



Evaluation of Transportation Projects in Northern Virginia Transportation District

TPB Travel Forecasting Subcommittee

January 24, 2014

Study Background

2012 VA-GA : § 33.1-13.03:1

(Code Chp. 768/825)
(HB 599 / SB 531)



**Evaluating and Rating at
Least 25 Significant Projects**



Publish Project Ratings

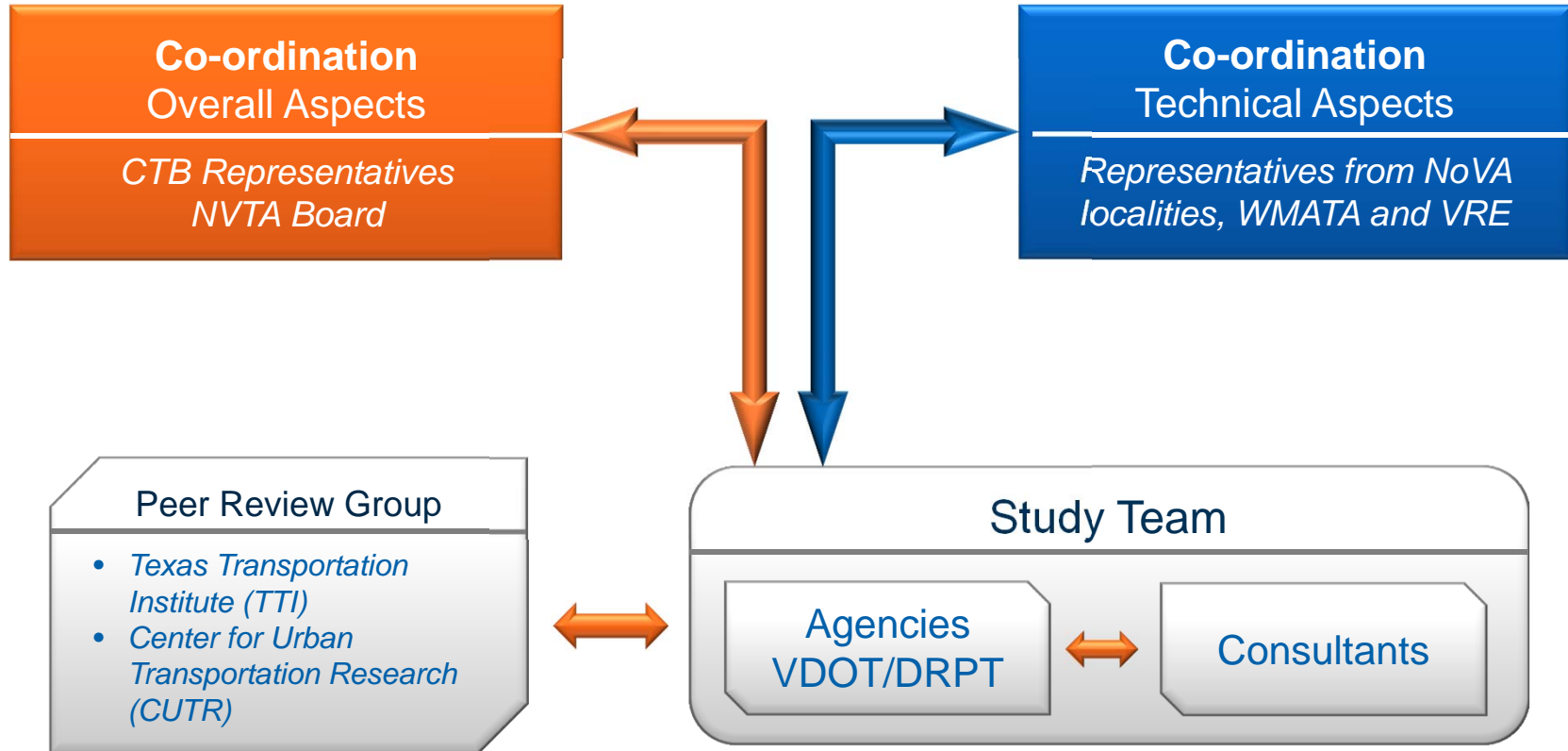
Informs
allocations

CTB / Others

Governs allocations
(Non-transit capacity adding projects)

**New NVTA
Transportation Funds**

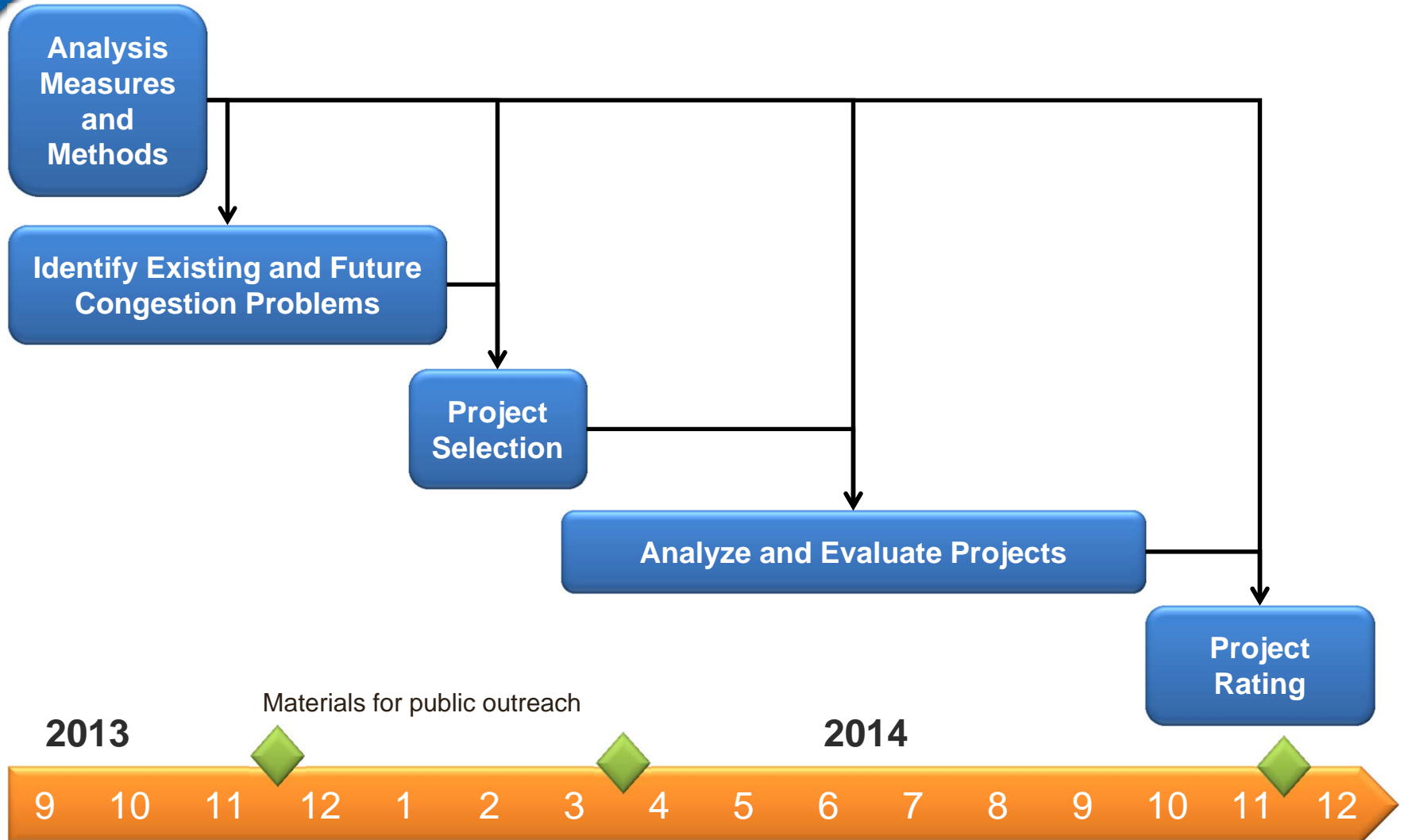
Study Organization



Overall Project Approach

- **Establish the analytical and decision framework**
- **Identify existing and future congestion problems**
- **Solicit projects to address identified problems**
- **Select 25-30 regionally significant projects**
- **Analyze and evaluate projects**
- **Rate project performance**

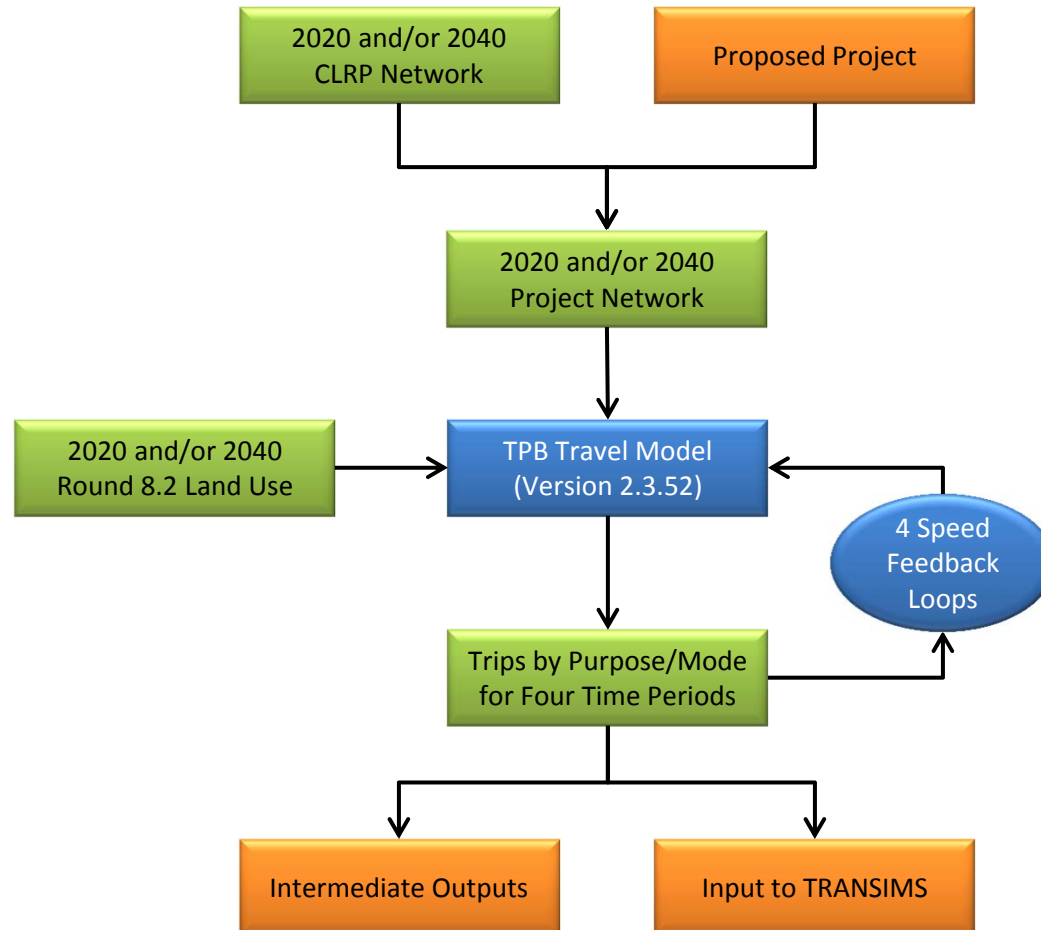
Implementation Study Schedule



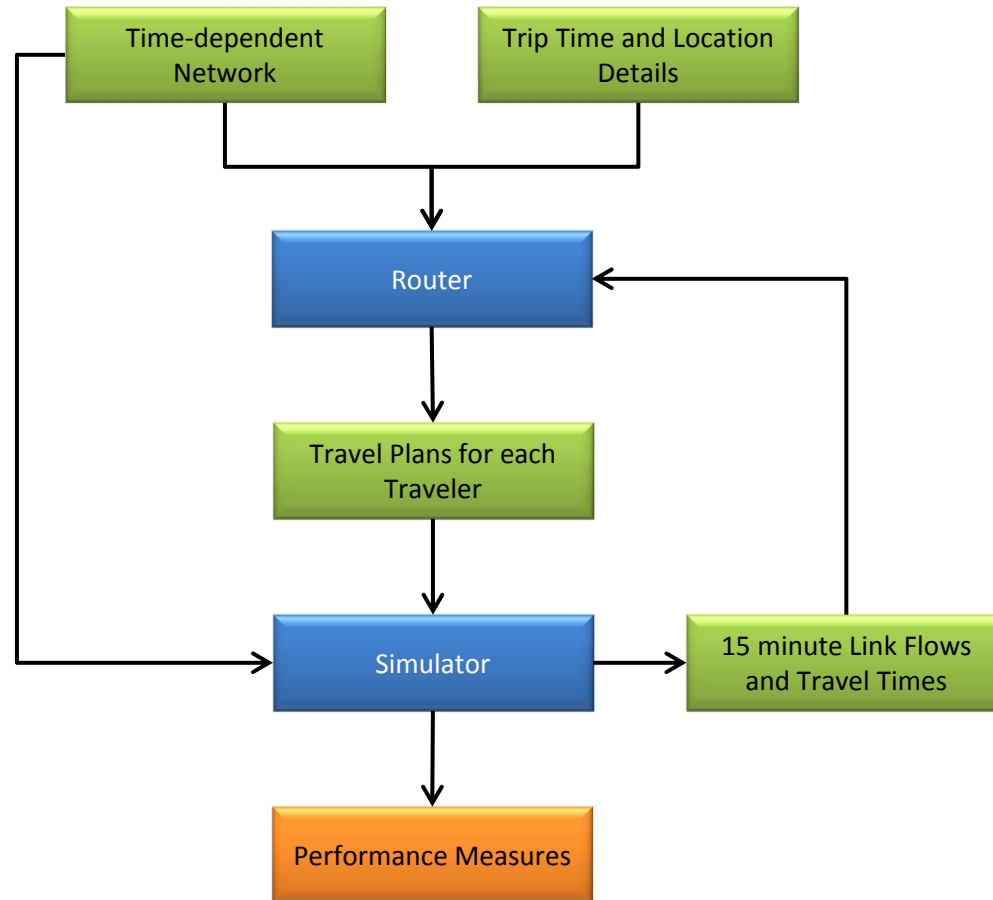
Analytical Process

- **Authorizing Legislation**
 - *Use transportation models and computer simulations to provide an objective, quantitative rating of significant transportation projects...*
 - *Projects will be evaluated and rated based on how well they reduce congestion and improve mobility during emergencies*
- **The proposed analytical process combines the TPB regional model with a dynamic travel simulation**
 - **TPB regional model generates zone-to-zone demand in four time periods**
 - **TRANSIMS distributes demand to activity locations and seconds of the day**
 - **Dynamic user equilibrium routing and simulation estimates the congestion impact and calculates performance measures**

TPB Travel Model → Travel Demand



TRANSIMS Simulation Convergence



Decision Support Models

- Project selection and rating decisions will be supported by an Analytical Hierarchical Process (AHP) using the Decision Lens tool
- The project team, the peer review group and stakeholders will help establish project selection and evaluation measures and methods
- Stakeholder input creates the relative weights for each performance measure and selection criteria
- Two decision support models will be developed for this study
 - Project Selection Model
 - Project Evaluation Model

Project Selection Model

Category	Attribute	Category Weights	Attribute Weights	Overall Weights
Project Significance		55.5%		
	Project Type		<div style="width: 5.6%; background-color: #90EE90;">5.6%</div>	<div style="width: 3.1%; background-color: #6495ED;">3.1%</div>
	Designated Corridors		<div style="width: 23.3%; background-color: #90EE90;">23.3%</div>	<div style="width: 12.9%; background-color: #6495ED;">12.9%</div>
	High Travel Volume		<div style="width: 27.3%; background-color: #90EE90;">27.3%</div>	<div style="width: 15.2%; background-color: #6495ED;">15.2%</div>
	Connects Regional Activity Centers		<div style="width: 29.3%; background-color: #90EE90;">29.3%</div>	<div style="width: 16.3%; background-color: #6495ED;">16.3%</div>
	Connects Major Facilities		<div style="width: 14.4%; background-color: #90EE90;">14.4%</div>	<div style="width: 8.0%; background-color: #6495ED;">8.0%</div>
			100.0%	55.5%
Congestion Reduction Potential		36.5%		
	Congestion Severity		<div style="width: 15.6%; background-color: #90EE90;">15.6%</div>	<div style="width: 5.7%; background-color: #6495ED;">5.7%</div>
	Congestion Duration		<div style="width: 25.2%; background-color: #90EE90;">25.2%</div>	<div style="width: 9.3%; background-color: #6495ED;">9.3%</div>
	Person Hours of Delay		<div style="width: 22.1%; background-color: #90EE90;">22.1%</div>	<div style="width: 8.1%; background-color: #6495ED;">8.1%</div>
	Adds Capacity		<div style="width: 24.4%; background-color: #90EE90;">24.4%</div>	<div style="width: 8.9%; background-color: #6495ED;">8.9%</div>
	Reduces Vehicle Trips		<div style="width: 12.7%; background-color: #90EE90;">12.7%</div>	<div style="width: 4.6%; background-color: #6495ED;">4.6%</div>
			100.0%	36.5%
Homeland Security Mobility		8.0%		
	Facility and Operational Improvements		100.0%	<div style="width: 8.0%; background-color: #6495ED;">8.0%</div>
Total		100.0%		

Proposed Performance Measures

- **Travel Time Index (TTI)** = percent reduction in the ratio of peak hour travel time / free flow travel time
- **Transit Congestion** = percent reduction in route miles with heavy crowding on transit vehicles by transit mode (local bus ≥ 1.15 riders/seat; express bus/commuter rail > 1.0 riders/seat; Metrorail > 110 riders/car)
- **Congestion Duration** = percent reduction in the number of lane miles * number of hours of the day with heavily congested travel conditions (TTI ≥ 2.0)
- **Person Hours of Delay (PHD)** = percent reduction in the person hours of travel time above free flow travel time on roadway facilities
- **Person Hours of Congested Travel (PHC)** = percent reduction in the number of person hours on congested roadways (TTI ≥ 2.0)
- **Person Miles of Congested Travel (PMC)** = percent reduction in the number of person miles of travel on congested roadways (TTI ≥ 2.0)
- **Accessibility to Jobs** = percent increase in the number of jobs that can be reached from each household based on a 45 minute travel time by automobile and a 60 minute travel time by transit
- **Emergency Mobility** = percent increase in person travel time resulting from a 10 percent increase in peak hour trip making

Project Evaluation – MOE Weights

Impact Area	Performance Measure	Near-Term 2020 Benefits			Long-Term 2040 Benefits		
		Category Weights ¹	Attribute Weights ¹	Weighted MOE Score ²	Category Weights ¹	Attribute Weights ¹	Weighted MOE Score ²
Identified Congestion Site		A%			C%		
	Travel Time Index		E%	$A\% * E\% * S11$		E%	$C\% * E\% * S31$
	Transit Congestion		F%	$A\% * F\% * S12$		F%	$C\% * F\% * S32$
	Congestion Duration		G%	$A\% * G\% * S13$		G%	$C\% * G\% * S33$
	Person Hours of Delay		H%	$A\% * H\% * S14$		H%	$C\% * H\% * S34$
	Person Hours of Congested Travel		i%	$A\% * I\% * S15$		i%	$C\% * I\% * S35$
	Person Miles of Congested Travel		J%	$A\% * J\% * S16$		J%	$C\% * J\% * S36$
	Accessibility to Jobs		K%	$A\% * K\% * S17$		K%	$C\% * K\% * S37$
	Emergency Mobility		L%	$A\% * L\% * S18$		L%	$C\% * L\% * S38$
			100%	Score1		100%	Score3
Rest of Northern Virginia		B%			D%		
	Travel Time Index		E%	$B\% * E\% * S21$		E%	$D\% * E\% * S41$
	Transit Congestion		F%	$B\% * F\% * S22$		F%	$D\% * F\% * S42$
	Congestion Duration		G%	$B\% * G\% * S23$		G%	$D\% * G\% * S43$
	Person Hours of Delay		H%	$B\% * H\% * S24$		H%	$D\% * H\% * S44$
	Person Hours of Congested Travel		i%	$B\% * I\% * S25$		i%	$D\% * I\% * S45$
	Person Miles of Congested Travel		J%	$B\% * J\% * S26$		J%	$D\% * J\% * S46$
	Accessibility to Jobs		K%	$B\% * K\% * S27$		K%	$D\% * K\% * S47$
	Emergency Mobility		L%	$B\% * L\% * S28$		L%	$D\% * L\% * S48$
		100%	100%	Score2	100%	100%	Score4
Congestion Reduction Score		2020 Score = (Score1 + Score2)			2040 Score = (Score3 + Score4)		

1. category and attribute weights will be determined through a stakeholder consensus building process

2. S11-S48 represent the project performance value from the modeling process

Next Steps

- Review Stakeholder input on the proposed performance measures and project evaluation process
- January 31 – stakeholder meeting to weight the performance measures
- February 7 – distribute 2020 congestion maps to help stakeholders define projects
- Apply the project selection model to projects proposed by NVTA
- Present the recommended set of projects to NVTA on March 13th and CTB on March 19th
- Run each project through the TPB modeling process by June 1st
- Run each project through the TRANSIMS process by October
- Final rating report in December



Questions / Comments

THANKS!

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