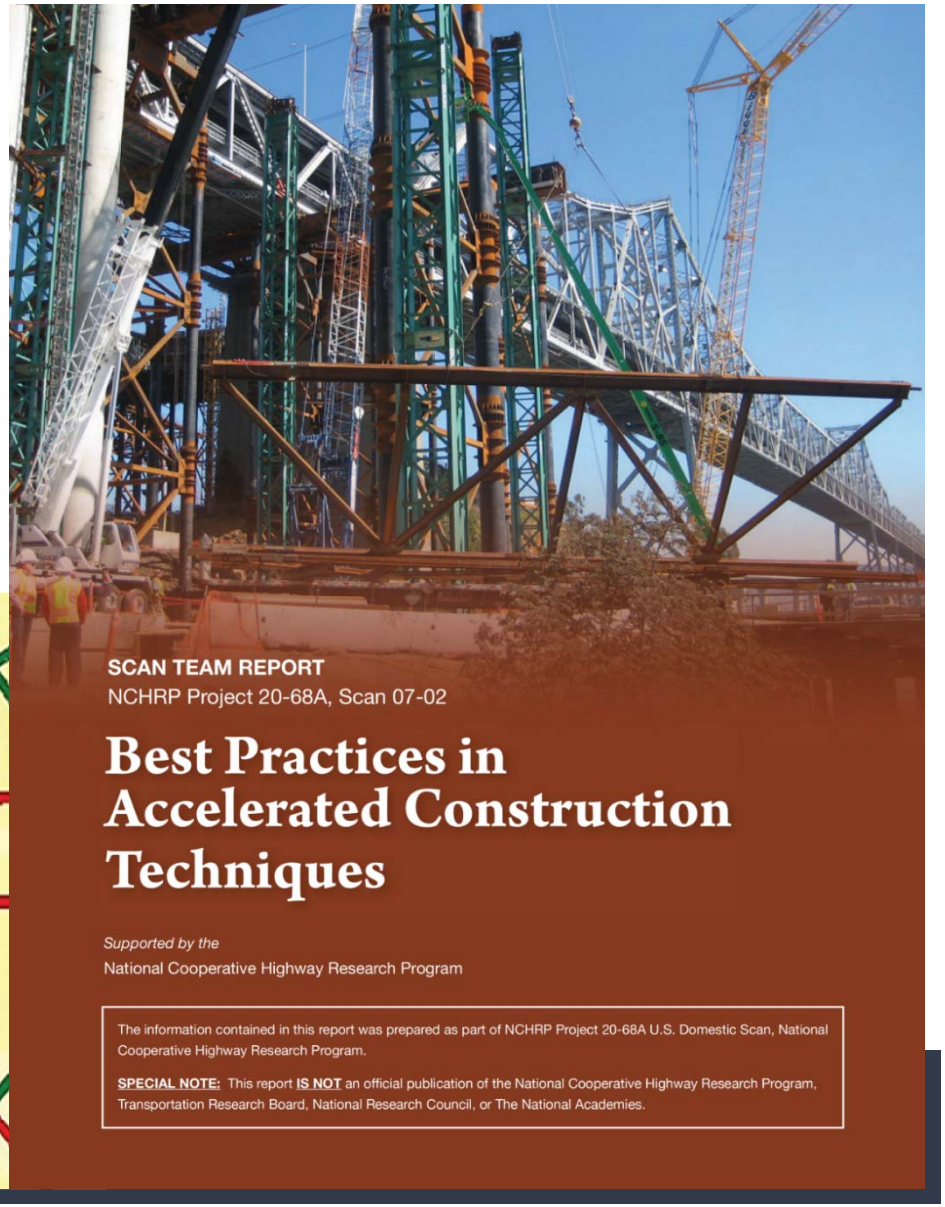
Letting

Construction

Time

Katy Freeway (IH-10)

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

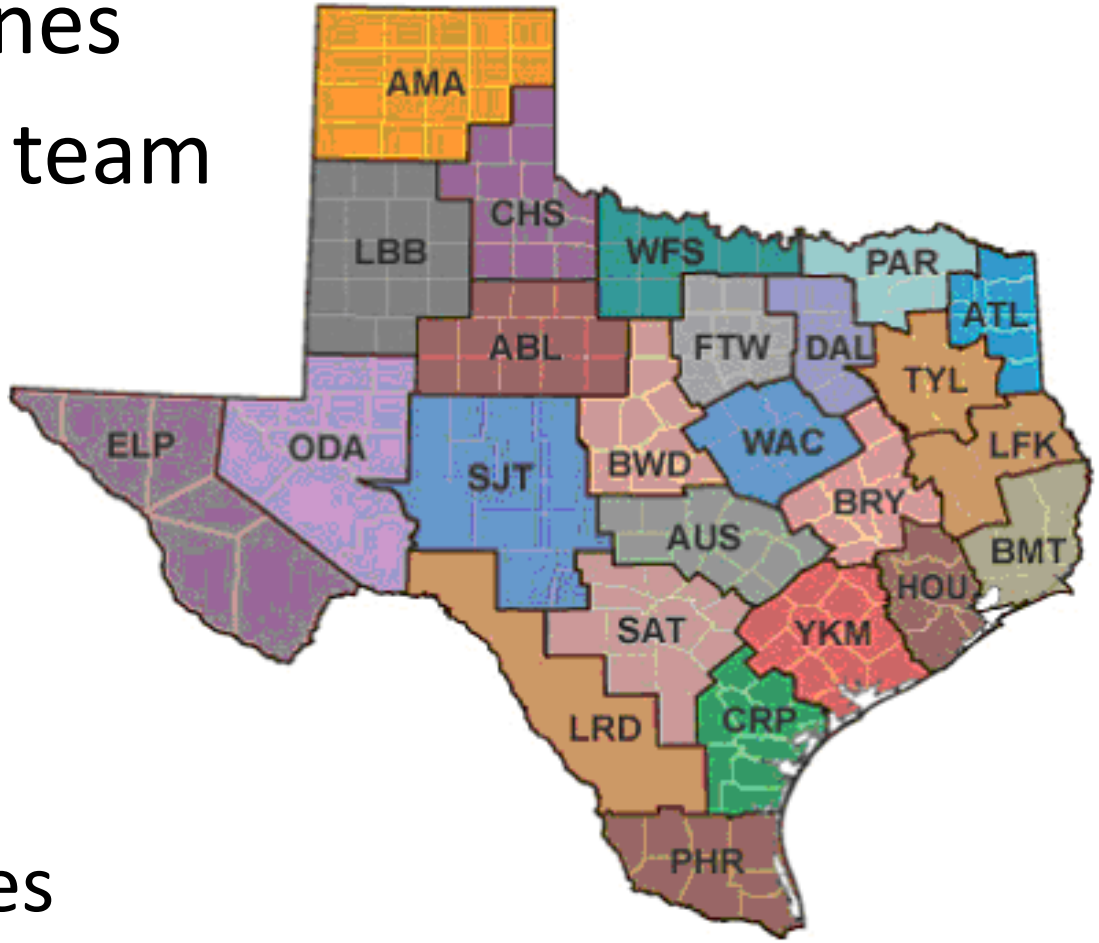


Economic Incentives - Contractor

- 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

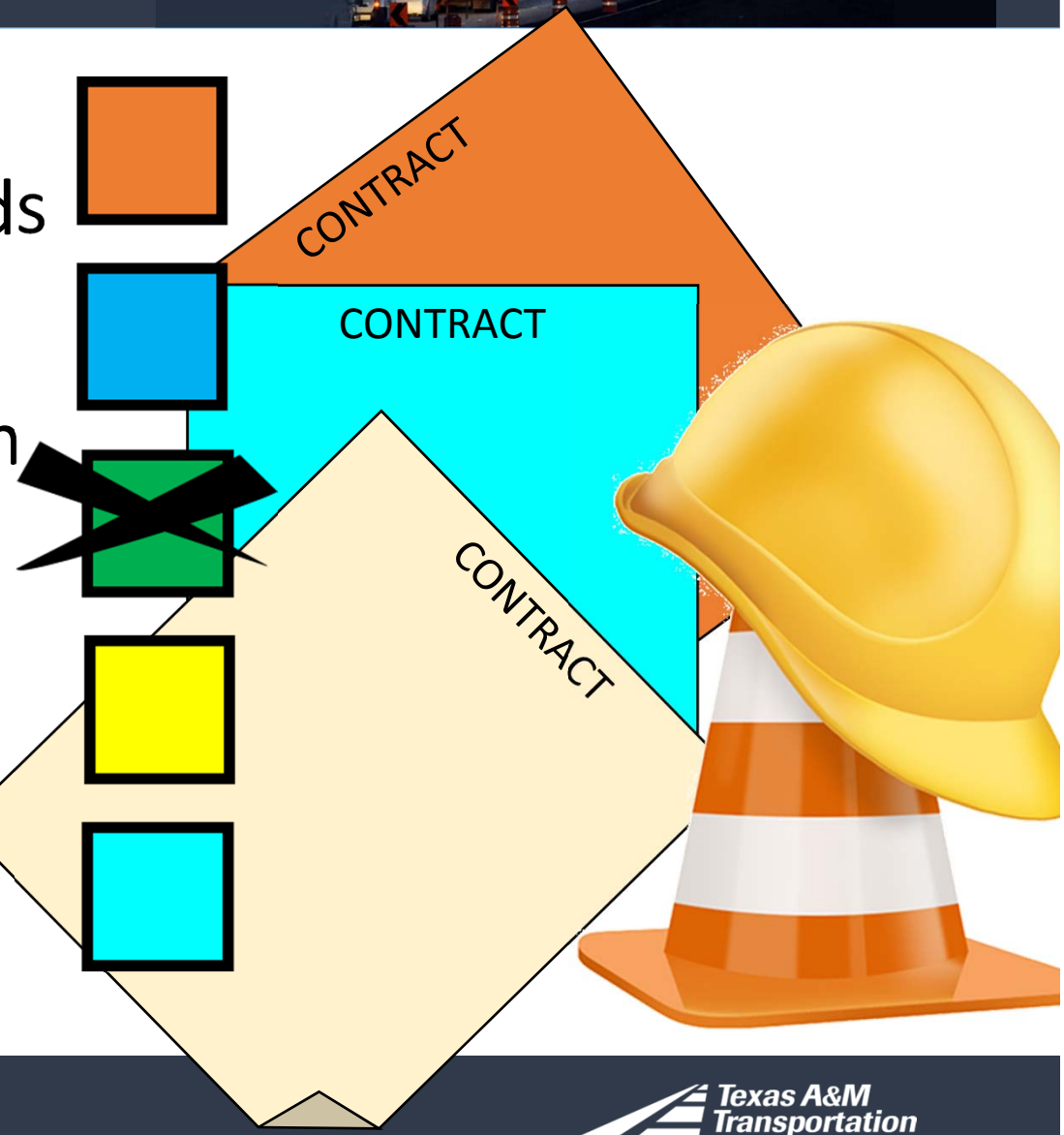


Involvement of Contractor

- Planning and design review
- Partnering
- Communication
- Workforce

Development Needs

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



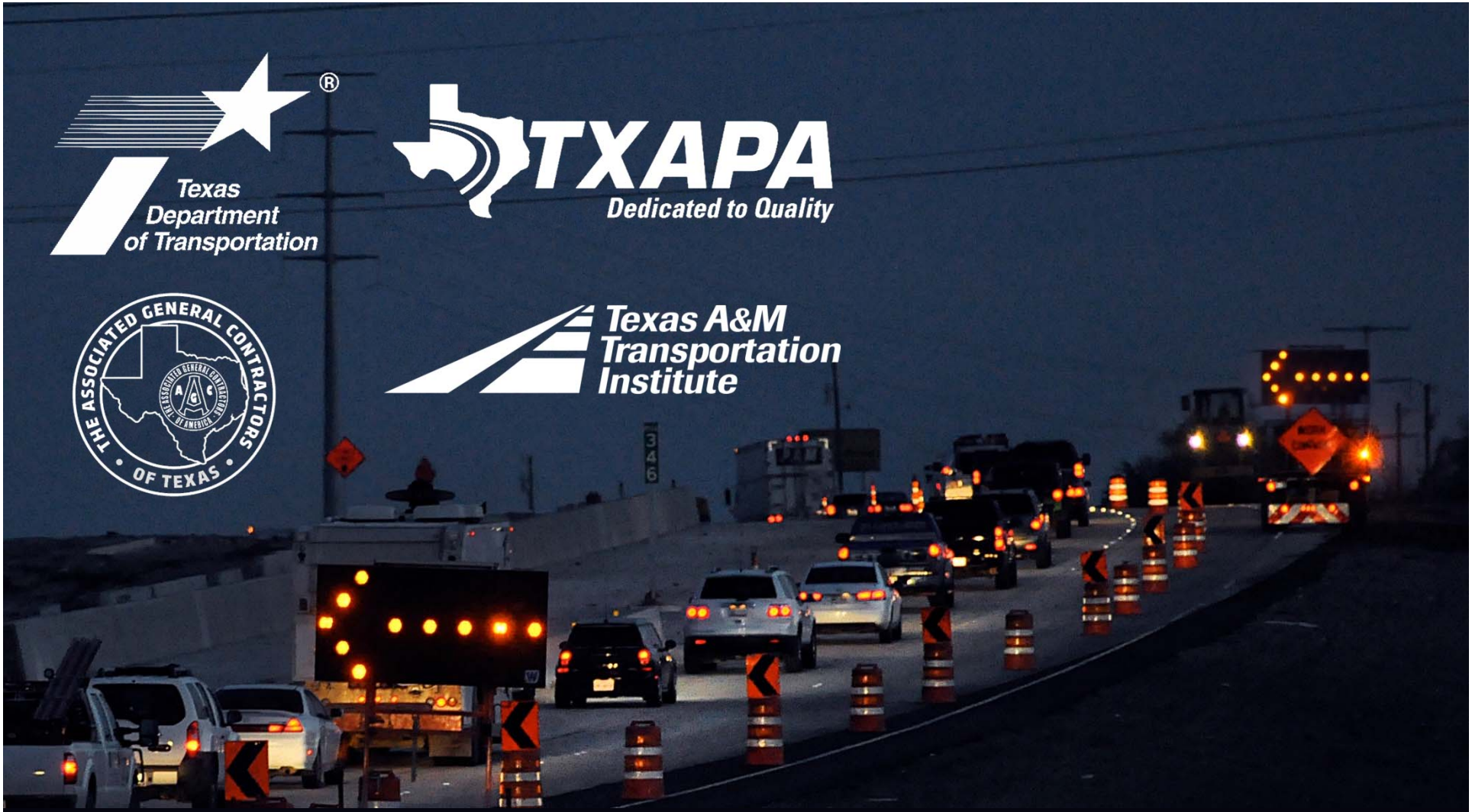
Development Needs

- 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

CAUTION

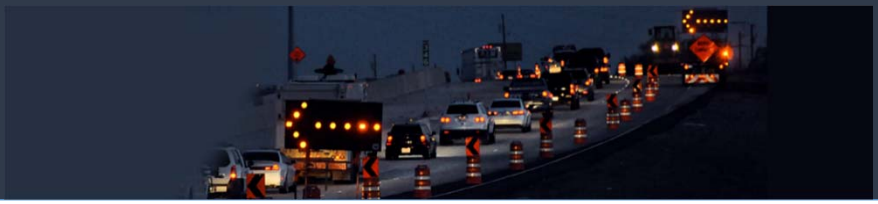
Not All Projects Are Suitable for Accelerated Construction

Get IN
Stay IN
Get OUT
Stay OUT



District Workshops on
Accelerated Construction

Slides Available



www.txdot.gov/business/resources/construction/regionalworkshops.html

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