ROAD USER BENEFITS THROUGH ACCELERATED CONSTRUCTION

MassDOT’S I-93 Fast 14 Project

FHWA Webinar

May 30, 2013
Project Overview
Birth of a Project

Interstate 93 bridge superstructures in Medford are more than 50 years old and need to be replaced.

An on-going MassDOT repaving project during the spring/summer of 2010 revealed advanced deterioration in northbound bridge decks.

In July 2010 MassDOT initiated a feasibility study to replace the superstructures for several bridges on Intersection 93.

Deck failure in August 2010 on I-93 over Valley Street significantly reduced road capacity during completion of emergency repairs.
Advanced Deck Deterioration

Isolated failures can result in full span repairs

Delaying commencement or completion of replacements may result in unscheduled emergency repairs
These structures carry 200,000 vehicles per day
Conventional Construction

- Requires 5 stages
- **Minimum** 4 years
- Increased congestion/delays
- Worker safety issues
- Unsafe traffic splits
- Narrow travel lanes
- Loss of accel/decel lanes
- Concern over durability of the existing decks
Accelerated Construction

- Replace 14 deteriorated bridge superstructures over 10 weekends June - August
- No Work on July 4th
- 2-weekends of float for weather/construction issues
- Use crossover on I-93 to provide 2 lanes NB and SB counter-flow in one barrel
- Aggressive traffic management
Initial Project Goals

- Use of Accelerated Bridge Construction to reduce the duration of construction
- Make work zone safety is a priority
- Minimize traffic impacts to motorists and local communities
- Stress need to encourage route diversion
- Effectively communicate travel delays and detour routes to the public at large
- Sell the overall benefits of ABC
Existing Traffic Volumes

- Evaluated historical I-93 summer count data to determine the possible impact for dropping two lanes on a 4-lane interstate highway.
- This section of I-93 carries between 169,000 and 181,000 vehicles per day, even weekends.
- I-93 weekend volumes for the highest hours of the day are still around 5,500 vph NB and SB.
- Route 28, the primary local detour route, carries between 700 to 1,800 vph on the weekend.
- The primary detour route has 16 traffic signals under local or other State Agency control and need to evaluated and re-timed for progression.
- Impacts expected on other regional facilities (Route 16, Route 38 & Route 60) which all see significant weekend peak hour traffic volumes.
Traffic Operations Goal
# Traffic Diversion Goal

<table>
<thead>
<tr>
<th>NORTHBOUND</th>
<th>DIVERSION RATE (Percentages)</th>
<th>QUEUE LENGTH (miles)</th>
<th>AVERAGE DELAY (minutes)</th>
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<td>SATURDAY</td>
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</tbody>
</table>

*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
## Road User Cost Projections

This represents the cost of one hour of general purpose vehicle driver’s travel time based on a 2011 forecast using Consumer Price Index (CPI) History

<table>
<thead>
<tr>
<th>TIME OF DAY</th>
<th>VALUE OF VEHICLE OPERATOR’S TIME ($ / HOUR)</th>
<th>DELAY TIME (HOURS)</th>
<th>VOLUME (VEHICLES / HOUR)</th>
<th>INCREMENTAL ROAD USER COST AT EACH 15 MINUTE INTERVAL</th>
<th>TOTAL ROAD USER COST AT EACH 15 MINUTE INTERVAL</th>
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<tbody>
<tr>
<td>Mon., 5:00:00 AM</td>
<td>$18.97</td>
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<td>6,549</td>
<td>$62,117</td>
<td>$62,117</td>
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</table>
Incentives & Disincentives

Operator valued at $18.97 per person per hour with an average volume of 6,549 veh/hour = Incremental Road User costs at each 15-minute interval starts at $62,117

The Road User Costs represent the disincentive values that could be charged against the contractor for being late by each 15-minute increment
So how do we do it?
Traffic Management Details

- Provide full access to one barrel of I-93 and divert traffic from opposite side via a crossover
- Use movable barrier to provide counter-flow operation for 2 lanes each direction
- Divert regional trips away from I-93
- Focus on “safe” means for mobility
- Allow local use of I-93 where feasible to provide access to on/off-ramps
- Use Real-Time Traffic Management system
- Use Police Details to support traffic operations and follow ICS for quick clearance
Use of Movable Barrier

- QMB Wall Deployed for 2/2 configuration
- Cones or Plastic Delineators
- Work Zone
- BTM’s parked behind wall at South End after deployment
Work Zone Speed Limit
Work Area Protection
Emergency Access Points
Local Detour Routes
Maps for Local Detour Routes
Incident Command Center

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).

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 of incidents and regional EMS.
I-93 Traffic Route Diagram

Diagrams created to assist State Police with simple layout of the traffic management plan displaying the lane/ramp status for use in fixed post assignment and quick emergency response.
Real-Time Traffic Management
RTTM Equipment

- 35 Portable Changeable Message Signs (PCMS)
- 4 Portable Camera Trailers
- 67 Traffic Sensor Trailers
- 3 Bluetooth Sensors
- 2 Speed Radar Trailers
- ASTI’s “CHIPS” Program (Operating System)
RTTM System
Field Office Operations Center
Video Wall at Command Post
MassDOT deployed six HAR units approaching key alternate routes.

Message sets were drafted for eight different traffic scenarios based on varying delay thresholds.
Entering the final weekend (#10), there were 825 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 sent Sendza, we also prepared a voice over message to cover the roadway detour plans
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 scheduled the traditional weekday rush hour Motorist Assistance Vans to keep the road free from breakdowns and traffic incidents.

747 stops with 394 motorists assisted
Anderson RTC -
People were encouraged to take advantage of the free parking
Bus Route Changes

Service Advisory
Effective Friday 07/12/11 6 PM until Monday 07/11/115 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 Bridge.

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

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.
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 within the limits of the TTCP
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