FHWA OFFICE OF OPERATIONS
PEER EXCHANGE WORKSHOP

INNOVATIVE CONTRACTING AND ACCELERATED CONSTRUCTION
TECHNIQUES FOR WORK ZONE SAFETY AND MOBILITY

I-93 Fast 14

Neil E. Boudreau, MassDOT State Traffic Engineer

June 5 & 6, 2012

Denver, CO
MassDOT’s I-93 Fast14

- Project Overview
- Traffic Impacts/Mitigation
- Lessons Learned
- Achievement of Goals
Project Overview

- I-93 in Medford area constructed in early 60’s
- Four travel lanes each direction – minimal shoulder width
- Processes 200,000 VPD
- Weekend hourly volumes still at 5,500 VPH in both directions during peaks
A scheduled highway resurfacing project, started in 2008, exposed severely deteriorated bridge decks.

Old age, chloride intrusion, from snow & ice control, main contributor to degradation.
Birth of a Project

- Valley Street failure underscored need for deck replacement project for entire corridor
- Traffic volumes preclude long term closures
- Concept started a month earlier
- Decision made,

**FIX THEM ALL IN SUMMER 2010**
7 Bridges are spaced out within a 1.5 mile corridor
Conventional Construction

- Multi stage – (possibly five)
- Minimum 4 years
- Worker safety issues
- Traffic splits
- Narrow travel lanes
- Loss of accel/decel lanes
- Concern over durability of the existing decks
Project Approach

- Replace 14 deteriorated bridge superstructures over 10 weekends in June, July, August
- No Work on July 4th
- 2-weekends of float for weather/construction issues
- Use one side of I-93 to provide 2 lanes NB and SB over weekend
Accelerated Bridge Construction

- Benefit of ABC on reducing the duration of construction and impacts on motorists
- Prefabricated steel beam & pre-cast deck panels
- Aggressive traffic management
- Innovative materials and construction methods
- Accelerated construction schedule
**Procurement Method - Design Build**

- Method shortens schedule – Construction & Design occurring simultaneously
- Risk of design is distributed to contractor who hires consultant to complete design from 25% level. Contractor owns the design.
- Incentive/Disincentive used to push schedule and reward acceleration and penalize delays.
- Project initiated in August 2010, RFP out in late October and NTP issued on Feb. 7, 2011. All bridge/highway work complete: Nov. 2011
The Construction Plan

- 14 bridge superstructures in ten weekend
- 252 modular units
- 18 for a three span bridge (6 across)
- Rapid strength gain concrete for 32” closure pour between units
- Minimize pick weights – cast parapet walls in-place after deck complete
Preparation Work
Sub-Structure Repair Work

- De-lead, shore, jack and cope 684 beam-ends to provide access for beam seat work

- Prep & pour 1008 beam seats total
Fabrication of Modular Units

252 Modular units cast in New Jersey, transported to MA
Precast Lifting Exercise
Dry Runs & After Action Reviews
Traffic Outreach Goals

- Manage Interstate Traffic with half the capacity each weekend
- Encourage diversion to alternate routes through providing real-time travel time information
- Monitor alternate routes to ensure that capacity is available
- Communicate work schedule to the public effectively
- Make safety a priority
Existing Traffic Volumes

- Evaluation of historical I-93 summer count data to determine the possible impact for dropping two lanes on a 4-lane interstate highway
- Reducing a four lane section to a two lane section is expected to have a capacity of approximately 2,960 vehicles per hour.
- I-93 weekend traffic volumes for the highest hours of the day are still up in the 5,500 vehicles per hour range in both directions
- Encourage diversion and use other regional roadways, Route 128/95, I-495, I-90 and Route 1
- The primary local detour route, Fellsway/Route 28 carries between 700 to 1,800 vehicles per hour on Saturdays and Sundays
- Impacts expected on other regional facilities, Route 16, Route 38 and Route 60 expected
Goal: Traffic Diversions

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<th>AVERAGE DELAY (minutes)</th>
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**Southbound**

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*Based on Highest Hour of Traffic Observed

**Need Minimum of 15% traffic diversion Northbound on I-93**

**Need Minimum of 35% traffic diversion Southbound on I-93**
So how do we do it?
Traffic Management Approach

Provide for safe and efficient maintenance of traffic on all roadways in project area.
Use of Movable Barrier

The need for positive protection to run counter-flow traffic and still be efficient to deploy, led MassDOT to the “Quick Change” barrier system.
Crossover Design Considerations

- Requirement that crossover be configured for a 65 mph design speed
- Including shifting tapers and curve radii
- Not designed for super-elevation (weekend closures only)
- Minimize conflicts with other roadway elements (i.e., bridge piers, interchanges, sign bridges, etc...)

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Barrier Configuration

- **Work Zone**
- **Cones or Plastic Delineators**
- **QMB Wall Deployed for 2/2 configuration**
- **BTM’s parked behind wall at South End after deployment**
Movable Barrier Deployment
I-93 Crossover TMP

Local Access Lane Ends Before Bridge Work Zone. See Typical Details.

Road Impact Attenuator for Median (Capable of Reduction of Restriction, C2).

See Crossover Details for NB Closure for Additional Details.

Reflectors Drums @ 50' D.C. Through Crossover

Crossover with Type C (steady) Light Every 20'.

Local Access Lane (See NB Local Access Lane for Weekend Work Details)

Meet D.O.T. Special Lighting Unit (4-Right Caution Display)

Temp Exit Sign (See Temporary Traffic Control Plan for Individual Bridges)

Meet D.O.T. Special Lighting Unit (For Individual Bridges)

I-93 NB Bridge Closure
SOUTH OF SOUTHERN CROSSED


massDOT
Massachusetts Department of Transportation

September 21, 2012
Work Zone Speed Limit
Emergency Access Points
Fellsway Traffic Plan
Fellsway Operations Plan: I-93 Traffic Composition

Note: assumes a regional diversion of 25%

Example: Riverside Ave NB
Local Detour Routes
Local Detour Routes
Incident Command Structure

- From early on in the process the decision was made to plan the Fast 14 traffic management operations as if the weekend schedule is an “incident” and utilize the Incident Command Structure according to the National Incident Management System (NIMS)

- NIMS provides a systematic, proactive approach to guide departments and agencies at all levels of government, in the management of incidents
Mobile Command Center

The Massachusetts State Police have a mobile “command center” that will serve as the focal point of communications between work zone traffic details, intersection control, construction operations, local police/fire and regional EMS.
Active Command Post
Real-Time Traffic Management

- 35 Portable Changeable Message Signs (PCMS)
- 4 Portable Camera Trailers
- 67 Traffic Sensor Trailers
- 3 Blue Tooth Sensors
- ASTI’s “CHIPS” Program (Operating System)
RTTM System Main Screen
RTTM System
Night Time Coverage

DMV being cleared off shoulder area
Video Wall at Command Post
Field Office Operations Center
Massachusetts Interagency Video Information System

MIVIS – Provides Remote Camera Access

Screen Shot from 1 of 6 new cameras in corridor

All password protected
EarthCam – Contingency Assist
Partnering with our 511 provider Sendza we had over **1,100 users** of the dedicated I-93 Fast 14 Construction Alerts

**Saturday, July 30th – General Message**

“**MassDOT- Medford I93 reduced to 2 lanes each dir – NB Ramps open, SB to Ex 33 only. Local access via Rt 28. Expect traffic delays/plan extra time/use alt rtes**”

**Voice over** – In addition to the traditional text messages that we send Sendza, we also prepare and send a local roadway detour plan
Highway Advisory Radio

MassDOT deployed six HAR units approaching key alternate routes.

Message sets were drafted for eight different traffic scenarios based on varying delay thresholds.
District 4 Maintenance has provided the Fast 14 project with on-call traffic operations needs, general highway maintenance and work zone traffic control.

Weekly deployment PCMS boards to support the local detour routes.

Without the support of the Highway Maintenance Team, MassDOT would have had a very difficult time managing the weekend schedule.
Highway Operations Center Support

- Each week the HOC supports the Fast 14 project with schedule/traffic advisories for the next weekend’s bridge (Mon-Fri)
- During the weekend, the HOC provides 7-10 site specific messages
- Two-way communications
  Using 800 MHz radios
Emergency Response

- Project team held 4 meetings with 16 local Police Departments as a part of the process in developing the Contingency Plan and Incident Action Plan.

- Team also conducted one big regional meeting with Armstrong Ambulance that included several other regional companies. In addition, there were coordination meetings with representatives from both Boston EMS and Massachusetts General Hospital (MGH).

- The MSP Truck Team Commander held several discussions with the MSP Truck Team, Coady's and DEP to ensure that an agreement on an expedited version of the HazMat cleanup protocol was reached.

- MSP Troop A worked with the Accident Recon Team (CARS) to develop an expedited accident reconstruction protocol to ensure a very quick cleanup and clearance for any accident involving a serious injury or fatality occurring within the Fast 14 Project boundary.
State Police Emergency Response Teams

CVES

CARS
On-Site Tow Services
Motorist Assistance Vans

In order to keep the “alternate routes” a viable option for motorists to consider diverting to, MassDOT has scheduled the traditional weekday rush hour Motorist Assistance Vans to keep the road free from breakdowns and incidents

747 stops with 394 motorists assisted
Public Transportation

Anderson RTC -
People were encouraged to take advantage of the free parking
Bus Route Changes

Service Advisory
Effective Friday 07/13/11 6 PM until Monday 07/17/11 3 AM

Route 710 detour due to Webster Street Bridge Closure

For the weekend of July 8th starting at 6:00PM the Route 710 will be detoured due to the closure of the Webster Street Bridge.

The route will omit service along Fulton Street, Webster Street and Forest Street between Fellsway, West and Lawrence Road.

For schedule information, call 617-222-3200, TTY 617-222-5146, or visit www.mbtas.com

Service Advisory
Effective Friday 06/24/11 6 PM until Monday 06/27/11 3 AM

Route 100 detour due to Valley Street and Fellsway Bridge Closure

For the weekend of June 24th starting at 6:00PM the Route 100 will be detoured due to the closure of the Valley Street and Fellsway Bridge.

The bus stop at Valley and Fulton Streets will be relocated temporarily on the far side of the intersection. No other stops will be missed.

For schedule information, call 617-222-3200, TTY 617-222-5146, or visit www.mbtas.com
Lessons Learned

- Involve key decision makers from the start
- Aggressive schedule requires organization
- Co-locate with Design-Build contractor
- Form discipline-based working groups
- Work with locals regarding impacts / expectations
- Engage law enforcement early
- Develop/exercise contingency plans
- Use any and all communication methods
- Practice key work activities
- Two-way radio communication
- Adjust methods to improve efficiency
Achievement of Project Goals

- Managed interstate traffic without long queues/excessive delays
- Kept local detour routes moving with acceptable levels of delay
- Protected workers from hazards of the work zone/highway
- Avoided serious crashes in TMP
Fast 14 Traffic Observations

- Traffic on I-93 averaged speeds of 35 mph through the work zone, with lower speeds entering the lane drop areas (15-20 mph) and higher speeds inside the movable barrier lanes (40-45 mph).

- Local detour routes maintained an average speed of 25-mph and delays were kept to an average of 2-3 cycles at key intersections.
RTTM Weekend Data

Weekend 10 Speed Plot Data:
I-93 Southbound over Route 16 (Mystic Valley Parkway)
August 12-14

Traffic volumes exceed capacity of the lane and speed drop to a crawl for periods of the day.

Q29: Southbound

Q19: Northbound
Project Crash History

- Between June 3rd and August 15th, there has been a total of 348 Motor Vehicle Accidents (MVAs) on I-93 within the TMP limits.
- 144 of those MVAs actually occurred during the 55-hour construction window over the ten weekends of work I-93 (No work on 4th of July Weekend).
- 55 of 144 were Paper Exchanges = not reportable.
- A total of 35 Disabled Motor Vehicles have been cleared during the 55-hr schedule.
I-93 Fast 14

Project In Action
Moving the Barrier
Sky Eye View of Barrier
Northbound Exodus
Dedicated Work Area Protection
Early Start on Demo
View of Early-Start Demolition
Truck Convoy Mobilization
Deck Panels on the Move
Parade of Sail
The morning after
Counter-Flow Operation
Modular Unit Erection
Modular Unit Erection Cont.
Forming, Reinforcement Installation
Forming, Dowel Bar Splicers
Approach Work/Cleanup