U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

ICM Deployers' Roundtable Webinar

HOSTS:

Steven Mortensen, Senior ITS Engineer, ITS Team, Office of Research, Demonstration and Innovation, Federal Transit Administration, U.S. Department of Transportation

Robert Sheehan, P.E., PTOE, Multimodal ITS Research and Deployment Program Manager, ITS Joint Program Office, U.S. Department of Transportation

PRESENTERS:

Todd Plesko, Vice President for Planning and Development, Dallas Area Rapid Transit (DART)

Sarah Burnworth, Incident Management Program Coordinator, Metropolitan Transportation Commission (MTC)

Raj Murthy, Program Manager, Alameda County Transportation Commission (ACTC)

Integrated Corridor Management

Steve Mortensen, Senior ITS Engineer,
FTA, U.S. DOT

Bob Sheehan, P.E., PTOE, ITS Multimodal
Program Manager, FHWA, U.S. DOT

U.S. Department of Transportation
Federal Highway Administration

U.S. Department of Transportation
ITS Joint Program Office

The Reality: Operations Today

- Surface transportation systems are made up of several independent networks
  - Freeways, bus/rail transit, arterials, etc.
- Most efforts to reduce congestion have focused on optimization of individual networks
  - Agency/facility/mode – specific ITS systems & strategies
- Minimal cross-network management in response to increased demand / reduction in capacity

ICM Vision

- An opportunity exists to realize significant improvements in the efficient movement of people and goods through integrated and proactive management of major multimodal transportation corridors.

Integration

Institutional Integration

Coordination to collaboration between various agencies and jurisdictions that transcends institutional boundaries.

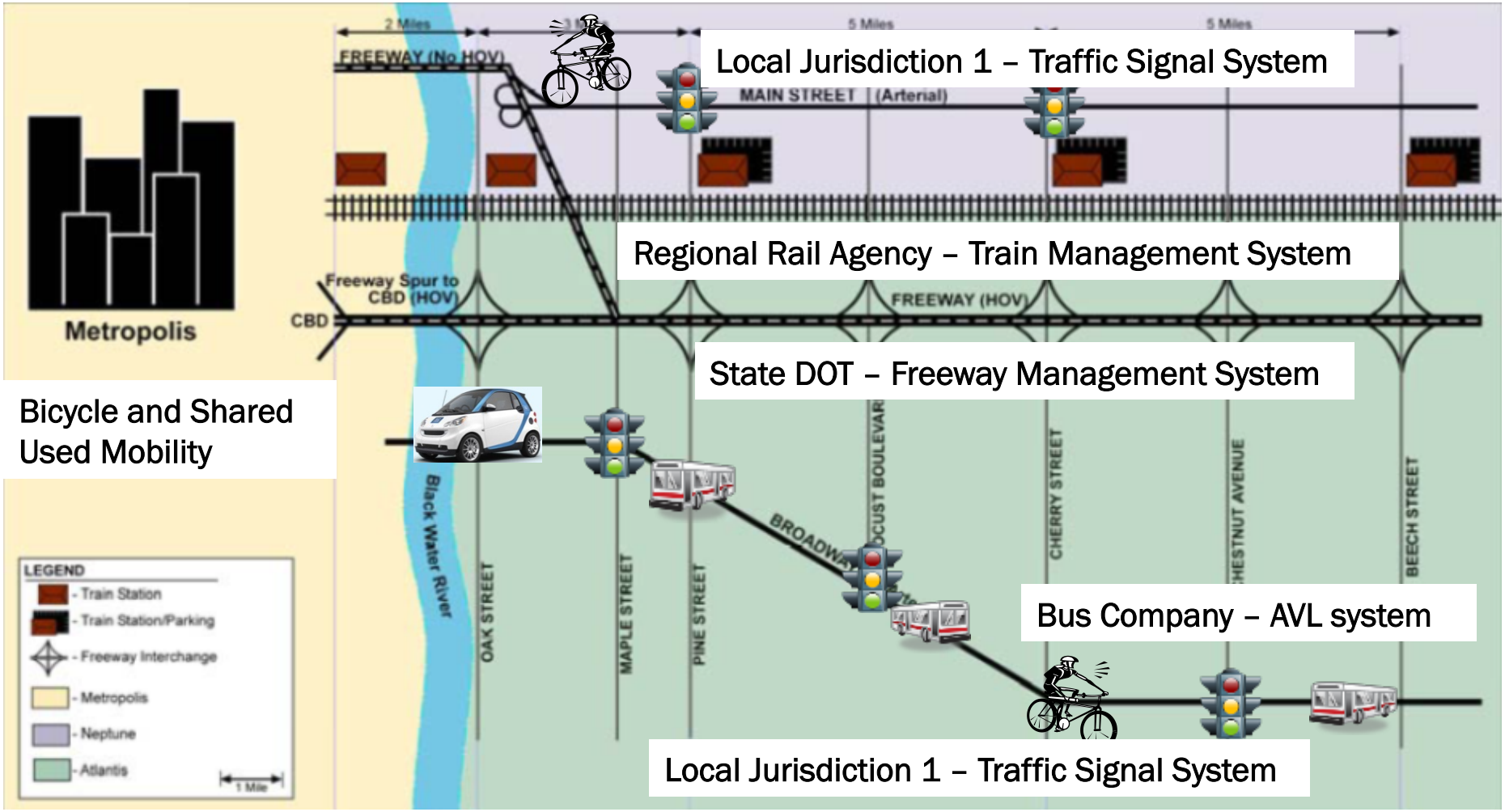
Operational Integration

Multi-agency and cross-network operational strategies to manage the total capacity and demand of the corridor.

Technical Integration

Sharing and distribution of information, and system operations and control functions to support the immediate analysis and response.

Generic Corridor



Stakeholders

- Roadway Agencies
- Planning Organizations
- Private Sector
- Transit Agencies
- Activity Centers
- Fleet Operations
- Public Safety
- Other agency departments
- Traveler

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ICM Analysis, Modeling, and Simulation Sites

US-75,

Dallas, TX

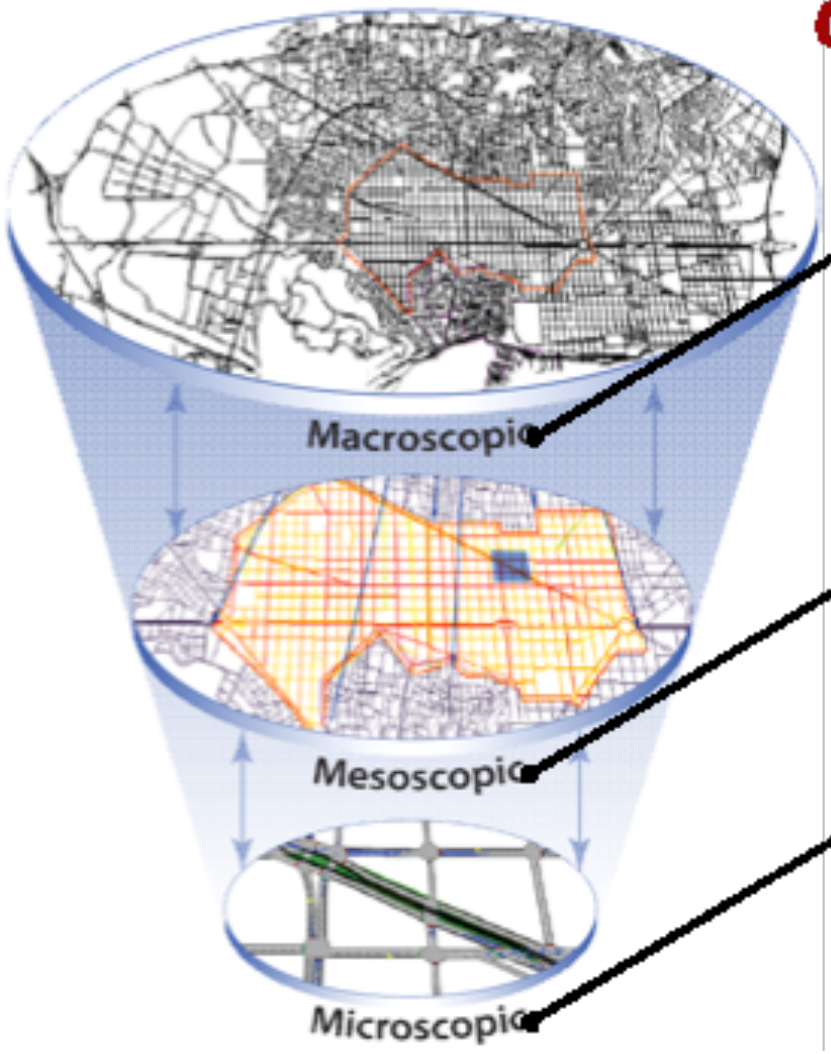
I-394,

Minneapolis, MN

I-15,

San Diego, CA

Multi-level Analysis Tools Provide Comprehensive Insight



Regional patterns and mode shift; Transit analysis capability

Traveler information, HOT lanes, congestion pricing and regional diversion patterns

Traffic control strategies such as ramp metering and arterial traffic signal control

Analysis, Modeling, & Simulation (AMS)

- **Improve the effectiveness/success of implementation**
  - Help identify problem areas
  - Help in building consensus among stakeholders
  - Optimize implementation staging
  - Provide insight to operators on how to refine ICM strategies in different operational conditions
- **Provide long-term capability to continually improve implementation based on experience**
  - Help evaluation effort focus on areas of highest impact

ICM Demonstration Sites

I-15, San Diego, CA

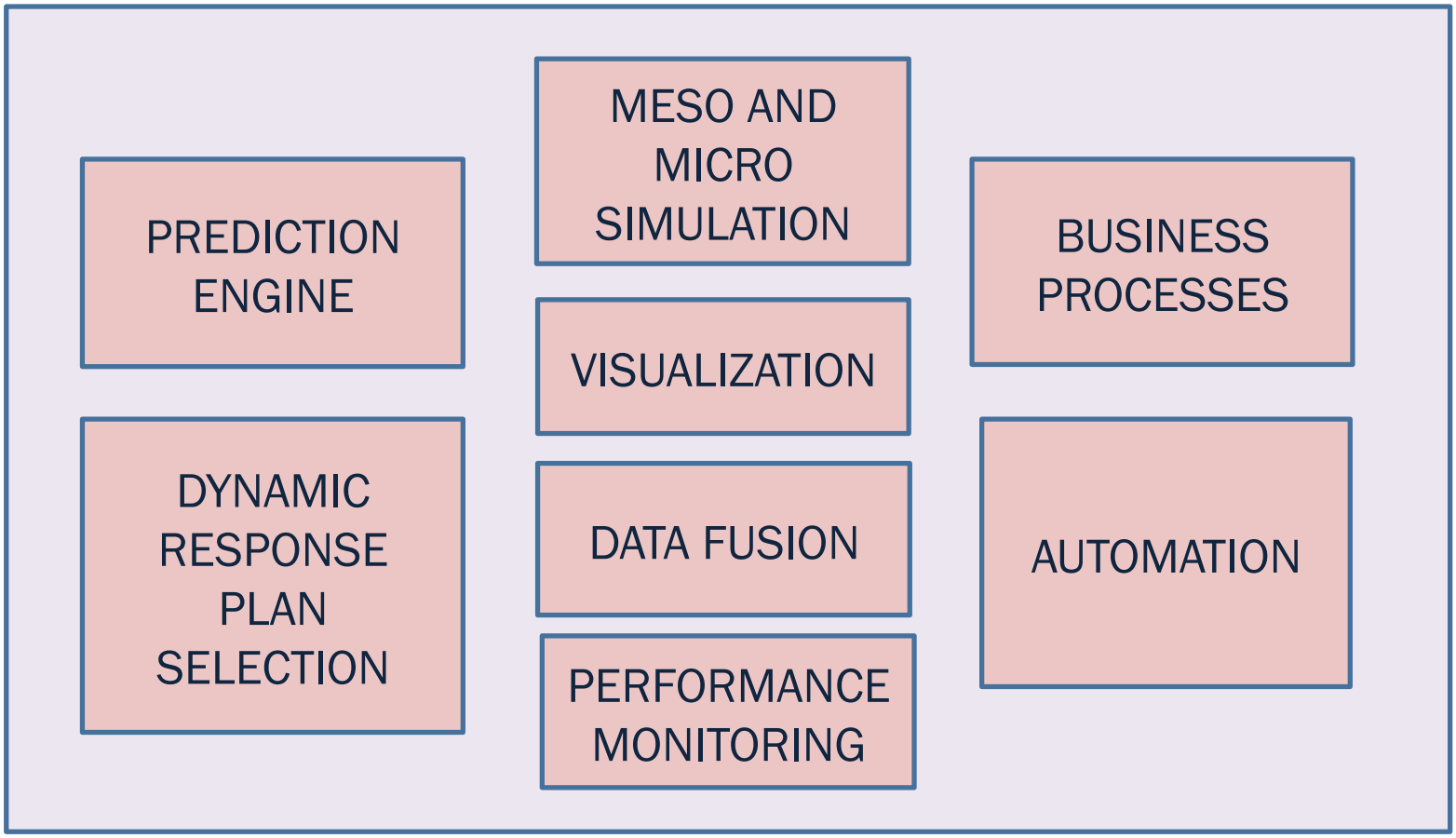
US-75, Dallas, TX

Demonstrations Include:

- Joints operations agreements
- Transit options – LRT and BRT
- Mode, route, time shift approaches
- Improved junctions between modes and facilities
- Real-time multi-modal data integration
- Parking systems
- Responsive signal and meter operations
- Data availability to public/ private
- Advanced Traveler Information approaches
- Shared and automated control

KEY: Implemented at a corridor-level, multi-jurisdictional, multi-modal fashion

Real-Time Decision Support Systems



Evaluation Questions

- Did the implementation of ICM:
  - Improve situational awareness?
  - Enhance response and control capabilities?
  - Provide better information to travelers?
  - Improve corridor performance?
- Did the implementation of ICM have a positive or no effect on:
  - Air quality?
  - Safety?
- Did the benefits justify the costs?
- How and what role did Decision-Support System (DSS) play?
- What were the Institutional and Organizational factors in success of the deployment?

Multi-pronged evaluation approach

Knowledge and Technology Transfer

- ICM Model Documents
- AMS Documents
- Guidance Documents
- Technical Support Workshops
- Peer-to-Peer Exchanges

Learn More

- **Sign up** for the ICM newsletter – anna.l.giragosian@leidos.com
- **Visit** the ICM website and bookmark the Knowledgebase - http://www.its.dot.gov/icms/

Poll Question #2

Do conditions exist in your region to support or consider ICM?

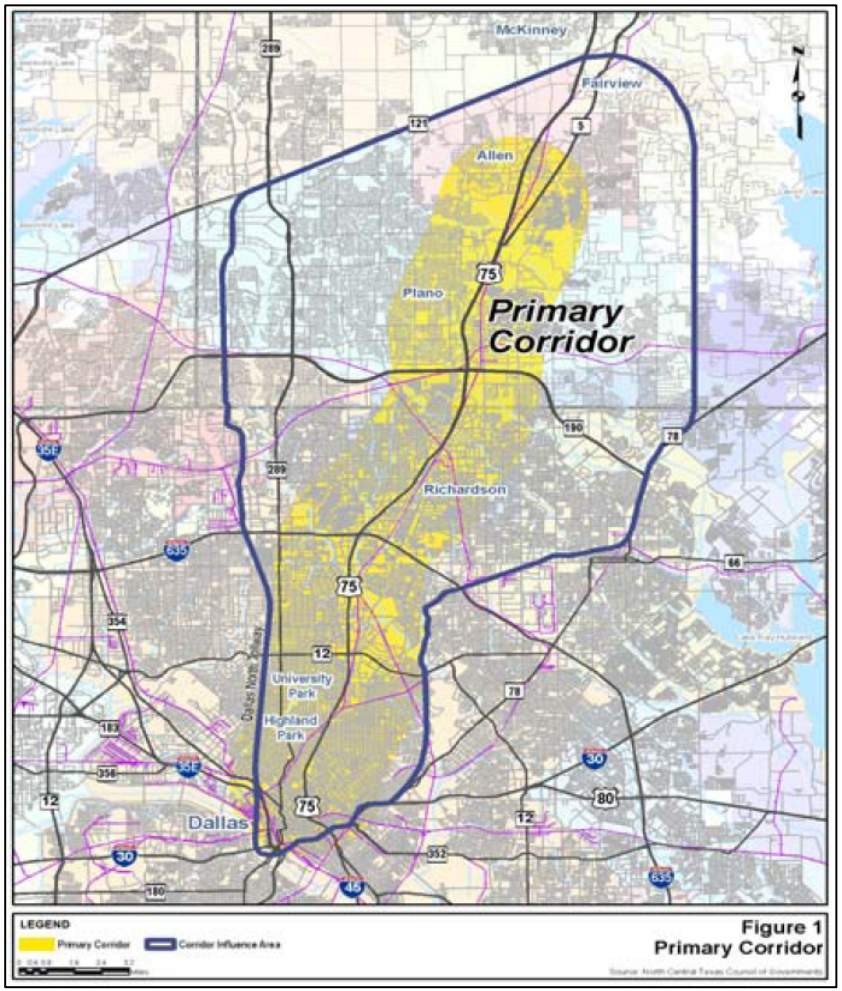
- ❑ Yes, ICM deployment in my region is underway.
- ❑ Yes, supporting another agency in my region deploying ICM.
- ❑ Yes, developing an ICM concept of operations.
- ❑ Yes, considering ICM deployment in the future.
- ❑ No, not considering ICM deployment at this time.

DALLAS INTEGRATED CORRIDOR MANAGEMENT SYSTEM LESSON'S LEARNED

ICM Deployer's Roundtable Webinar Series, Webinar #2

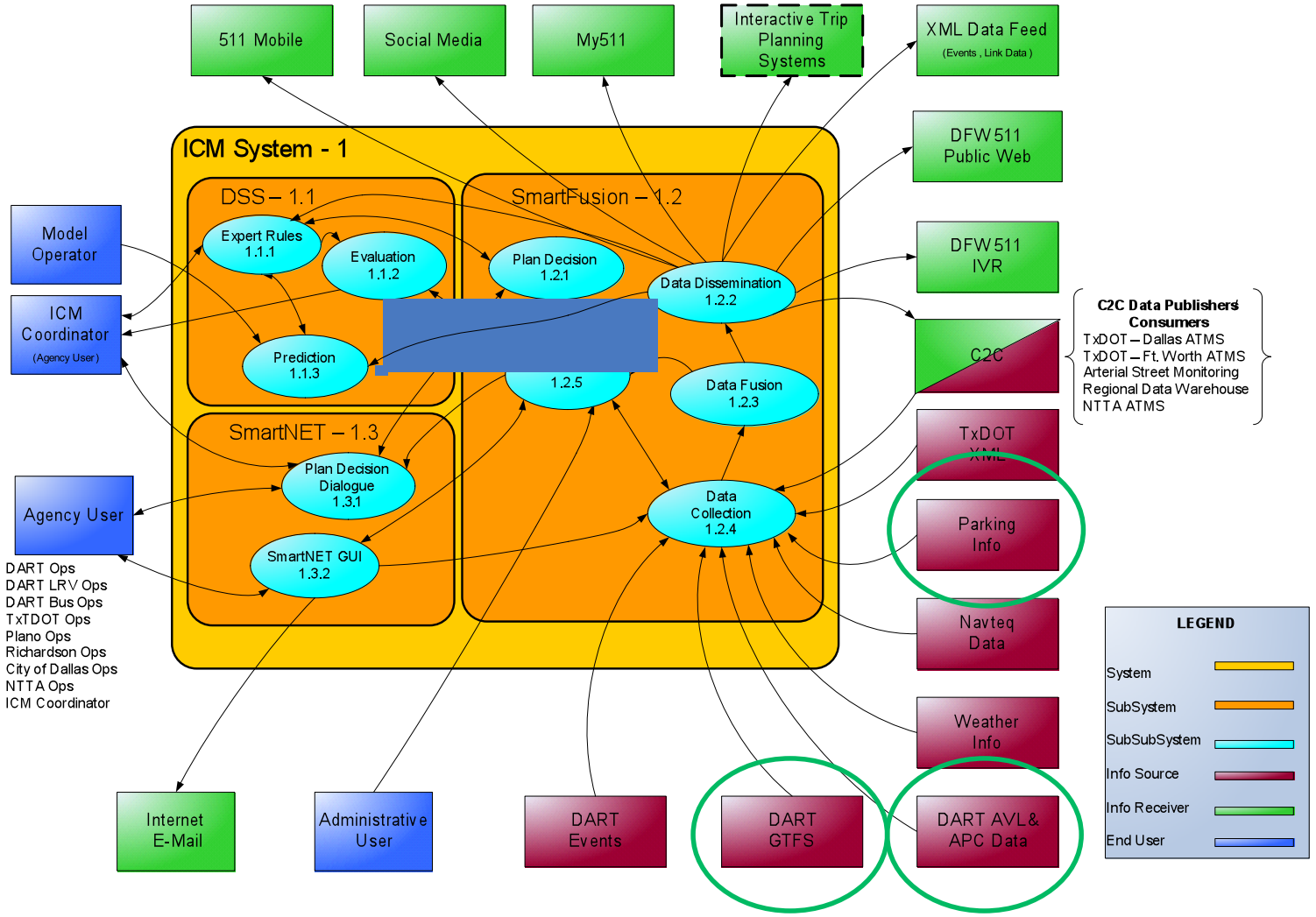
December 4, 2014

US 75 Corridor Transportation Networks

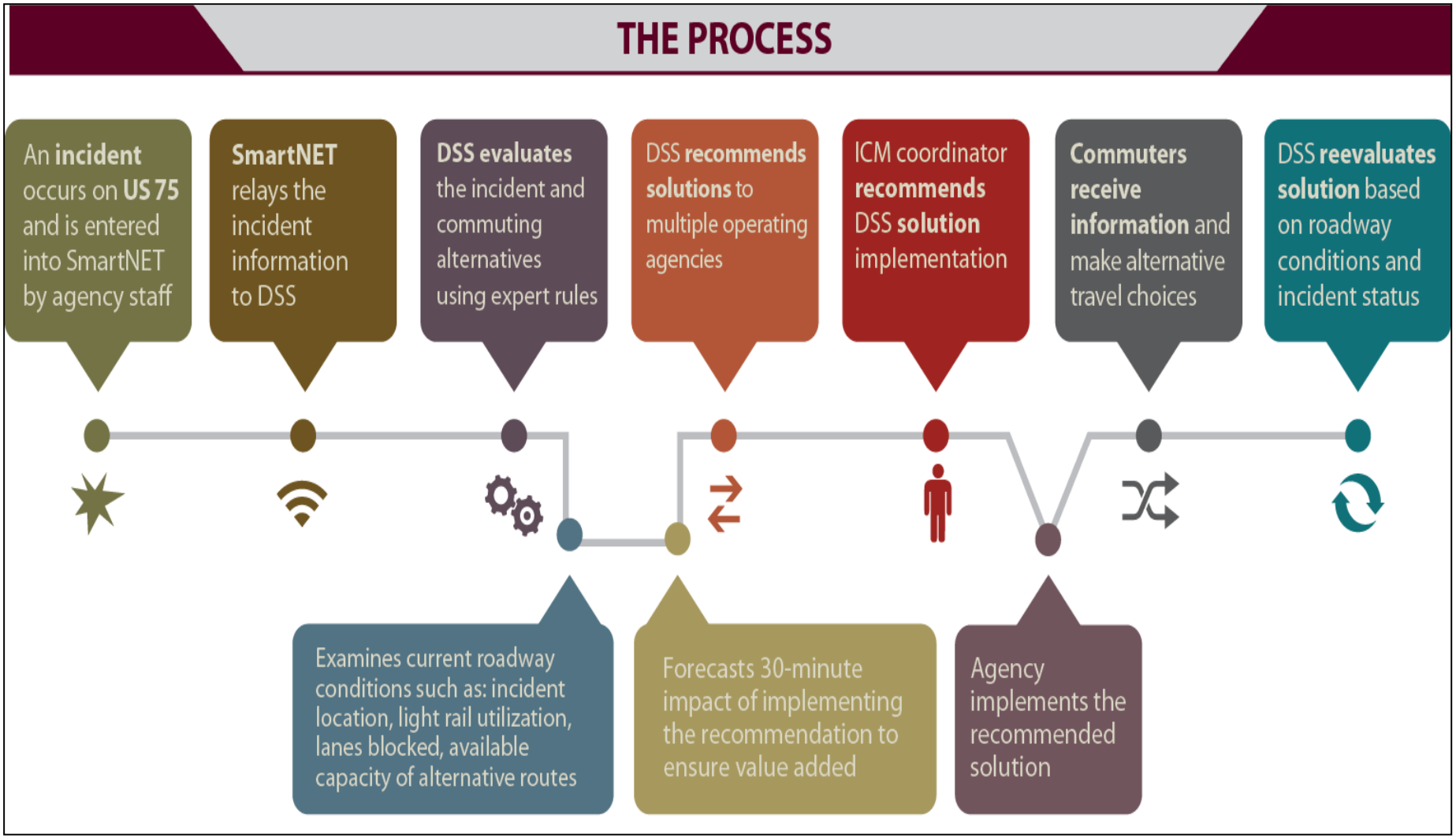


- US 75 Freeway with Continuous Frontage Roads
- 167 Miles of Arterials
- HOV lanes on US 75 and I-635
- Dallas North Tollway
- DART Bus Network
- DART Light Rail Lines
- 900 Signals
- Multiple TMC
- Regional ATIS

Integrated Corridor Management System

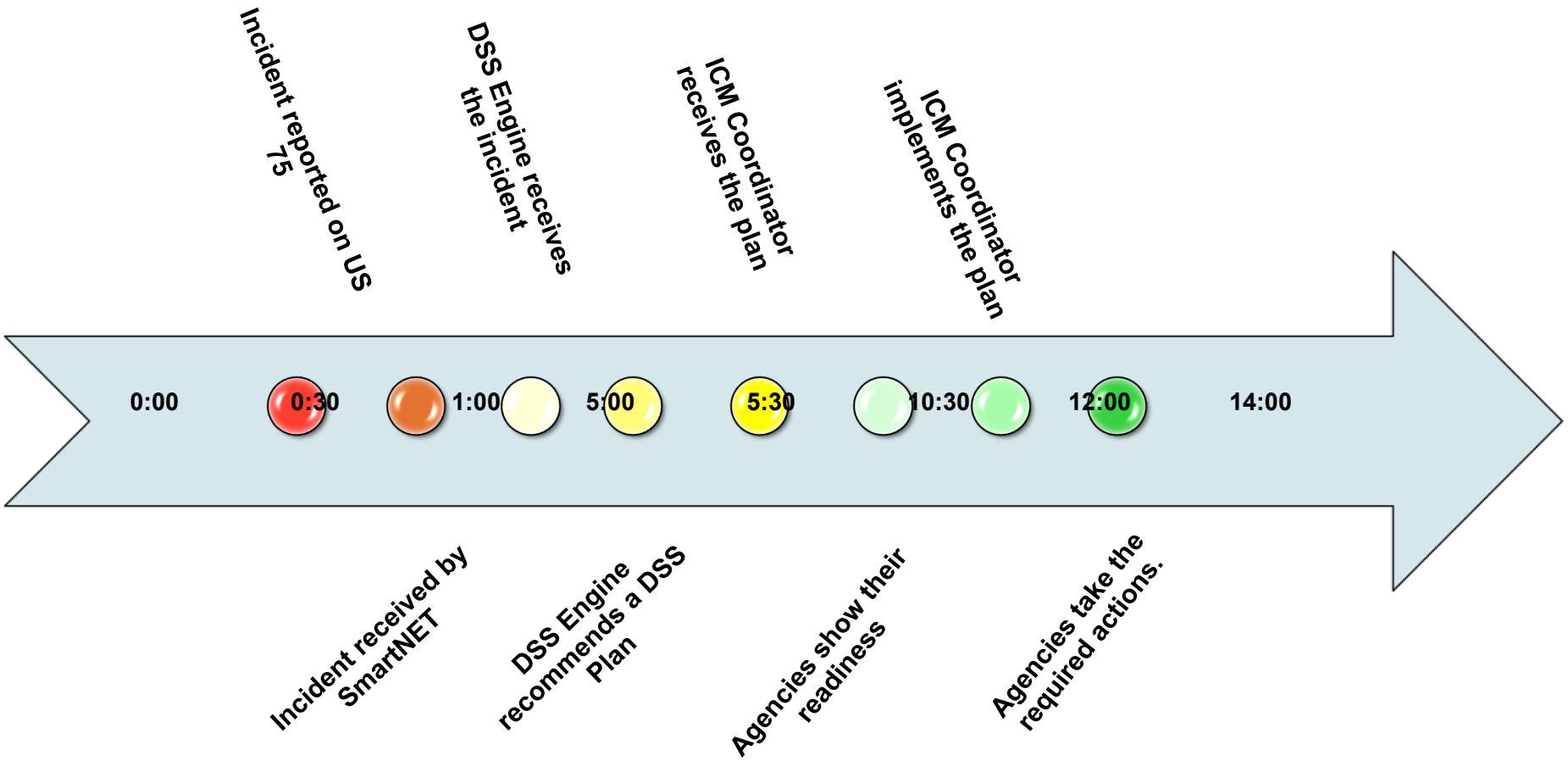


Dallas ICM Decision Process Flow



DSS Plan implementation timeline

Timeline for Incident US75 NB @ MidPark (Minutes)



For Each Event the DSS Evaluates each Rule to Select a Plan:

Incident at US75 SB & Midpark in the Morning peak

1

Rules							
No. Affected Lanes	Queue Length [mi]	Frontage Rd Speed [mph]	Greenville Speed [mph]	Red LRT Utilization	Park-n-Ride Utilization	US-75 Prediction Benefit (ΔMOP)	Network Prediction Benefit (ΔMOP)
2	4	15	14	65%	68%	4%	-2%

DSS Picks a Strategy after the Rules are met

2

Strategies

- Short Diversion to Frontage
- Long Diversion to Frontage
- Diversion to FR. + Greenville.
- Diversion to FR. + Greenville + Transit

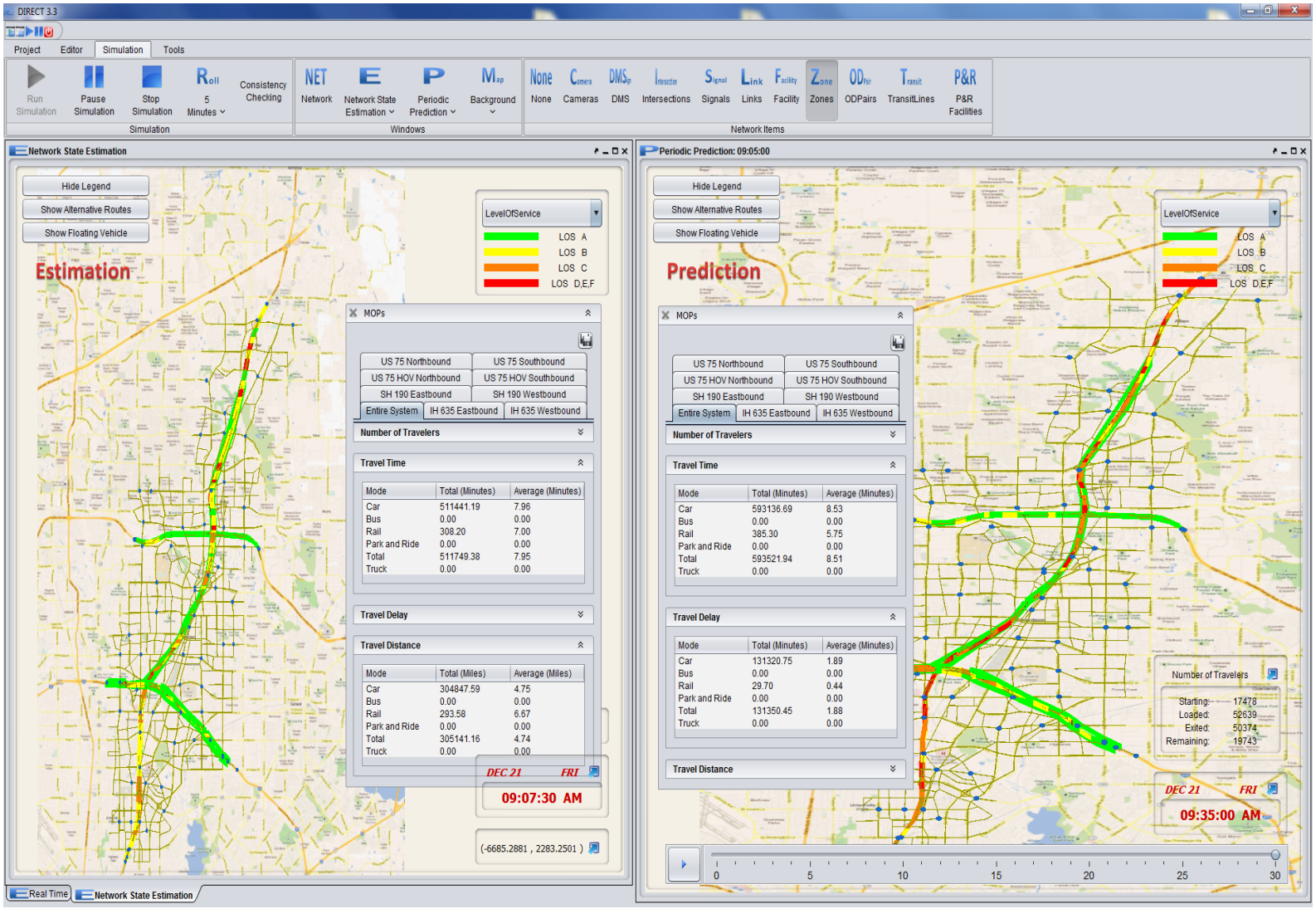
A Plan is Recommended

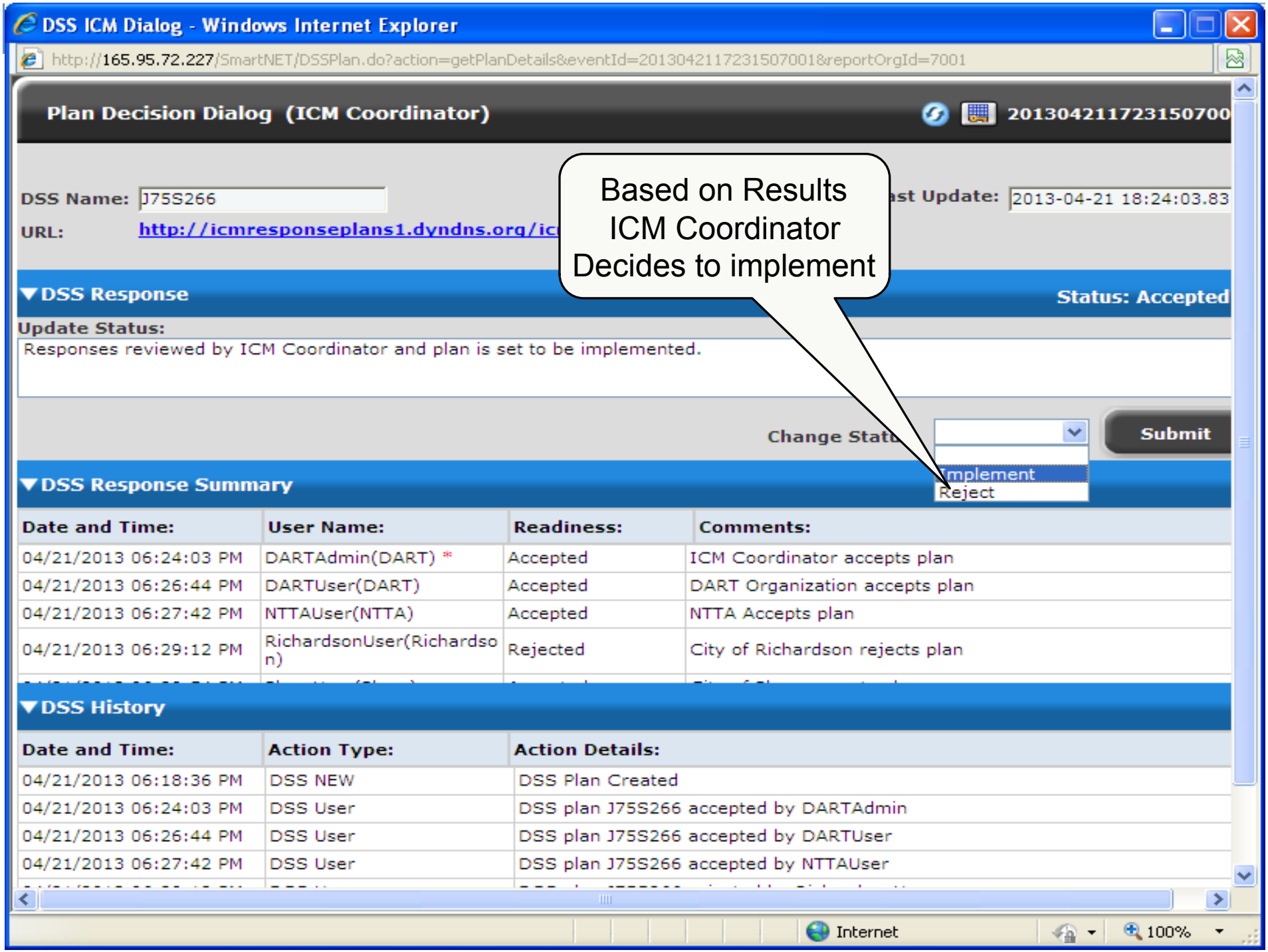
3

J75S260 AM

FR = Frontage Rd.
GV = Greenville

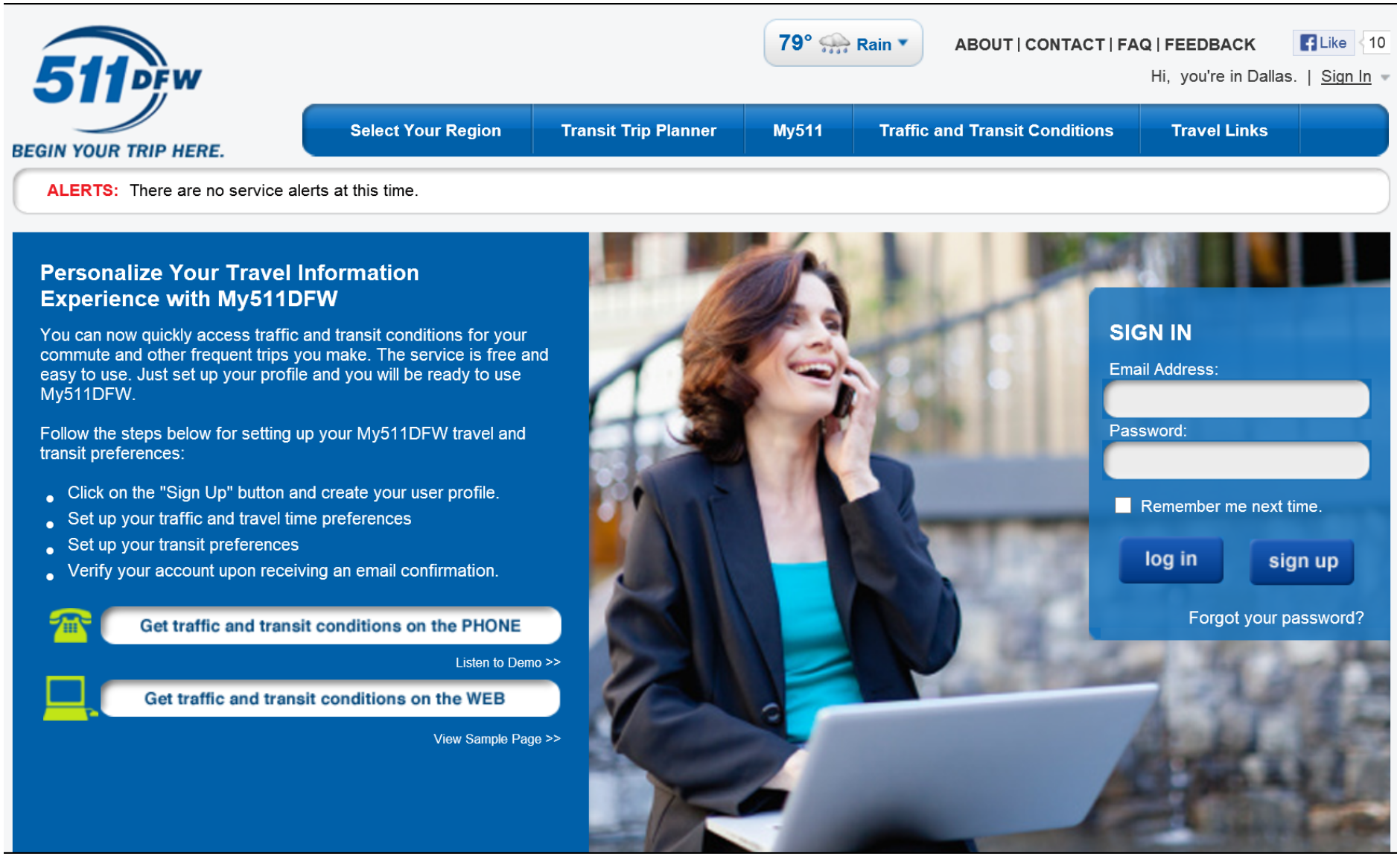
Direct Model Insures Benefits Result from the Response Plans Recommended



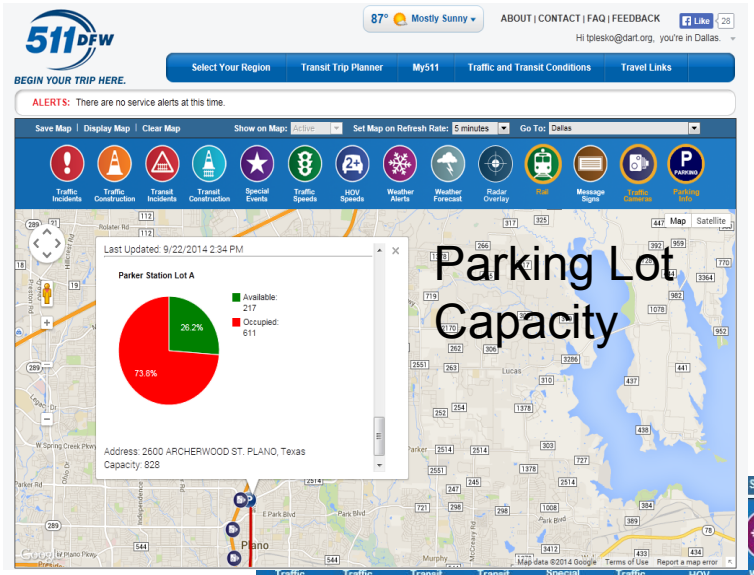

DSS ICM Dialog - Windows Internet Explorer
http://165.95.72.227/SmartNET/DSSPlan.do?action=getPlanDetails&eventId=2013042117231507001&reportOrgId=7001
Plan Decision Dialog (ICM Coordinator)
2013042117231507001
DSS Name: J75S266
Last Update: 2013-04-21 18:24:03.83
URL: http://icmresponseplans1.dyndns.org/ic
Based on Results ICM Coordinator Decides to implement
DSS Response
Status: Accepted
Update Status:
Responses reviewed by ICM Coordinator and plan is set to be implemented.
Change Stat
Submit
Implement
Reject
DSS Response Summary
Date and Time: | User Name: | Readiness: | Comments:
04/21/2013 06:24:03 PM | DARTAdmin(DART) * | Accepted | ICM Coordinator accepts plan
04/21/2013 06:26:44 PM | DARTUser(DART) | Accepted | DART Organization accepts plan
04/21/2013 06:27:42 PM | NTTAUser(NTTA) | Accepted | NTTA Accepts plan
04/21/2013 06:29:12 PM | RichardsonUser(Richardson) | Rejected | City of Richardson rejects plan
DSS History
Date and Time: | Action Type: | Action Details:
04/21/2013 06:18:36 PM | DSS NEW | DSS Plan Created
04/21/2013 06:24:03 PM | DSS User | DSS plan J75S266 accepted by DARTAdmin
04/21/2013 06:26:44 PM | DSS User | DSS plan J75S266 accepted by DARTUser
04/21/2013 06:27:42 PM | DSS User | DSS plan J75S266 accepted by NTTAUser
Internet
100%

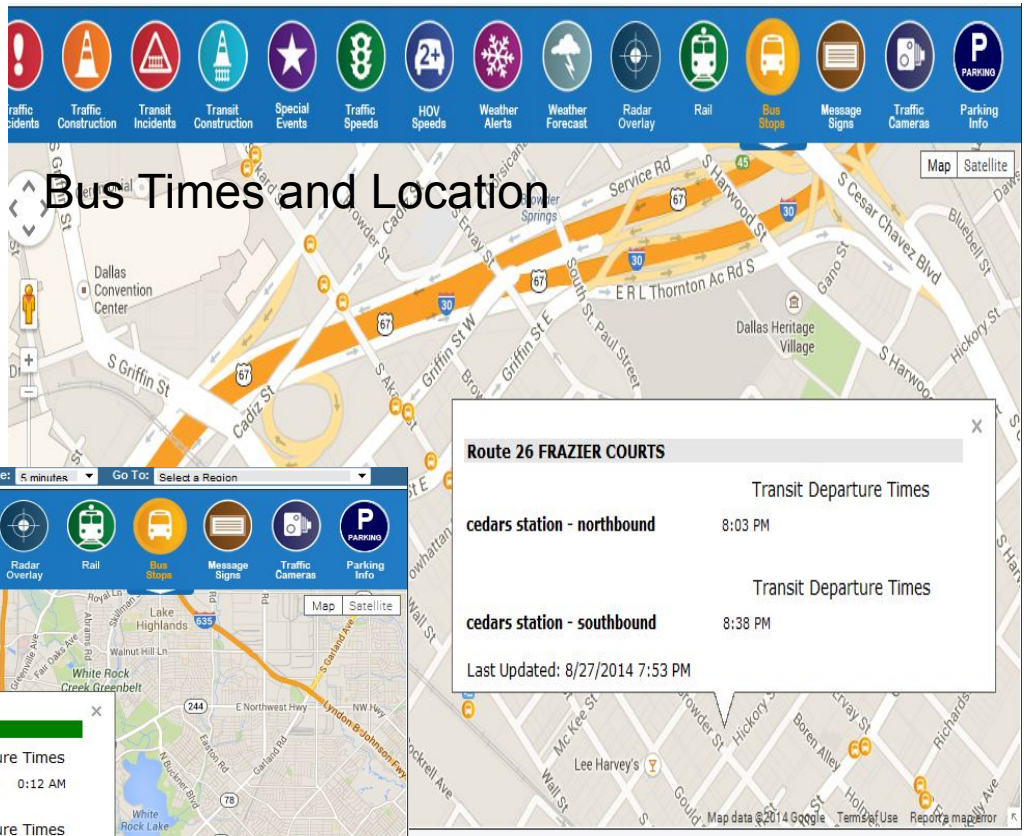

Recommend “Use Light Rail” on DMS Signage
Signals Optimized for Frontage Road Flow North-South
Greenville Ave. Flow is priority north-South
Richardson Heights
Terrace Park
N Grove Rd
S Waterview Dr
Buckingham
Maham Rd
S Greenville Ave
Richland Park
Audelia Rd
Restland Memorial Park
W Walnut St
Walnut St
75
635
21
24

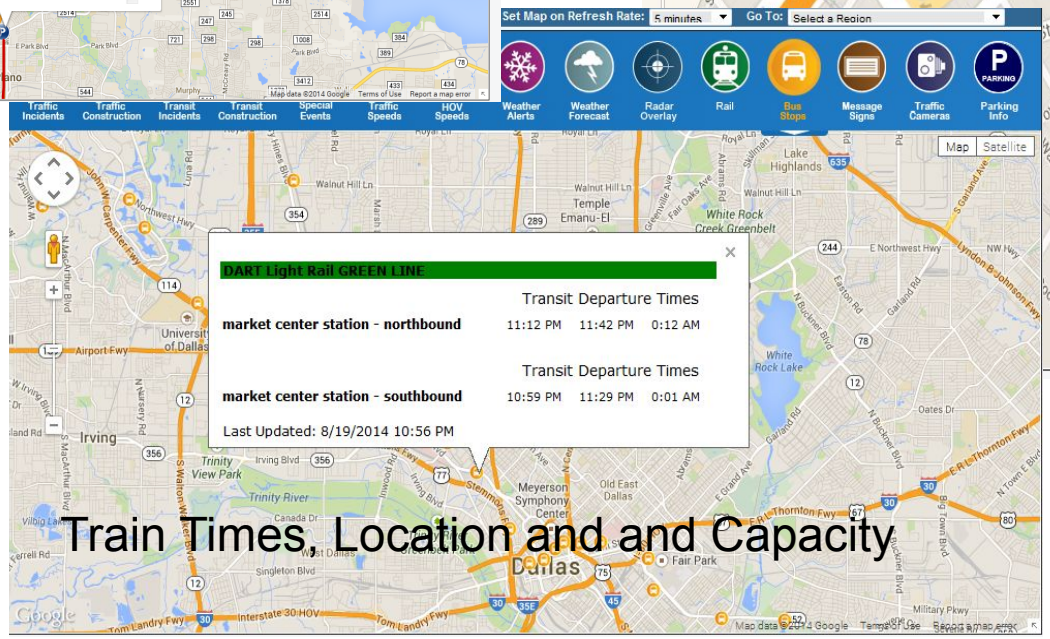
MY511


511DFW
BEGIN YOUR TRIP HERE.
79° Rain
ABOUT | CONTACT | FAQ | FEEDBACK
Like 10
Hi, you're in Dallas. | Sign In
Select Your Region
Transit Trip Planner
My511
Traffic and Transit Conditions
Travel Links
ALERTS: There are no service alerts at this time.
Personalize Your Travel Information Experience with My511DFW
You can now quickly access traffic and transit conditions for your commute and other frequent trips you make. The service is free and easy to use. Just set up your profile and you will be ready to use My511DFW.
Follow the steps below for setting up your My511DFW travel and transit preferences:
Click on the "Sign Up" button and create your user profile.
Set up your traffic and travel time preferences
Set up your transit preferences
Verify your account upon receiving an email confirmation.
Get traffic and transit conditions on the PHONE
Listen to Demo >>
Get traffic and transit conditions on the WEB
View Sample Page >>
SIGN IN
Email Address:
Password:
Remember me next time.
log in
sign up
Forgot your password?

Real Time Transit Data Used for ICM and 511DFW



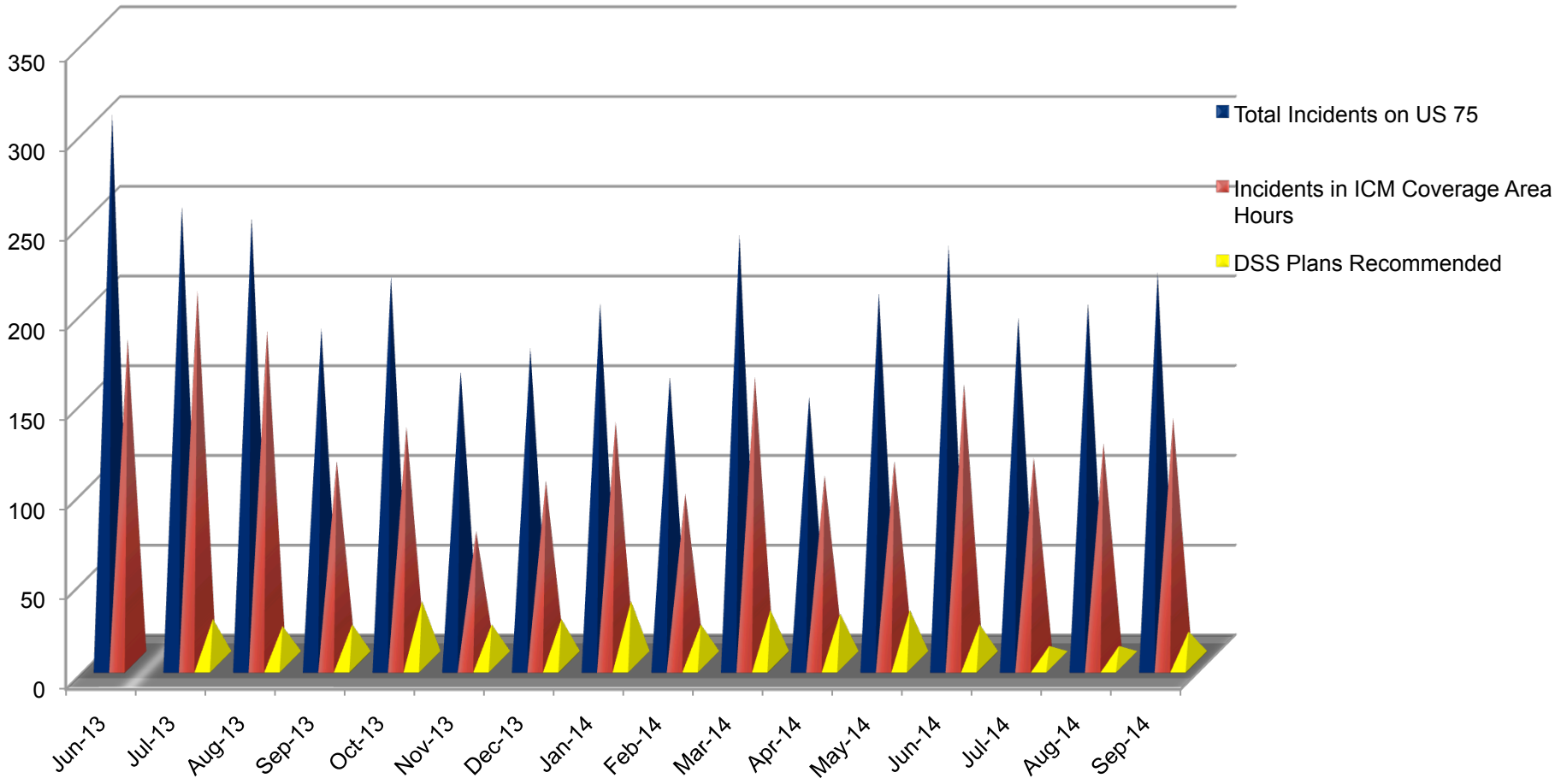




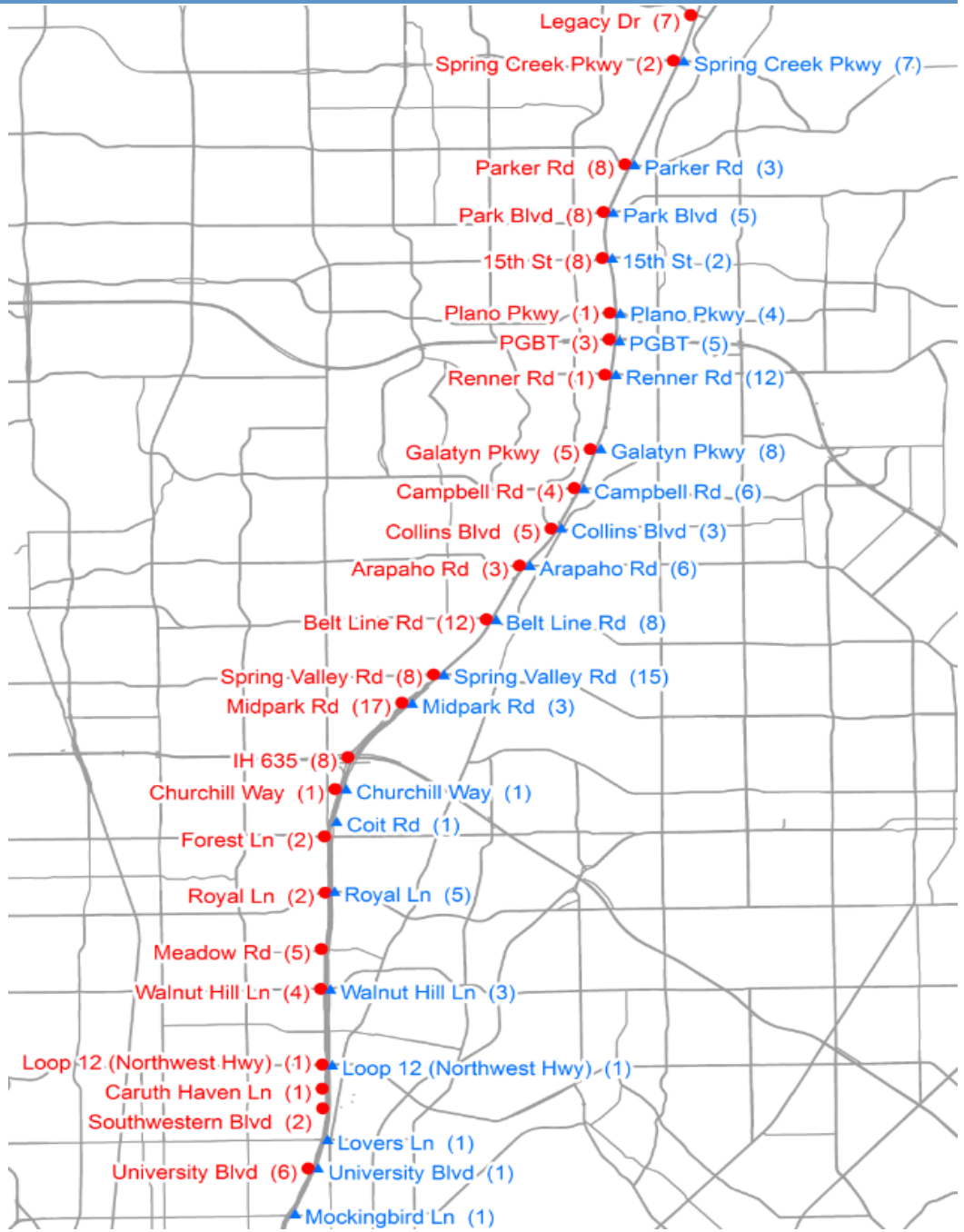
DSS Statistics On US-75 between Legacy and Mockingbird

		Events for 24/7 Period			Events During Operating Hours (6a – 6p)		Plan Recommendations	
Year	Month	ICM	12-Months Earlier		Total	With Lanes Affected ≥ 1	Total	Tears
2013	June	305	252	Post ICM	180	83	Testing	Testing
	July	254	269		207	132	24	-
	August	248	218		185	83	20	1
	September	186	239		112	52	21	2
	October	215	245		131	71	34	5
	November	162	287		73	41	21	0
	December	175	306		101	55	24	8
2014	January	200	302		134	68	34	9
	February	159	252		94	45	21	4
	March	238	264		159	93	29	3
	April	148	232		104	51	27	6
	May	206	267		112	62	29	2
	June	232	305		155	87	21	2
	July	192	254		114	56	9	1
	August	200	248		122	54	9	4
	September	217	186		136	61	17	4

Dallas ICM Event Data Analysis



Cumulative Incident Events with "Recommended" Response Plans Since Go-Live Oct 28, 2013



Legend:

- Northbound Incidents
- Southbound Incidents

Plan Big, Start Small

- ICM should be part of regional ITS strategic plan
- Plan the system for future expansion
  - Geographic Boundaries
  - Systems
  - Agencies
  - Applications
- Deal with institutional issues up front
- Data sharing is a good start

Proceed with O&M in mind

- A well conceived concept of operations is critical
- Envision the ultimate working system
  - Who is in charge, single agency or regional?
  - Budget and staff needs
  - Institutional, politics, policies
  - Regional agreements and MOUs up front
  - Continuous commitments

Decision Support Lessons

- Modeling was an essential tool to obtain partner consensus
- Manual vs. Automated Actions
- DSS GUI is a work in progress
- Funding sources for keeping system and modeling current
- Continuous updates of response plans are necessary
- Transit Management Center operators found value in ICM applications providing information on road conditions

In-reach / Out-reach

- Because ICM programs take time to implement, continuous communication of the goals, benefits and progress is essential.

- Communicate with stakeholders within your agencies
  - Buy-in by agency Boards and leadership requires benefits to your agency

- Communicate with stakeholders outside your agency
  - Regional Council of Governments, City Staff and Councils

Out of Sight, Out of Mind

- Build strong partnerships from beginning
- Schedule routine stakeholders meetings
- Define committees, leads and assignments up front
- Emphasize teamwork where everyone must benefit

Questions

Todd Plesko
VP Planning and Development
Dallas Area Rapid Transit
(214) 749-2750
tplesko@dart.org

I-880 Integrated Corridor Management Project (ICM)

December 4, 2014

METROPOLITAN TRANSPORTATION COMMISSION

Regional ICM Projects

In addition to I-880 ICM…

- **US 101 Smart Corridor (San Mateo)**
- **I-80 Integrated Corridor Mobility (ACTC)**

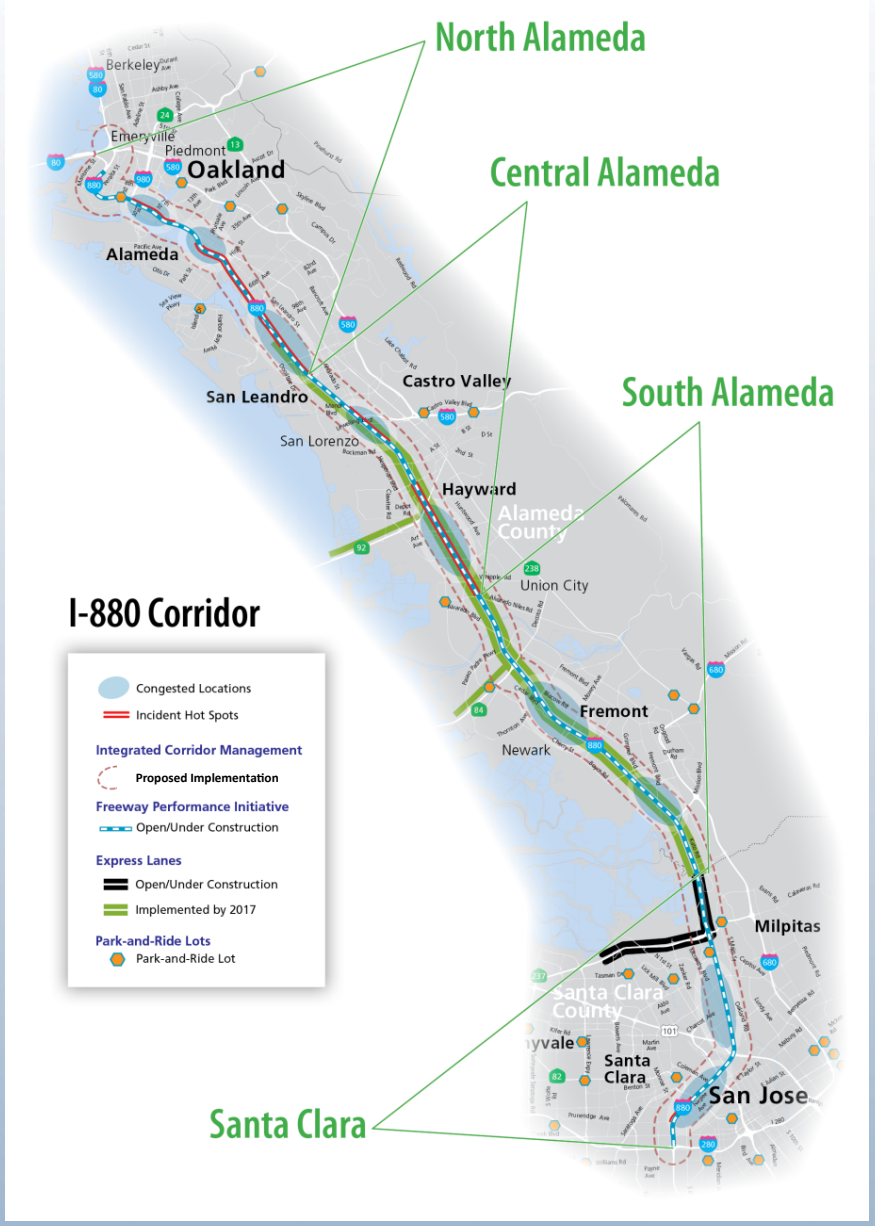
Statewide Projects

- **I-15 Integrated Corridor Management (SANDAG)**
- **Connected Corridors (Caltrans D7)**

Regional ICM Projects

	Freeway Gantries/ Variable Speed Advisory	Adaptive Ramp Metering	Transit Signal Priority	Arterial CCTV Cameras	Arterial Trailblazer Signs	Freeway CMS	Arterial Signal Coord.
I-880 ICM (MTC) $14M				●	●		●
101 Smart Corridor (San Mateo) $20M				●	●		●
I-80 ICM (ACTC) $80M	●	●	●	●	●	●	●

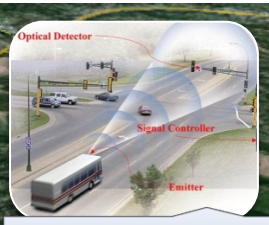
I-880 Corridor



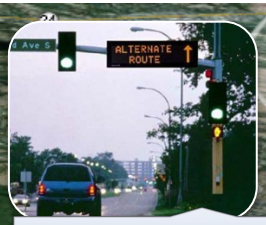
Future Vision
(Conceptual Graphic)

Real-Time Info for Truck Drivers

Comparative Travel Times



Transit Signal Priority



Arterial Incident Management

Adaptive Ramp Metering

Travel Demand Management

Coordination with Express Lanes

First Mile/Last Mile Connections

Oakland
Alameda
San Leandro
Broadway
Nimitz Fwy
International Blvd
92nd Ave
Edes Ave
Bancroft Ave
Durant Ave
E 14th St
Davis St
Doolittle Dr
Airport D
Pkwy
980
880
580
260
61
77
13
123
Image © 2012 TerraMetrics
©2012 Google
Google earth
Imagery Date: 10/11/2011
1993
37°45'26.47" N 122°12'20.54" W elev 14 ft

Congested Locations

Northbound I-880 South of Marina Blvd

- How to manage traffic that naturally diverts from the freeway due to incidents?

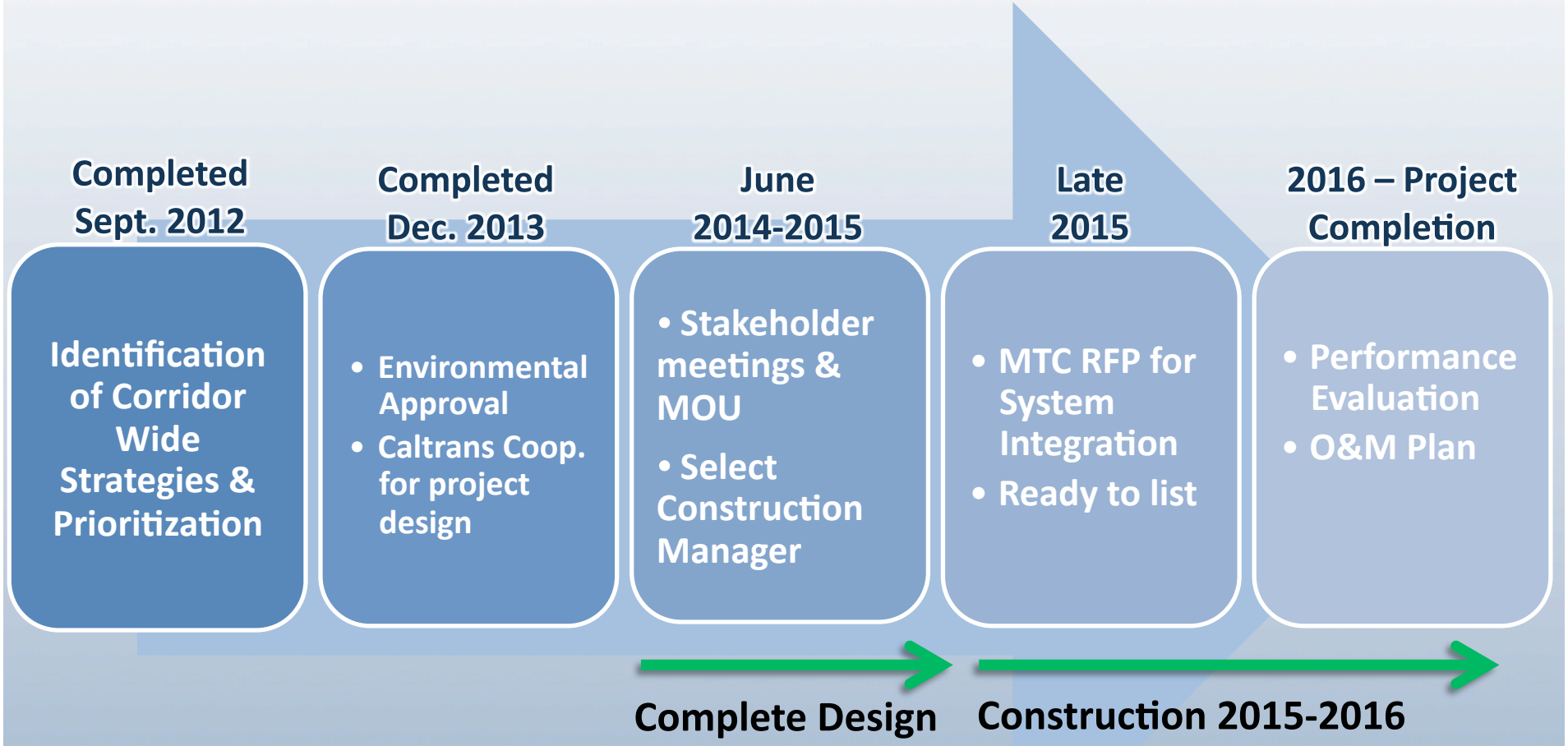
I-880 North Segment Project Map

I-880 Arterial Incident Management Strategy

- **12 mile stretch from 980/880 to Davis St in Oakland & San Leandro**
- **Emphasis on arterial network**
  - Traffic Signal Interconnection
  - Trailblazer signs, cameras, detectors
  - Communication Network
- **Coordination with other ITS Projects**

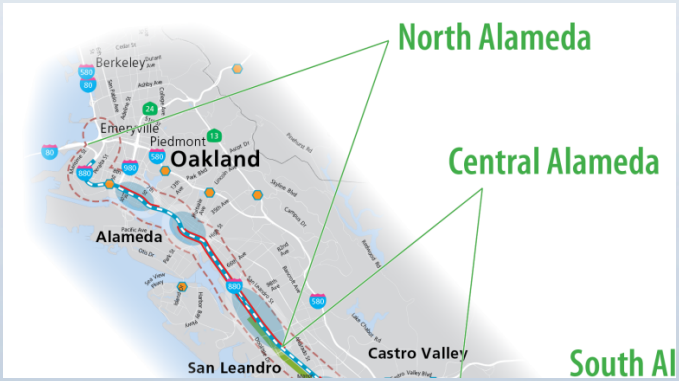
*Graphic Not to Scale

I-880 ICM North Segment Schedule



Next Steps (I-880 North Segment Design)

- **Reconvene I-880 North Segment Stakeholders**
  - Individual stakeholder meetings
  - Develop public outreach materials
- **Develop MOU**
- **Construction Management**
- **System Integration RFP**
- **Performance Evaluation and O&M Planning**
- **Estimated Project Completion 2016**



Lessons Learned

1. Stakeholder Outreach and Consensus
2. Coordination With Other ITS Projects
3. Operations and Maintenance

I-880 ICM Stakeholders

Sarah Burnworth

Incident Management Program Coordinator

Metropolitan Transportation Commission

sburnworth@mtc.ca.gov 510-817-5947

The I-80 Integrated Corridor Mobility (ICM) Project

A Presentation to

ICM Roundtable Webinar

December 4, 2014

ALAMEDA County Transportation Commission

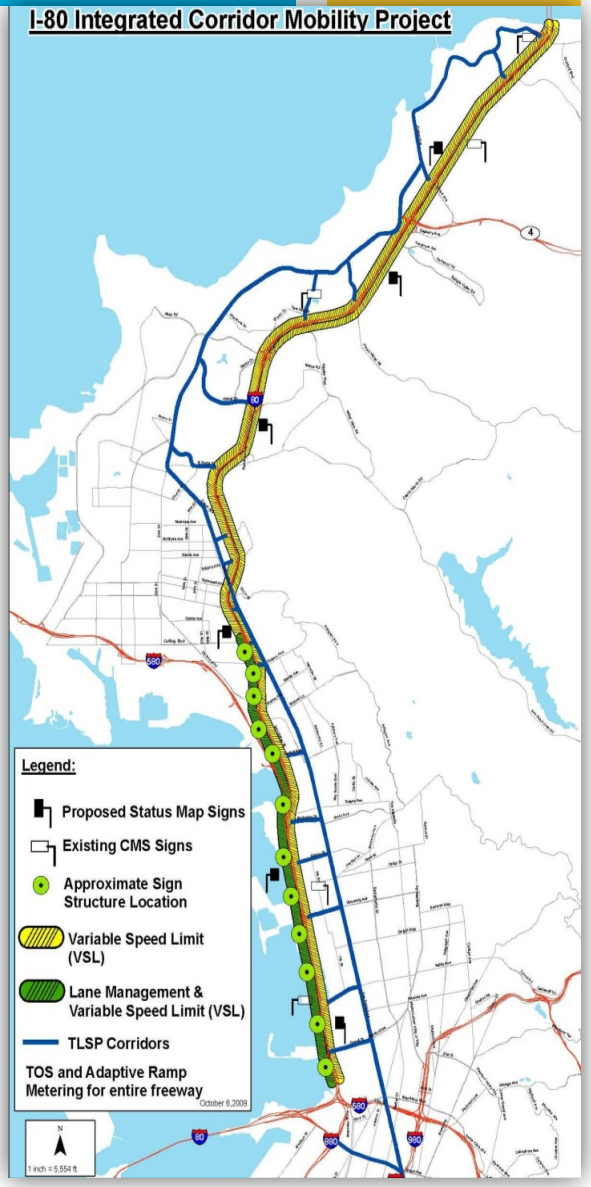
smart corridor
INTERSTATE 80
INTEGRATED CORRIDOR MOBILITY

Presentation Overview

- The I-80 Corridor and Integrated Corridor Mobility (ICM)
- The I-80 ICM Project (aka I-80 Smart Corridor)
- Agency Collaboration
- Lessons Learned

The I-80 Corridor

- 20 mile corridor from Bay Bridge to the Carquinez Bridge
- Major corridor for commuters and transit
- National freight corridor
- Link to 2 international airports and the Port of Oakland
- Connects significant job centers (Alameda County ranked 2nd largest in Region)
- Spans across 2 counties and 9 cities



The I-80 Commute

- One of the most congested corridors in the region
- Traffic volumes about 290,000 vehicles per day
- High level of congestion: over 20,000 vehicle-hours of delay per day
- Over 2,000 incidents annually
- Unreliable travel times
- Congestion has increased more than 23% in the past year alone

Mainline Congestion

Arterial Congestion

Why ICM?

- Adding capacity/lanes is not feasible
  - Bound by the Bay on the west and fully developed urban areas on east
  - Real estate costs too high
- Environmentally Sensitive Areas
- Carpool lanes are already 3+
- A proactive, multi-modal, Systems Management approach was necessary:
  - Freeway, Ramp systems, Transit and Local arterials

Project Concepts Deployed

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- Freeway & Incident Management
- Adaptive Ramp Metering
- Transit Management
- Arterial Management
- Traveler Information
- Traffic Monitoring

ALAMEDA County Transportation Commission

smart corridor INTERSTATE 80 INTEGRATED CORRIDOR MOBILITY

Freeway & Incident Management

- Close Affected Lanes
  - Lane Use Signs (LUS)
- Facilitate Clearing Incidents
  - Access to first responders
- Reduce Speeds
  - Variable Advisory Speed Signs (VASS)
  - Reduce secondary accidents
- Incident Response Plans (IRP)
  - Arterial Trailblazer Signs
  - Signal Timing Flush Plans

Adaptive Ramp Metering

- Adaptive Ramp Metering
  - System-wide Adaptive Metering system
  - 44 Ramps
- Coordinated Ramp Meters
- Maximum Queue Detectors
  - Designed to alleviate spill back onto local streets

Transit Management

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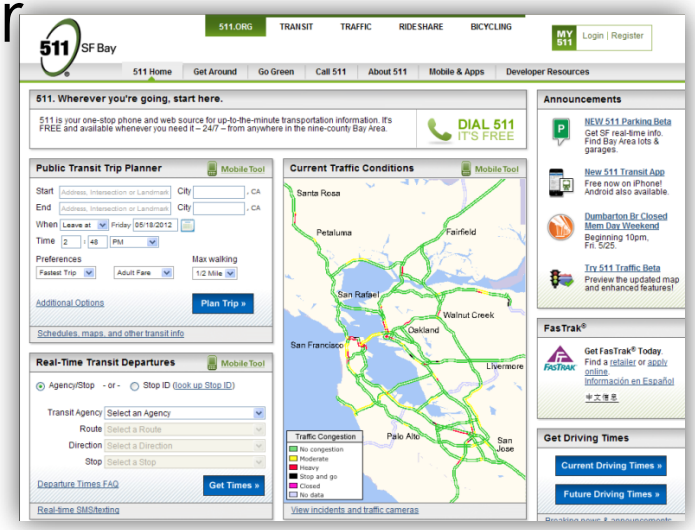
Transit Management and Traveler Information Systems provide:

- Preferential Treatment for Transit
  - Transit Signal Priority
  - Ramp Meter Bypass
- Park and Ride Facilities (future)
  - Provide Real-time information
- Transit Traveler Information
  - Travel times
  - Directions to transit facilities
  - Real time Transit Departure Times

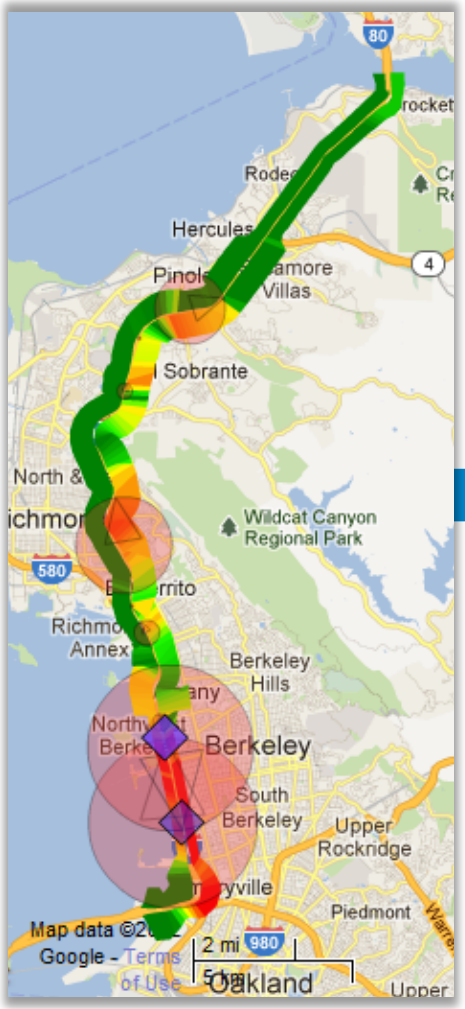


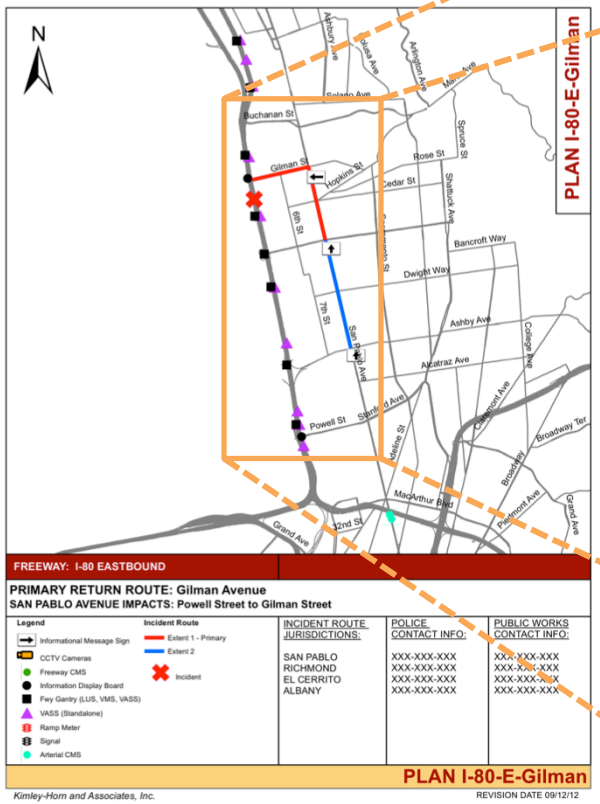
smart corridor
INTERSTATE 80
INTEGRATED CORRIDOR MOBILITY

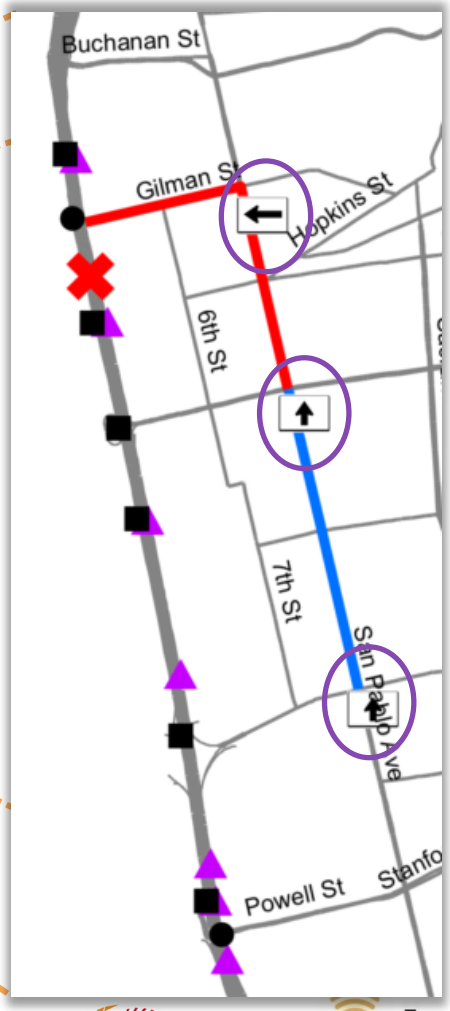
Arterial Management

- Surveillance and Monitoring System
  - Closed Circuit TV (Live Video Streams)
  - Non-Intrusive Detection System
    (to collect volume and congestion)
- Emergency Pre-Emption System
- Expanded Signal Coordination

Arterial Management (Incident Response Plan)







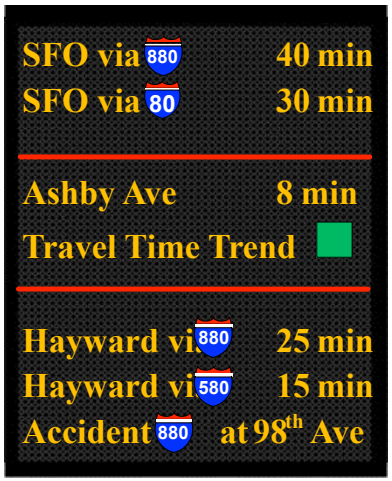
ALAMEDA County Transportation Commission

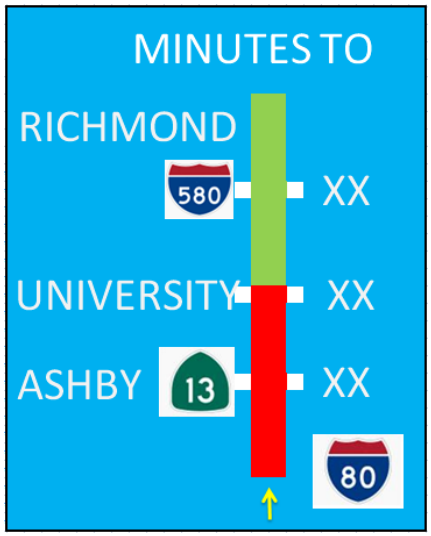
smart corridor INTERSTATE 80 INTEGRATED CORRIDOR MOBILITY

Traveler Information

- Highway Advisory Radio
- Changeable Message Signs
  - Integration with Richmond and Ride; Hercules and Berkeley Ferry Terminals
  - Transmit Freeway travel times and alternatives
  - Comparative transit travel times (BART & AC Transit)
- Integration with the Bay Area 511 system and East Bay SMART Corridors

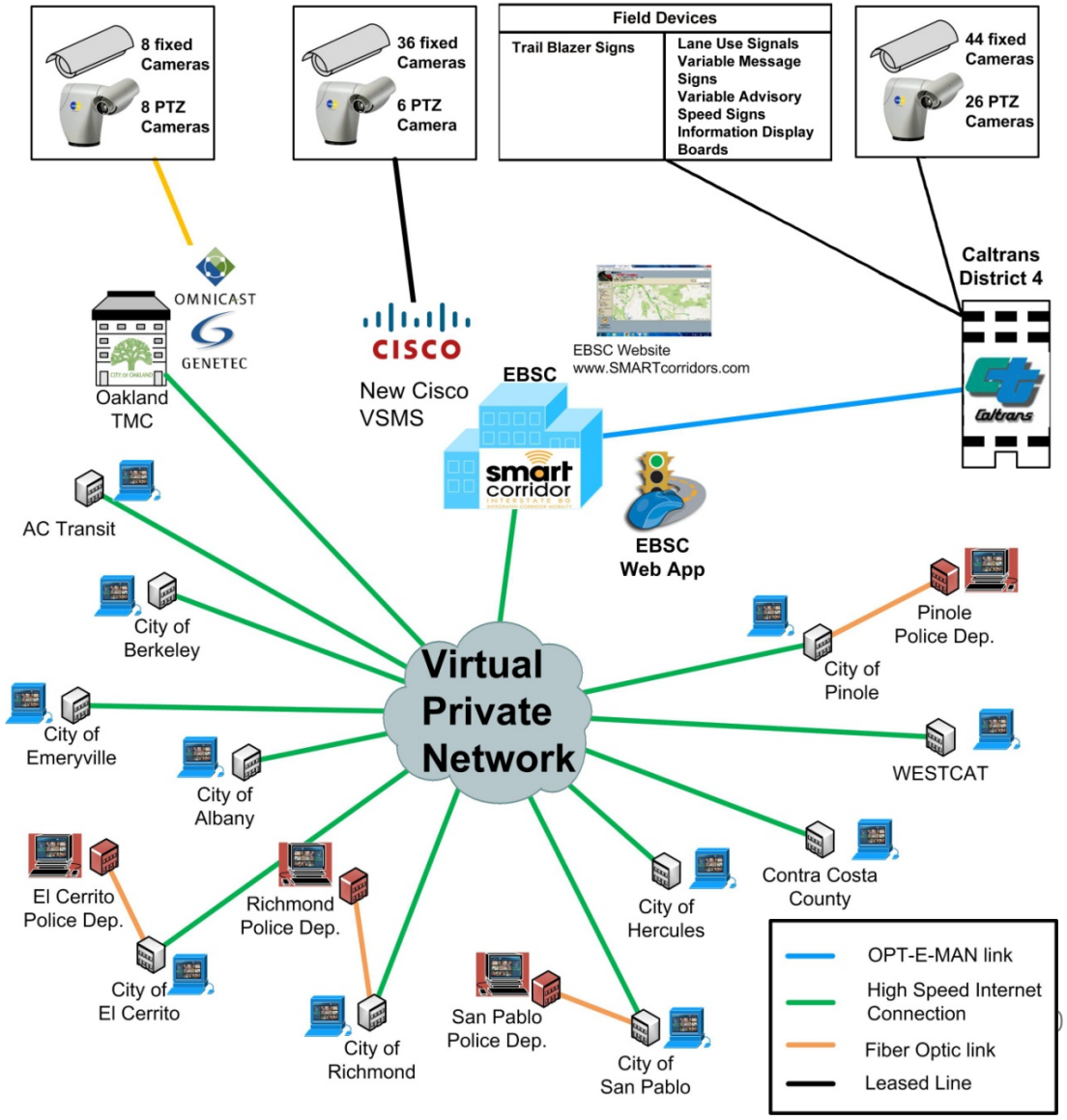
Full Color Graphic Signs

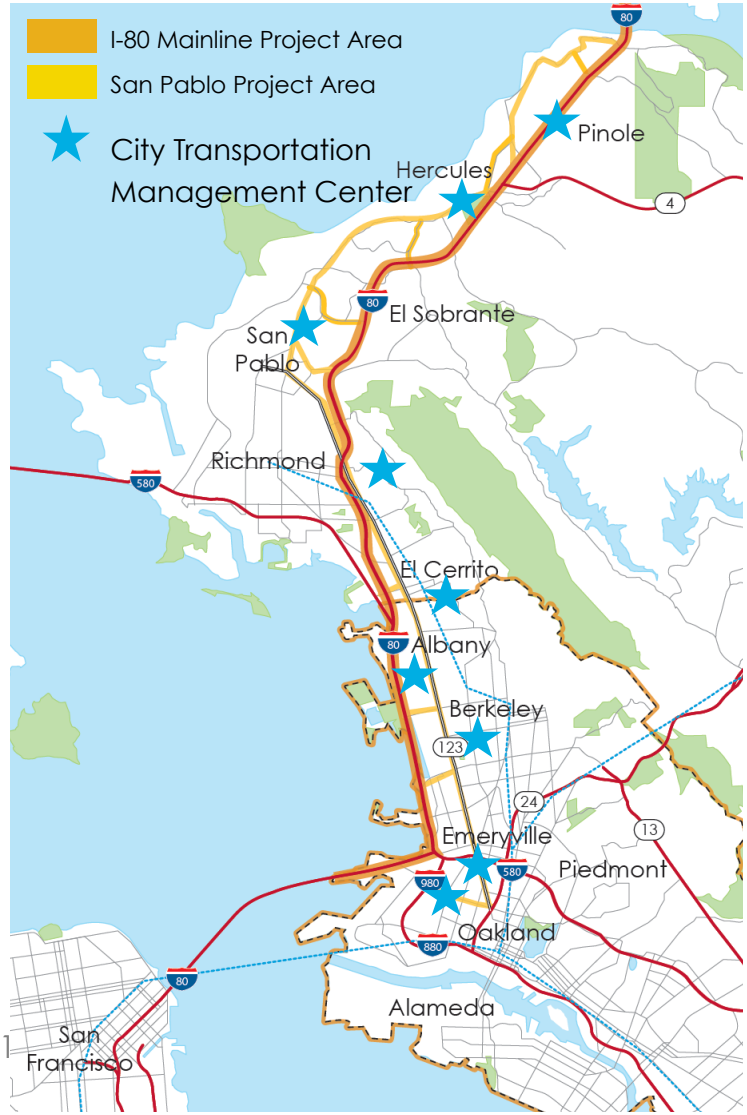




smart corridor
INTERSTATE 80
INTEGRATED CORRIDOR MOBILITY

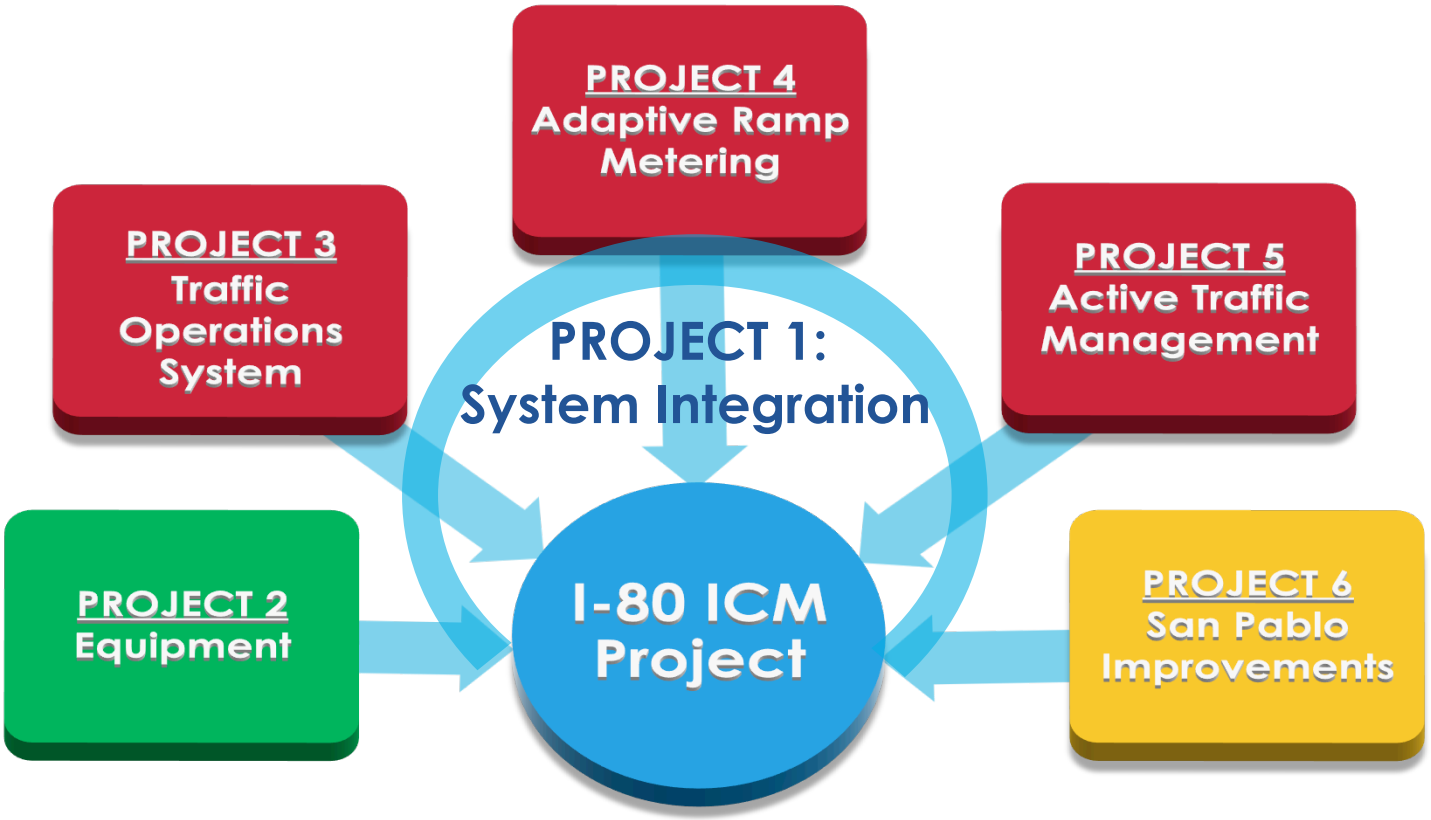
System Integration





Delivery Strategy

- Procurement Package
- Freeway Construction Projects
- Arterial Construction Projects
- System Integration



I-80 ICM Funding

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PROJECT COST ESTIMATE		
Cost Estimate by Phase ($ X 1,000)		
Scoping	$	150
PE/Environmental	$	6,617
Final Design (PS&E)	$	6,929
Right-Of-Way	$	120
Utility Relocation	$	0
Construction	$	66,154
TOTAL Expenditures:	**$**	**79,970**

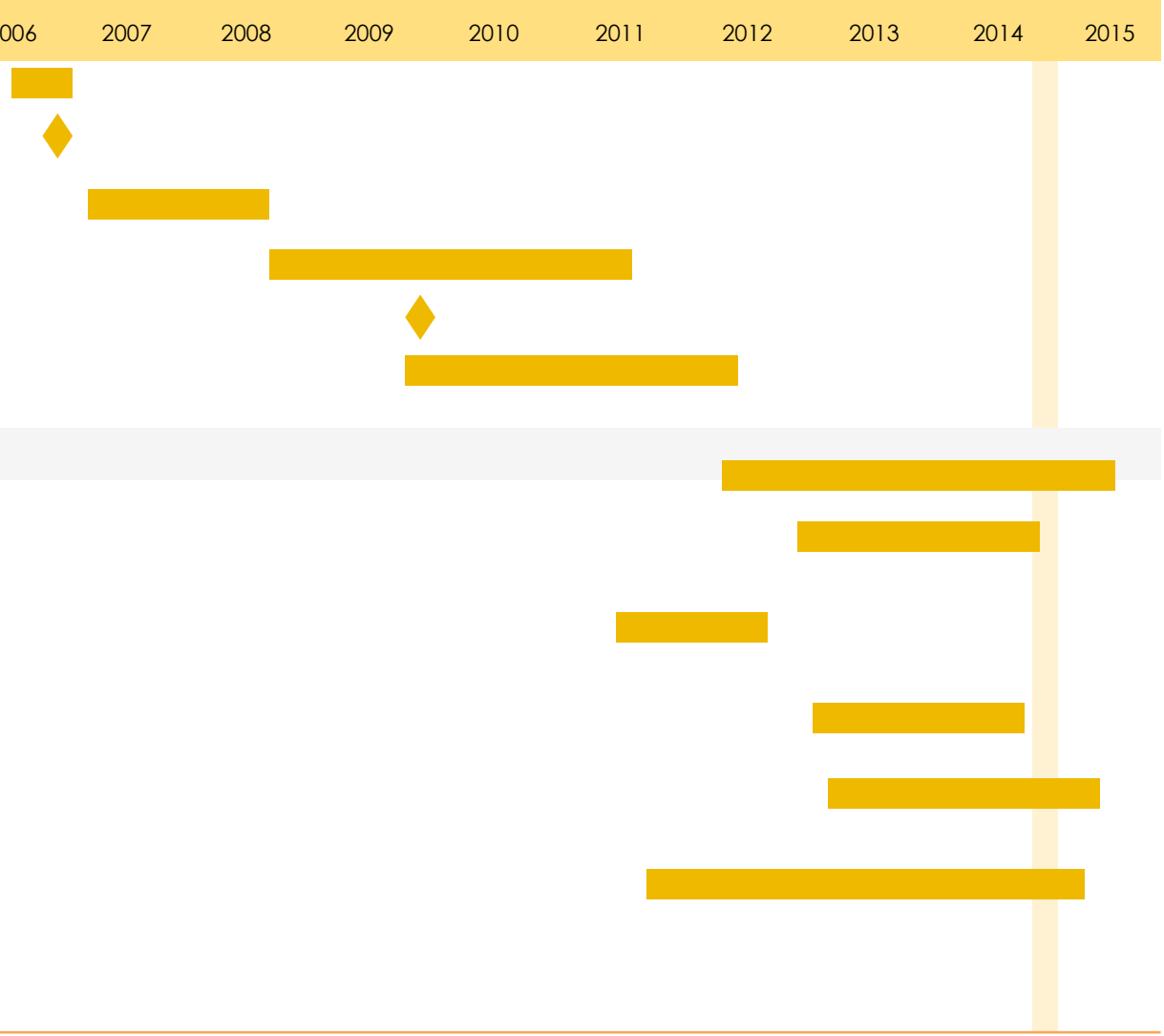
PROJECT FUNDING		
Funding by Fund Source ($ X 1,000)		
Measure B (ACTC)	$	2,800
Federal (CMAQ)	$	3,243
State (CMIA, TLSP, STIP)	$	66,543
Regional (BAAQMD)	$	1,155
Local (CCTA Measure J)	$	4,876
Other Local (ACTC)	$	1,353
TOTAL Revenues:	**$**	**79,970**

smart corridor
INTERSTATE 80
INTEGRATED CORRIDOR MOBILITY

I-80 ICM Project Schedule

PROJECT SCHEDULE

Project Phase	Begin - End MM/YY
Scoping	07/06 – 01/07
SEMP	12/06
Preliminary Engineering	02/07 - 08/08
Environmental	08/08 - 07/11
Con Ops	11/09
Final Design	09/09 - 04/12
Construction Phase	
System Integration	03/12 - 05/15
Specialty Procurement	08/12 - 10/14
Traffic Operation System	06/11 - 07/12
Adaptive Ramp Metering	09/12 - 08/14
Active Traffic Management	10/12 - 01/15
Traffic Light Synchronization	09/11 - 12/14



Agency Collaboration

- Alameda CTC, Contra Costa Transportation Authority and Caltrans formed a partnership
- Extensive collaboration between 9 cities, multiple transit agencies and federal, regional and local transportation agencies
- Local dollars attracted $65.6 million in State funding (Prop 1B) to deliver the project

Lessons Learned

- Stakeholder consensus on planned strategies
- Manage Sponsor / Owner Expectations
- Engaged Change Management
- Environmental Process - Expect the unexpected

Thank you

http://www.alamedactc.org/GoI80

Follow the project on Twitter @AlamedaCTC and/or @CaltransD4, and use hashtags #80SMART and #80ICM.

http://vimeo.com/25423461

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Questions and Answers

Please Type your questions in the Q & A box or press *1 to ask a question over the phone

Contacts:

Robert Sheehan, P.E., PTOE, Multimodal ITS Research and Deployment Program Manager,
ITS Joint Program Office,
U.S. Department of Transportation,
Robert.Sheehan@dot.gov

Steven Mortensen, Senior ITS Engineer,
ITS Team, Office of Research,
Demonstration and Innovation,
Federal Transit Administration,
U.S. Department of Transportation,
Steven.Mortensen@dot.gov

Todd Plesko, Vice President for Planning and Development, Dallas Area Rapid Transit (DART),
tplesko@dart.org

Raj Murthy, Program Manager,
Alameda County Transportation Commission (ACTC)
rmurthy@alamedactc.org

Sarah Burnworth, Incident Management Program Coordinator,
Metropolitan Transportation Commission (MTC)
SBurnworth@mtc.ca.gov

Feedback

A feedback form will be emailed to all participants following the webinar. Please take a few minutes to fill it out – we value your input. The form contains information for those requesting Professional Development Hours (PDHs).

Thank you!