National Capital Region Transportation Planning Board

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M E M O R A N D U M

TO: Members of the TPB's Bus On Shoulders (BOS) Task Force

FROM: Eric Randall
Department of Transportation Planning

SUBJECT: Preparations for the April 17 Meeting of the BOS Task Force

DATE: April 5, 2013

Meeting Date and Location

The third and final meeting of the BOS Task Force is scheduled for April 17, 2013, at 10:00 am in COG Meeting Rooms 4&5 (prior to TPB that day). The proposed agenda for the meeting includes:

- An update on VDOT's I-66 Inside the Beltway Pilot Project and steps to implementation.
- Additional information from SHA on the feasibility of BOS on the I-270 and MD-5/US-301 corridors.
- An overview of a planning-level BOS benefit-cost analysis model, with preliminary findings and sensitivity analysis results.
- Discussion of preparation of final report.

Following the task force meeting, the Task Force Co-Chairs will update the Transportation Planning Board at the afternoon's TPB meeting.

All materials of the BOS Task Force are available online at: http://www.mwcog.org/bostf

Additional Information

Virginia Department of Transportation

VDOT will provide an update on the activities of their working group in support of the I-66 Inside the Beltway Bus on Shoulder Pilot Program. A report has been prepared and is currently being finalized, which will lay out a schedule for preliminary engineering and additional actions that need to be completed for implementation of the pilot project for BOS operations.

Maryland State Highway Administration

SHA has collected additional information on the condition of shoulders along the I-270 and MD-5/US-301 highways. Meeting participants will be briefed on the following:

- Tools SHA used to determine shoulder widths (Planning Level)
- Describe what pinch points/conflict points there are
- Cursory aerial view of I-270 and MD 5
- Analysis from I-70 to Montgomery County Line along I-270 (pinch points identified)
- Analysis from the Montgomery County Line to Germantown along I-270 (pinch points identified)
- Analysis of the Germantown to Shady Grove section of I-270 (pinch points identified)
- Analysis of MD 5/US 301 (I-495 to Waldorf) (pinch points identified)
- Unforeseen issues and concerns along both corridors
- Shoulder improvement costs for cost-benefit analysis. Some examples include:
    - Maintenance of Traffic (MOT)
    - Environmental Site Design (ESD)
    - Traffic Barriers
    - Pavement
    - Drainage
    - Earthwork
    - Milling/Resurfacing
- Next Steps

Transportation Planning Board Staff

TPB staff has developed a benefit-cost analysis (BCA) model for planning-level assessment of BOS operations on select corridors/routes. The BCA model requires input data on the characteristics of the corridor for which BOS operations are proposed: length of shoulders, travel speed data, and the number of buses and of passengers.

The BCA model uses the travel data to calculate the improvement in travel time and in reliability from buses making use of shoulders to circumvent traffic according to typical operating protocols. Based on operational cost data and the passenger value of time, the results are converted into dollars to calculate the financial and passenger benefits of BOS operations. These benefits are then compared to cost assumptions, including the capital cost of necessary shoulder improvements and project start-up costs as well as ongoing operations costs. A benefit/cost ratio over ten years is then calculated.

The BCA model provides a "first cut" indication of the potential for BOS on an analyzed corridor. The model reacts to changes in estimated implementation costs and transit ridership, and a sensitivity analysis of the impact of different inputs can be made. For example, inputting an increase in transit ridership would provide more benefits and a higher benefit/cost ratio, but should be evaluated against a range of low, medium, and high implementation cost estimates to provide a broader assessment of the feasibility of BOS on an analyzed corridor.

BCA model results for the three study corridors are being refined, and a sensitivity analysis for a range of project costs and transit ridership for each will be presented at the task force meeting.

Attached is a presentation on the activities of the task force given at the April 5 TPB Technical Committee, which reviews the progress of the task force and includes an illustrative example of the BCA model.

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Update on the Activities of the TPB Bus On Shoulders (BOS) Task Force

TPB Technical Committee

April 5, 2013

Eric Randall, DTP

TPB Task Force on BOS

- At the July 18, 2012 meeting of the Transportation Planning Board (TPB), it was requested that a task force be established to identify promising locations in the region to operate buses on the shoulders of highways.
- The proposed membership, work plan, and schedule were approved at the September 19 TPB meeting.

BOS is an arrangement by which buses providing public transportation service operate on designated highway shoulders, when safe and practical to do so, in order to circumvent peak traffic congestion.

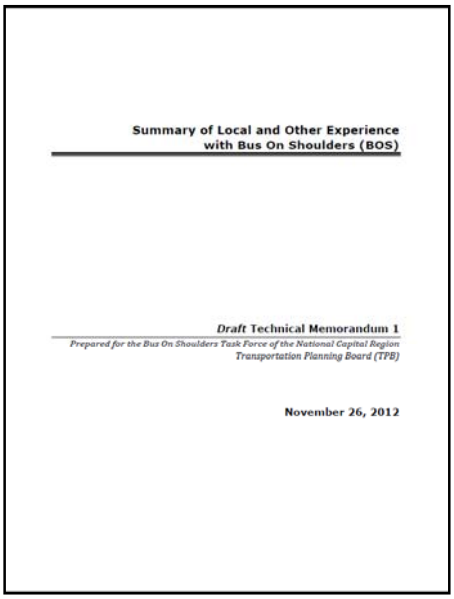
Task Force – Meeting #1

Meeting #1 – October 17

- Discussed local and national/world experience with BOS.
- Requested inputs on corridors to study.

Draft Technical Memo #1 – Nov. 26

- Summary of local and national/world experience with key issues: implementation, design, operational, and regulatory.



Summary of Local and Other Experience with Bus On Shoulders (BOS)

Draft Technical Memorandum 1

Prepared for the Bus On Shoulders Task Force of the National Capital Region Transportation Planning Board (TPB)

November 26, 2012

Task Force – Meeting #2

Meeting #2 – January 19

- Discussed three study corridors:

Maryland

- MD 5/US 301 Corridor in Prince George's and Charles Counties.
- I-270 Corridor from City of Frederick to the Capital Beltway.

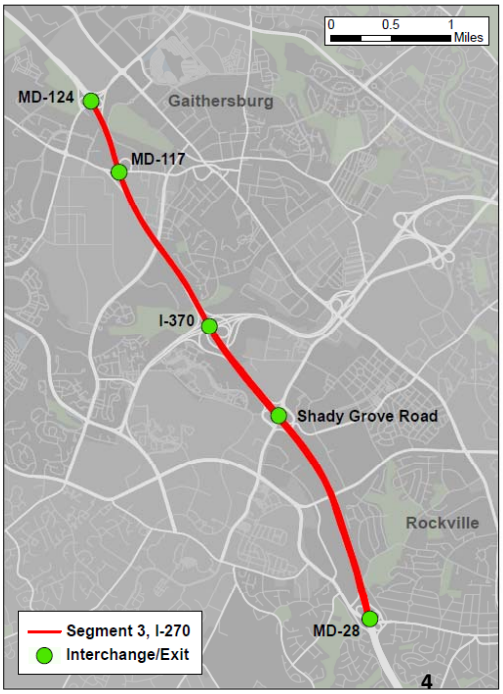
Virginia

- I-66 Inside the Beltway.

Meeting Highlights and Draft Memo #2 – February 28

- Summary of discussion of factors affecting BOS feasibility on the three study corridors.

I-270 BOS Corridor, Segment 3: MD-124 to MD-28

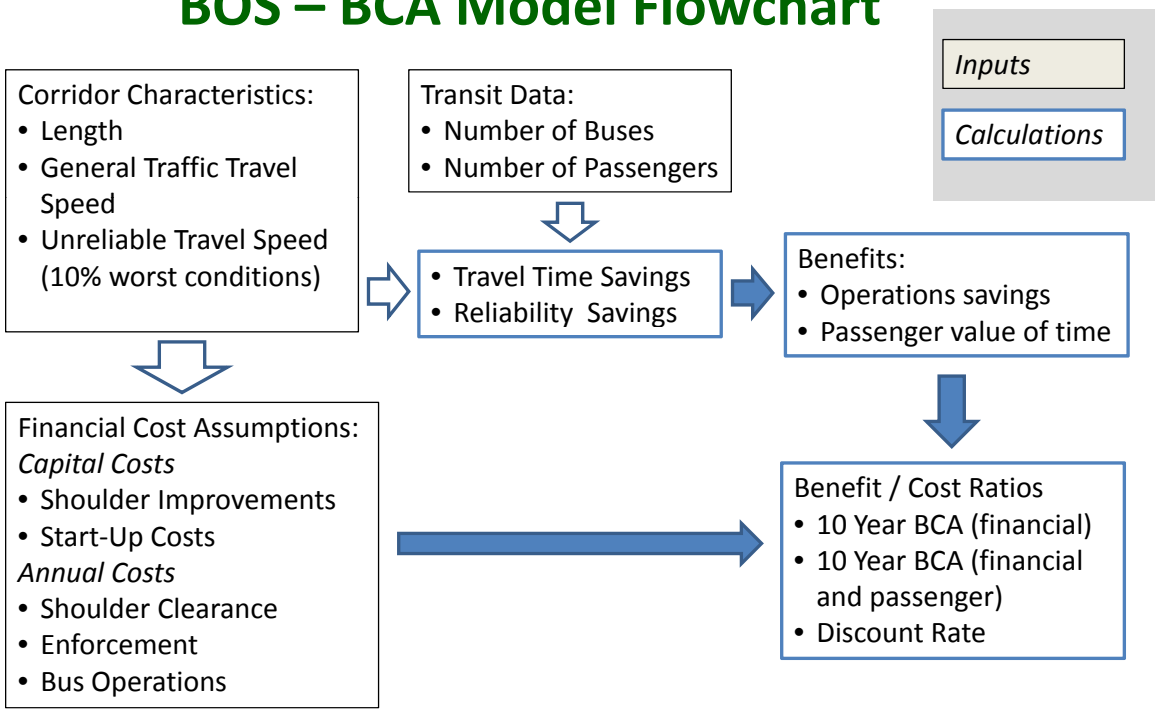


BOS Task Force Meeting #3 – April 17

Agenda

- Present further analysis of select corridors/routes.
  - VDOT: I-66 Inside the Beltway
  - SHA: I-270 and MD-5/US-301
- Present planning-level model of benefit-cost analysis (BCA) results for select corridors/routes.
  - Estimated capital costs for implementation
  - Benefits of travel time and reliability improvements
  - Sensitivity analysis for different inputs/assumptions
  - Benefit/cost ratio over ten years
- Discuss preparation of findings for final report

BOS – BCA Model Flowchart



Sensitivity analysis can vary costs based on assumptions or new information

BCA Model: I-270 (SB, AM) Inputs

Bus On Shoulders (BOS) Benefit-Cost Analysis		I-270 - Segments				
		1	2	3	4	TOTAL
		I-70 interchange (Frederick) to MD-	MD-121 to MD-124 (Gaithersburg)	MD-124 to MD-28 (Rockville)	MD-28 to Beltway	
Corridor Characteristics						
Length of Bus On Shoulder Segment	miles	14.35	6.87	4.96	6.51	**32.69**
General Traffic Travel Speed	miles per hour	45.4	33.1	26.8	38.2	
Unreliable Travel Speed (10% worst conditions)	miles per hour	29.5	16.3	16.3	24.1	
Transit Data						
Number of Buses	Scheduled trips (peak hour)	4	25	25	4	**25**
	Scheduled trips (peak period)	12	70	70	11	**70**
	peak factor	33%	33%	33%	33%	
Number of Passengers	Ridership (peak hour)	416	1442.8	1442.8	94.6	**1443**
	Ridership (peak period)	2080	6558	6558	215	**6558**
Travel Time Savings	% of peak bus trips using shoulders	50%	50%	50%	50%	
	BOS speed	0	35	35	0	
	average speed differential	0	1.9	8.2	0	
	segment length	14.35	6.87	4.96	6.51	
	Travel Time Savings (hr)	***0.000***	***0.006***	***0.022***	***0.000***	***0.0273***
Reliability Improvement	% of peak bus trips arriving on time	90%	90%	90%	90%	
	BOS speed	35	31.3	31.3	35	
	average speed differential	5.50	15.00	15.00	10.90	
	segment length	14.35	6.87	4.96	6.51	
	Reliability Savings (hr)	***0.069***	***0.182***	***0.131***	***0.076***	***0.4575***

Preview for Illustrative Purposes Only – 04/05/13

BCA Model: I-270 (SB, AM) BCA Results

		1	2	3	4	TOTAL
Benefits and Costs		I-70 interchange (Frederick) to MD-121 (Clarksburg)	MD-121 to MD-124 (Gaithersburg)	MD-124 to MD-28 (Rockville)	MD-28 to Beltway	
Capital Costs	***Assumptions***					
Shoulder Improvements (cost/mile)	$1,500,000	$21,525,000	$10,305,000	$7,440,000	$9,765,000	**$50,535,000**
Public Education (per project)	$50,000					**$50,000**
Operations Training (per bus driver)	$600					**$42,000**
O & M Costs						
Shoulder Clearance (annual, per mile)	$10,000	$5,000	$5,000	$5,000	$5,000	**$30,000**
Enforcement (annual, per mile)	$5,000	$2,500	$2,500	$2,500	$2,500	**$15,000**
Bus Operations (annual, per bus)	$2,500					**$175,000**
Travel Time & Reliability						
Operations Savings (weekday, $/hour)	$100	$46	$747	$609	$48	**$1,550**
Passenger value of time ($/hour)	$12.00	$797	$7,041	$5,745	$122	**$13,718**
Project Summary						
Capital Costs (once)		$21,525,000	$10,305,000	$7,440,000	$9,765,000	$50,627,000
O & M Costs (annual)		$7,500	$7,500	$7,500	$7,500	$220,000
Financial Benefits (annual)		$11,420	$186,716	$152,352	$11,944	$387,432
Passenger Benefits (annual)		$199,191	$1,760,355	$1,436,371	$30,512	$3,429,429
10 Year BCA (financial)		**0.00**	**0.17**	**0.19**	**0.00**	**0.03**
10 Year BCA (financial and passenger)		**0.09**	**1.88**	**2.13**	**0.04**	**0.71**
Discount Rate	*3%*					
10 Year BCA (financial)		**0.00**	**0.15**	**0.17**	**0.00**	**0.03**
10 Year BCA (financial and passenger)		**0.08**	**1.61**	**1.81**	**0.03**	**0.61**

Preview for Illustrative Purposes Only – 04/05/13

Next Steps

- Task Force Meeting #3 – April 17 (prior to TPB that day)
  - Meeting Rooms 4&5, 10:00 to 11:45 am
  - Possible press attendance – WTOP
  - Co-Chairs to report on task force at TPB meeting
- Final Steps
  - Take away discussion from meeting.
  - Complete technical memorandum #3 with corridor information and BCA results.
  - Compile meeting discussions and materials, and three technical memoranda, into final report (June).
  - Update TPB in early 2014 on VDOT I-66 Pilot Implementation and further BOS developments.