



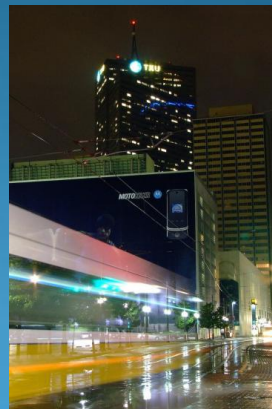
Transit Signal Priority Project in the City of Dallas Downtown Transit Mall



2010 TexITE Winter Meeting
Frisco, Texas
January 29, 2010



Presentation Outline

- Background
- Study Limits
- Project Goals
- Partial Priority System Overview
- Detection
- Communications
- Peer-to-Peer
- Closing





Background

- Partnership between City of Dallas and DART
- DART – Additional rail line
- Downtown Dallas – All lines share tracks
- Increased number of trains in Downtown Mall

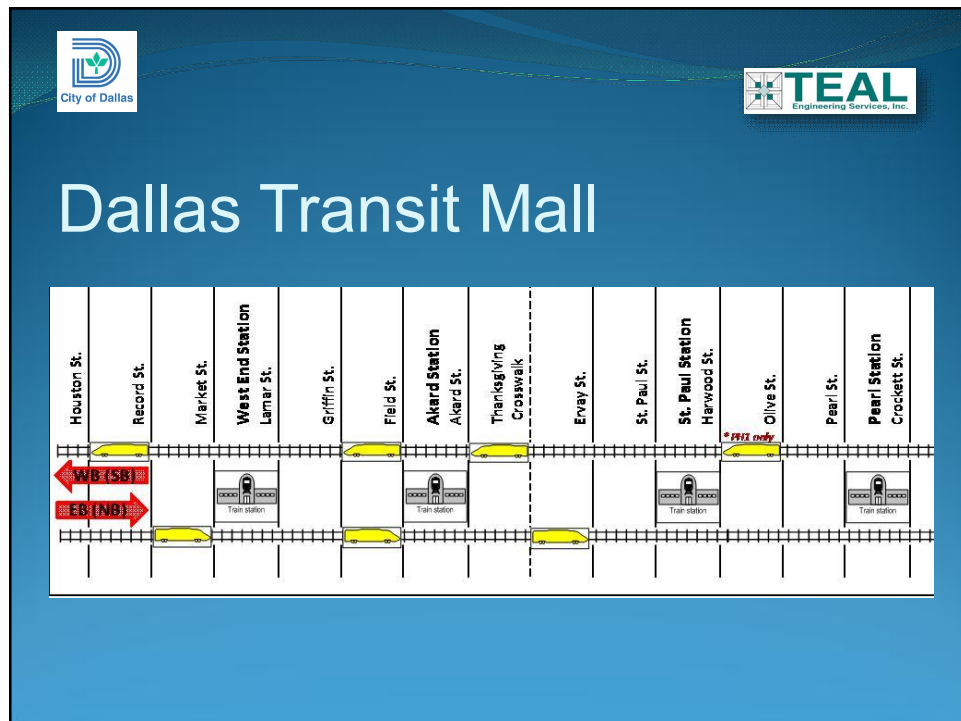
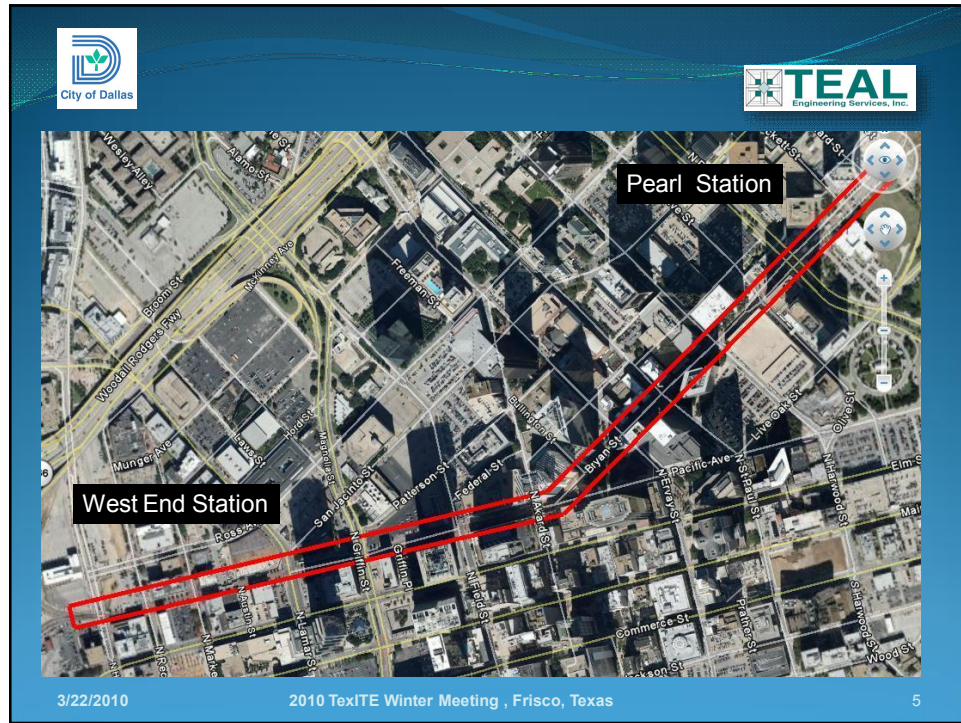
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Study Limits

- DART tracks in Downtown Dallas
- Four rail stations
- Fourteen signalized intersections
 - Trains
 - Vehicles
 - Pedestrians

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Project Goals

- City of Dallas
 - Pedestrian Service
 - Maintain existing level of service
 - Vehicle progression
 - No intersection blockage
- DART
 - Support 2.5 minute headways
 - Non-stop Station-to-Station travel



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TSP Elements

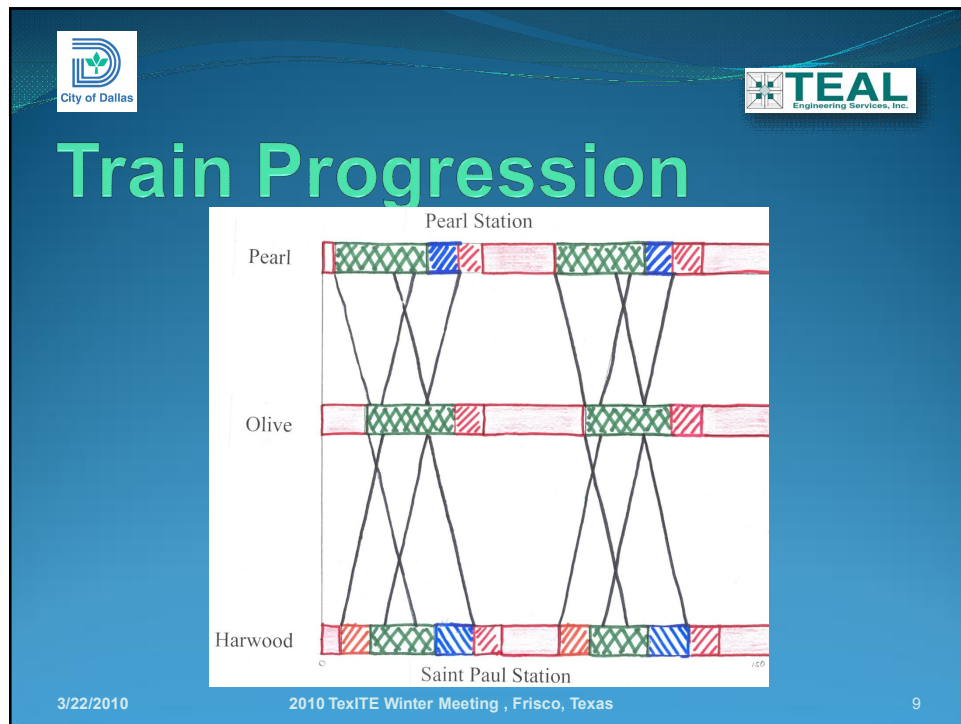
- Partial Priority Logic
- Train Detection
- Holding Blocks
- Communication
- Peer-to-Peer Messaging



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Train Detection

- Detect train presence in stations
 - Normal boarding
 - Hy-block boarding
 - Activate Countdown Timers
 - Train Roll-up
 - Sends track clear input upstream
 - Calls for Partial Priority
- Detect train presence at intersections
 - Track not clear
 - Call for Partial Priority

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Detection Types

- Wireless Magnetometers
- Operator-Initiated Train-To-Wayside (TWC)
- Time-of-Flight Infrared

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Time of Flight Infrared Detection

- Used extensively in other industries
- Compact
- Ability to set detection limits
- Detects top edge of trains

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Infrared Detection



Station Enclosure



Intersection Enclosure

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Communication Network

- Implemented and maintained by DART
- Provides connection between intersections and stations
- Redundant system
 - Wireless
 - Fiber/Wireless
 - Ethernet over Twisted Pair



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Peer-to-Peer Messaging

- Utilizes ModBus Protocol
- Transmits Trains detector inputs between intersections
- Interfaces with Controller
- External logic capabilities to assist 170 controller
 - Pre-processes detector inputs
- Creates virtual presence
- Monitors loss of communications

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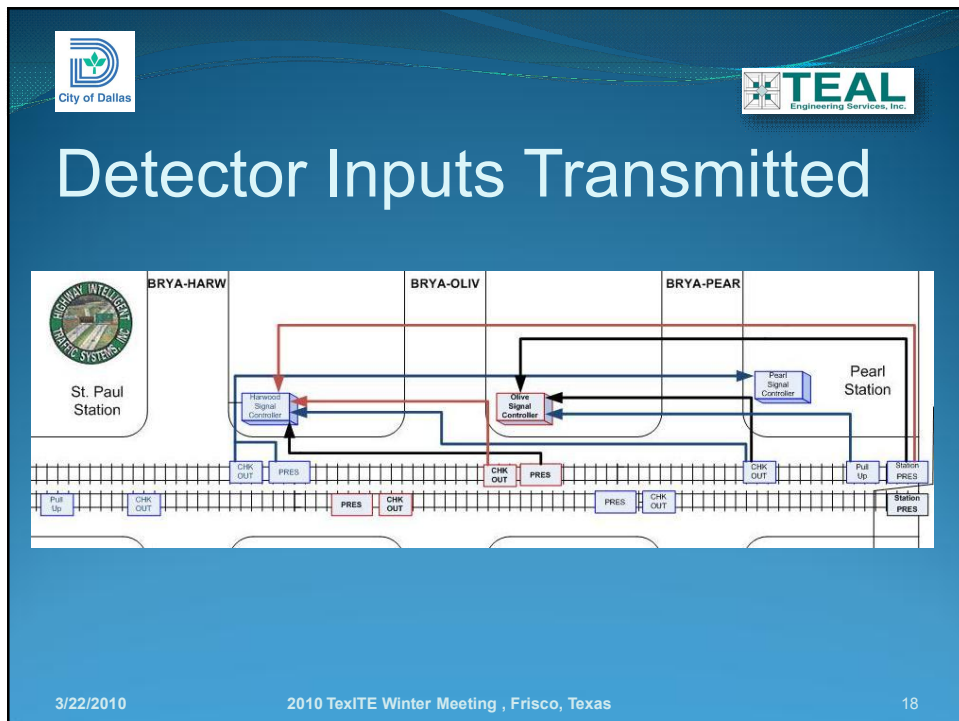
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Peer-to-Peer




Warning – Don't try this at home

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Phase I Complete

- Accommodates 2.5 minute train headways
- Provides nonstop station to station travel
- Eliminates intersection blockage
- Maintains vehicular levels of service

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TSP Phase II

- Vehicle queue detection system
- All-way pedestrians
- Integration with Junctions
- Eliminate Hy-Block Boarding
- Train length detection
- Controller Upgrade



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The TSP TEAM

<ul style="list-style-type: none"> • DART • City of Dallas • The TEAL Team <ul style="list-style-type: none"> • TEAL Engineering Services • Cactus Computer Inc. • Highway ITS • HDR Engineers • Savant Group, Inc. • DKS • TTI 	<p>Abed Abukar</p> <p>Mark Titus</p> <p>Gary Jost</p> <p>Jake Smith</p> <p>David Steffen</p> <p>Paul Luedtke</p> <p>Susan Langdon</p> <p>Mike Wobken</p> <p>Roberto Macias</p>
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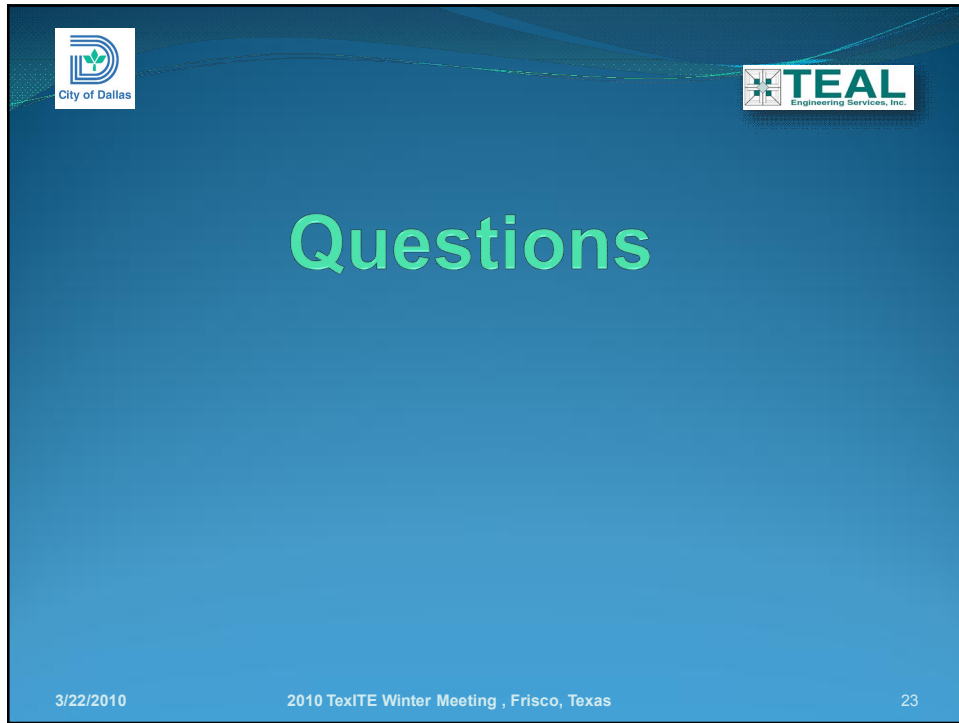



Closing

- Stretched the capabilities of 170 controllers to its limits
- Implemented Out-of-the-box solutions
- Lesson learned valuable for Phase 2

- TSP complete and working in Downtown Transit Mall

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The slide features a blue gradient background with a wavy line at the top. In the top left corner is the City of Dallas logo, and in the top right corner is the TEAL Engineering Services, Inc. logo. The word "Questions" is centered in a large, light green font. At the bottom, there is a footer with the date "3/22/2010", the event name "2010 TexITE Winter Meeting , Frisco, Texas", and the page number "23".

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Questions

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