



COMMONWEALTH *of* VIRGINIA
Office of the
SECRETARY *of* TRANSPORTATION

House Bill 2 Update

Nick Donohue
Deputy Secretary of Transportation
May 19, 2015



Virginia Department of Rail and Public Transportation



Agenda

- **Weighting Frameworks**
- **Proposed Changes to Measures**
- **Key Findings from Pilot Projects Test**
- **Measures, Scoring and Pilot Results**
- **Next Steps**

WEIGHTING FRAMEWORKS

Stakeholder Feedback on Weighting Frameworks

- Many PDCs/MPOs requested a change in weighting frameworks – B to C, C to D
- Suggested revisions to weighting percentage for some typologies
 - Suggestions that land use should be available as a measure statewide
 - Many small and medium size areas requested increased weight for economic development
- Suggestions to include additional weighting frameworks
- Want the ability to change frameworks over time

Factor Weighting Frameworks

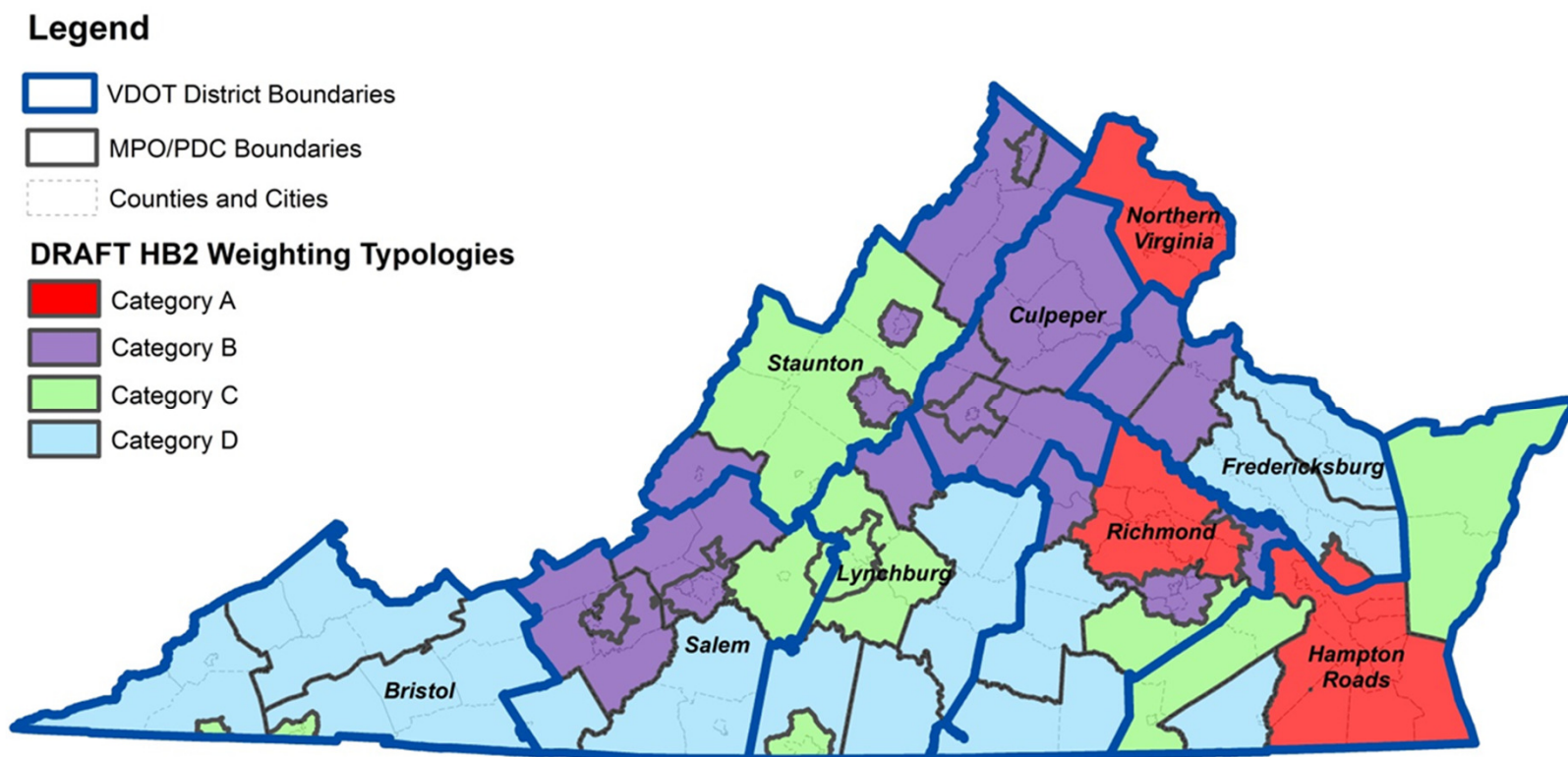
Factor Weighting Framework – March 2015

Factor	Congestion Mitigation	Economic Development	Accessibility	Safety	Environmental Quality	Land Use
Category A	35%**	10%	25%	10%	10%	10%*
Category B	15%	20%	25%	15%	10%	15%*
Category C	10%	20%	30%	30%	10%	
Category D	10%	30%	20%	30%	10%	

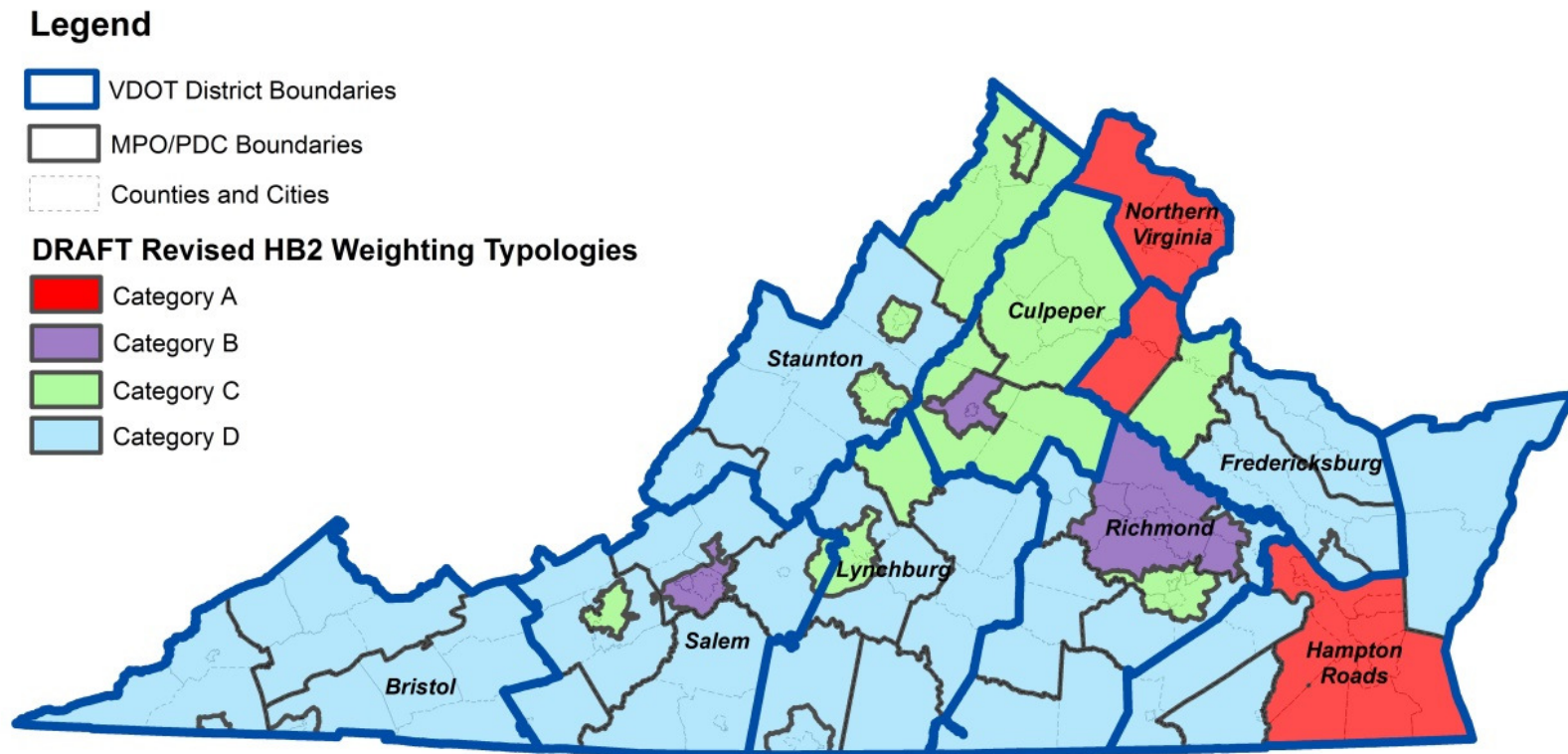
Recommended Factor Weighting Framework – May 2015

Factor	Congestion Mitigation	Economic Development	Accessibility	Safety	Environmental Quality	Land Use
Category A	35%	10%	25%	10%	10%	10%
Category B	15%	20%	25%	20%	10%	10%
Category C	15%	25%	25%	25%	10%	
Category D	10%	35%	15%	30%	10%	

Factor Weighting Categories by MPO and PDC (March draft)



Factor Weighting Categories by MPO and PDC (revised in May)



PROPOSED CHANGES TO MEASURES

Safety Factor Measures

- 50% of score – Expected reduction in total fatalities and severe injuries (100% of score for transit projects)
- 50% of score – Expected reduction in the rate of fatalities and severe injuries per 100 million vehicle miles traveled
- **Proposed Change to methodology – Use 5 years of historical crash data**

Congestion Factor Measures

- 50% of score – Change in peak period corridor total (multimodal) person throughput in the project corridor
- 50% of score - Change in the amount of peak period person hours of delay in LOS E or worse conditions in the project corridor
- No proposed changes to measures. Continuing to refine methodologies for measures calculations.

Accessibility Factor Measures

- 60% of score – Change in cumulative job accessibility (within 45 minutes) (within 60 minutes for transit projects)
- 20% of score - Change in cumulative job accessibility for disadvantaged populations (within 45 minutes by automobile and 60 minutes by transit)
 - Moved from Environmental
- 20% of score – Assessment of the project support for connections between modes, and promotion of multiple transportation choices
 - Revised language for scoring criteria
- ~~– 20% of score - Change in cumulative accessibility to essential destinations (within 30 minutes)~~

Environmental Quality Factor Measures

- 50% of score – Potential of project to reduce criteria air pollutant and greenhouse gas emissions
- ~~40% of score – Change in cumulative job accessibility for disadvantaged populations and accessibility for non-auto modes (within 45 minutes)~~
 - Measure moved to Accessibility
- ~~10% of score – Change in cumulative essential destination accessibility for disadvantaged populations and accessibility for non-auto modes (within 30 minutes)~~
- 50% of Score – New Measure - “Potential impacts to natural and cultural resources”

Environment – Potential Impacts to Natural and Cultural Resources – 50%

Sum the total acreage of land (within ¼ mile of project) in four categories:

- Conservation Land
- Species/Habitat
- Cultural Resources
- Wetlands

(Data sources: VOF, VDCR, VDOF, VDGIF, NPS, VDHR, USFWS)

Example

Project	Conservation	Species/Habitat	Cultural Resources	Wetlands	Total Acres
A	100	25	25	150	300

Environment – Potential Impacts to Natural and Cultural Resources

Scaling Impact and Assigning Points:

The type of environmental document required for each project will be used to assess and scale the potential natural resource impacts.

- *Environmental Impact Statement* – 100% of acreage will be used for scoring; maximum of 80 points
- *Environmental Assessment* – 50% of acreage will be used for scoring; maximum of 80 points
- *Categorical Exclusion* – projects in this category will receive 100 points for this measure

Environment – Potential Impacts to Natural and Cultural Resources Example

Project	Conservation	Species/ Habitat	Cultural Resources	Wetlands	Total Acres	Enviro Doc	Scaled Acres	Points
A	100	25	25	150	300	EA	150	6.67
B	NA	NA	NA	NA	NA	CE	0	100
C	100	25	25	150	300	EIS	300	3.33
D	20	0	0	5	25	EA	12.5	80

Economic Development Factor Measures

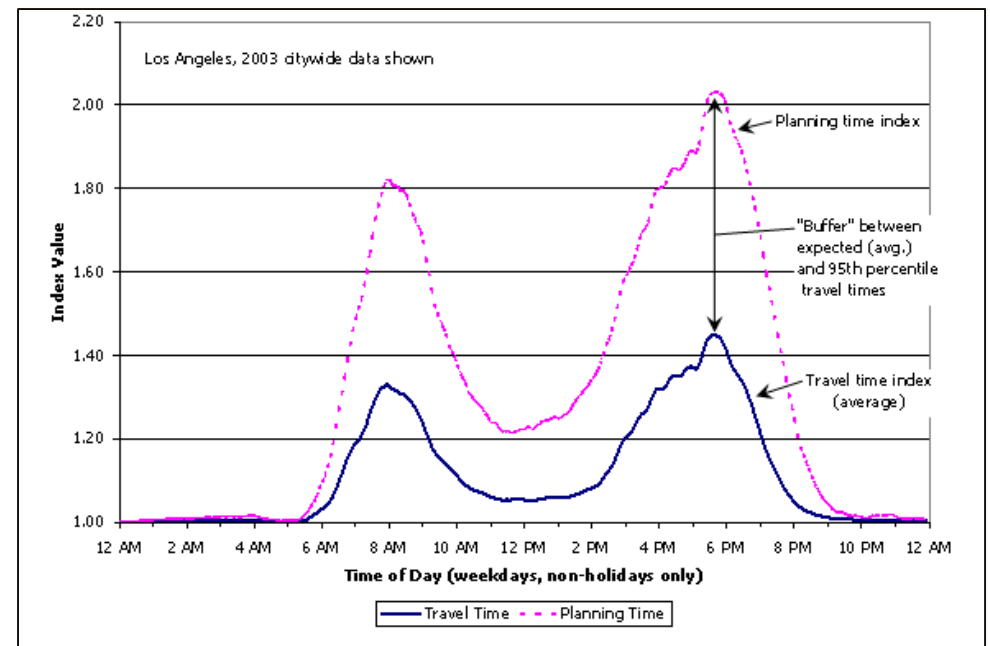
- **70% of score – Assessment of progress made towards new economic development (new and expansion of existing)**
 - Revised language and points for scoring criteria
 - Included factors to account for distance from the project to the development site and to account for extent of improved access
 - Need to consider whether type of project and ability to influence development should be considered, for example does a park-n-ride lot influence growth in its proximity?
- **30% of score - Rate projects based on the extent to which the project is deemed to enhance access to critical intermodal locations, interregional freight movement, and/or freight intensive industries**

Reliability

- Reliability is defined as the variability in travel time observed over a long period of time, typically a year. From a traveler's perspective, reliability is a measure of how much their daily trip time varies from one day to the next.
- There are four primary contributors to decreased reliability
 - Incidents, Weather, Work zones, Capacity Bottlenecks (including signal operations)
 - Given the other measures captured by HB2 scoring, incidents and weather are the focus of the reliability measure

Reliability Terms

- Reliability can be expressed in a variety of ways
 - Planning Time Index – represents the time travelers should allow to ensure on-time arrival 95% of the time
 - Buffer Index - Extra time travelers should add to average travel times to ensure on time arrival
- Buffer Index minimizes the impact of recurring congestion and serves as the basis for the proposed measure



Reliability Scoring

- The reliability score of a project has two components:
 - Impact: The ability of a project to reduce the impact of 2 of the 4 causes for unreliable travel time; highway incidents (I) and weather events (W). Qualitative assessments of impact are based on findings from the SHRP2 Reliability Research Program
 - Eliminated future work zone impacts and congestion impacts
 - Frequency: The likelihood of unanticipated delays due to highway incidents and weather events. Estimates of frequency are based on segment data for incidents and weather
 - Proposed reliability measure:
Buffer Index*[(Incident Impact*Incident Frequency)+(Weather Impact*Weather Frequency)]

Project	Buffer Index	Incident Impact	Incident Freq	Weather Impact	Weather Freq.	Reliability Measure
A	0.50	2	2	1	2	3.00
B	0.36	2	1	1	2	1.44

Limitations of the Method

- Current method is qualitative in nature – no estimate of improved BI is calculated
 - Current methodology does not take into account severity of events to the same degree as frequency of events
- Data to calculate Buffer Index is not currently available for all roadway segments
- Reliability, as defined by SHRP2, “is a feature or attribute of congestion, not a distinct phenomenon”

Reliability - Sample Scores – Top 15

Project ID	Generic Description	New Typology	Project Buffer Index	Buffer Index (Adjusted for Incidents and Weather)	Score Reliability	Rank	Score / Total Cost	Rank
32	To use shoulders on the NB as travel lanes to alleviate the impacts of the extended queues on the interstate. (1.8 mi.)	A	3.02	18.12	100	1	50.00	1
27	Improve traffic flow in the area and to alleviate traffic delays caused by turning movements, improving substandard geometry and roadway width. (1.468 mi.)	A	0.5	3	16.56	2	2.07	7
30	Improve capacity deficiency by adding an auxiliary lane. (0.625 mi.)	A	0.94	2.82	15.56	3	9.85	4
36	Widen 1 mile of a primary route from 4 to 6 lanes	B	0.43	2.13	11.73	4	11.28	2
31	This project consists of a new 0.6 mile segment of a 4-lane divided arterial with sidewalk and bicycle lanes to complete a new east-west urban connector.	C	0.35	2.07	11.42	5	11.20	3
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	A	0.36	1.44	7.95	6	1.09	9
1	Extend an existing 4 lane urban route approximately 1 mile with sidewalk	A	0.35	1.4	7.73	7	1.10	8
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	A	0.3	1.2	6.62	8	0.30	15
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	C	0.35	1.04	5.71	9	2.86	6
37	Train station in planned community	A	0.43	0.85	4.69	10	3.13	5
5	Widen 2.2 miles of urban primary route from two-lanes with center turn lane to four-lanes with curb, gutter, raised median, continuous turn lanes and some sidewalk. Improvement connects two existing four-lane segments of roadway, improves access to existing/planned development and facilitates safer bicycle and pedestrian usage.	B	0.23	0.69	3.81	11	0.81	11
33	The main road will be widened from two lanes to four lanes and a center median will be added. The existing 2 lane bridge over the interstate will be replaced with a 4 lane bridge. An adjacent side street will be extended to intersect the main road with a new roundabout. This will provide a new connection between the main road and an adjacent heavily traveled primary route.	A	0.35	0.69	3.81	12	0.87	10
4	Reconstruct existing partial interchange to add full movements; including mainline auxiliary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	B	0.12	0.6	3.31	13	0.52	13
26	Replace existing at-grade intersection with grade separated interchange; including two roundabouts, and relocation of connecting roadways and multi-use path. Improvements address safety and congestion issues, and enhance access to major existing/planned development areas.	C	0.11	0.44	2.43	14	0.47	14
17	Construct New 4-Lane Limited Access facility	D	0.06	0.3	1.66	15	0.64	12

Land Use Coordination Factor Measures

- **100%** ~~50%~~ of score – Degree to which project will support transportation efficient land use patterns and local policies
 - Revised language and points for scoring criteria
- ~~50% of score – Forecasted percentage change in the VMT per capita for the MPO region~~
 - Included as evaluation criteria in first Land Use measure

Summary of Recommended Measures

- **Safety** – reduce the number and rate of fatalities and severe injuries
- **Congestion** – reduce person hours of delay and increase person throughput
- **Accessibility** – increase access to jobs and travel options
- **Economic Development** – support economic development and improve goods movement
- **Environmental Quality** – improve air quality and avoid impacts to the natural environment
- **Land Use** – support transportation efficient land development patterns

KEY FINDINGS FROM PILOT PROJECTS TEST

Summary of Findings from Pilot Test

- Pilot scoring of sample projects conducted to test the application of the evaluation measures, factor weights, and overall prioritization process
- 38 projects were selected representing typical projects expected to apply for HB2 funding including 2 transit projects
- Projects had already been funded and are either in construction or completed
- District and DRPT staff provided inputs to the evaluation based on local knowledge

Caveats and Considerations of Pilot Scoring

- Projects evaluated were randomly selected and may not be representative of overall future projects to be put forward within a given area
- Projects were developed without consideration for explicit cost-benefit review
 - Some of these projects may have been designed differently or included other components
- All scores are relative based on the other available projects being evaluated
 - Take away highest scoring project in an area and scores for all projects change

Key Findings of Pilot Scoring

- Does not appear to be any clear biases based on area type or size of project.
- Projects with low “raw scores” can have high relative scores when cost is considered
- Projects tend to score well in a few but not all of the factors
- Highest raw score was 60.4 out of a possible 100 and the average raw score was 14.7 out of 100
- Refinement of language for ratings-based measures is necessary to improve consistency
 - Original language for economic development resulted in wide disparity of the development considered

MEASURES, SCORING AND PILOT RESULTS

Everything is Relative

**Highest Value
Dictates Scores**

Project	Measure	Score
A	250	50
B	300	60
C	75	15
D	15	3
E	500	100
F	150	30

**Change here only
affects one score**

Project	Measure	Score
A	200	40
B	300	60
C	75	15
D	15	3
E	500	100
F	150	30

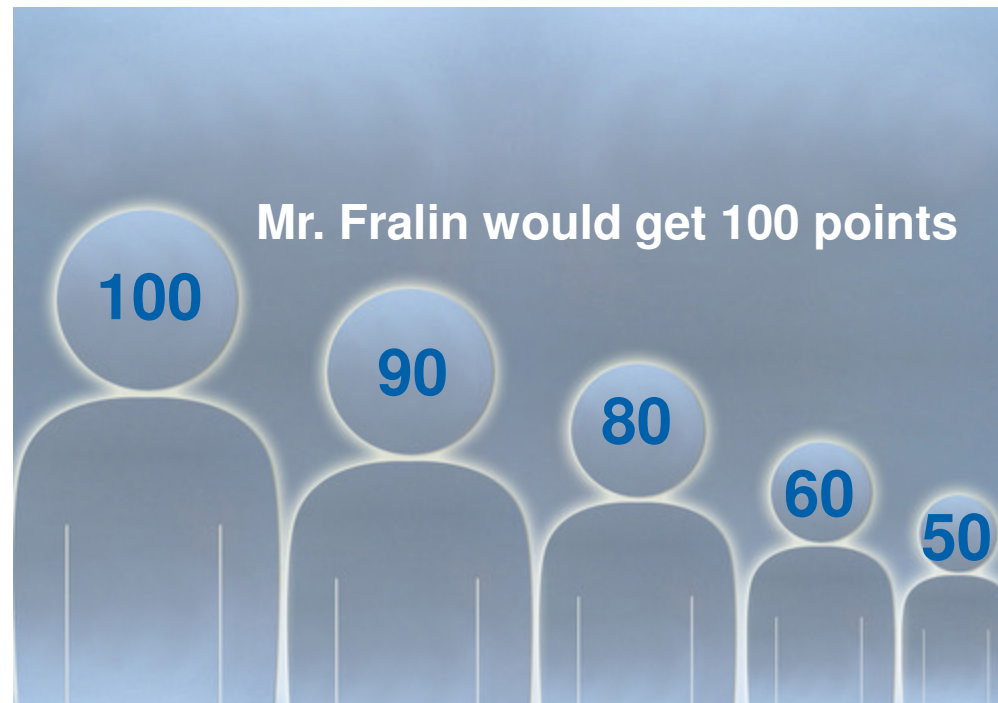
**Change here affects
all scores**

Project	Measure	Score
A	250	33.3
B	300	40
C	75	10
D	15	2
E	750	100
F	150	20

The best project for that measure dictates the score for all other projects

How Scoring Works

Let's say height is a measure



Congestion

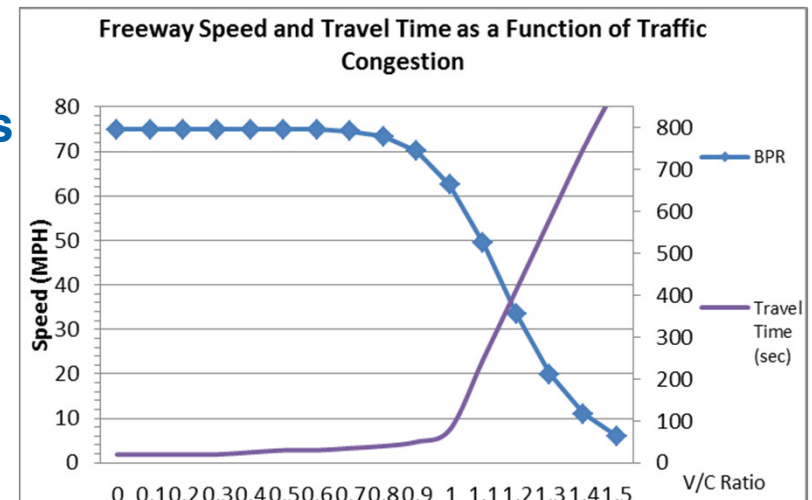
- **Two Measures**
 - Increase in Person Throughput
 - Decrease in Person Hours of Delay

Person Throughput

- **Highway Projects**
 - Volume to Capacity ratio calculated for each hour of day
 - Determine time period(s) where demand exceeds capacity
 - Calculate volume above capacity now being served by improvement – convert to person throughput
- **Transit/Travel Demand Management**
 - Identify corridor served
 - Determine peak period ridership/volume reduction (Throughput A)
 - Using process above for highways, calculate additional vehicle demand that can now be served based on transit diversion in corridor served (Throughput B)
 - Add together to get total person throughput

Person Hours Delay

- **Highway Projects**
 - Volume to Capacity ratio calculated for each hour of day to estimate speed
 - Sum delay reduction for peak period and convert to person hours
- **Transit/Travel Demand Management**
 - Identify corridor served
 - Determine peak period ridership/volume reduction
 - Using process above for highways, calculate reduction in person hours



Congestion Example

- Widen 2 lane primary route to 4 lanes
 - Person Throughput
 - Capacity – 720 passenger cars per lane per hour
 - Maximum demand determine to be Eastbound from 5-6PM – 520 passenger cars (trucks converted to passenger car equivalents)
 - $V/C = 0.72$
 - Facility is not at capacity – so all demand is being served. *Increase in person throughput is 0*
 - Decrease in person hours of delay
 - Using Volume/Delay function – calculate before and after speed
 - No-Build $V/C = 0.72$ – 66.14 MPH
 - Build $V/C = 0.36$ – 66.47 MPH
 - Using length of project and speed change the *decrease in person hours of delay = 0.15 person hours*



Congestion Example

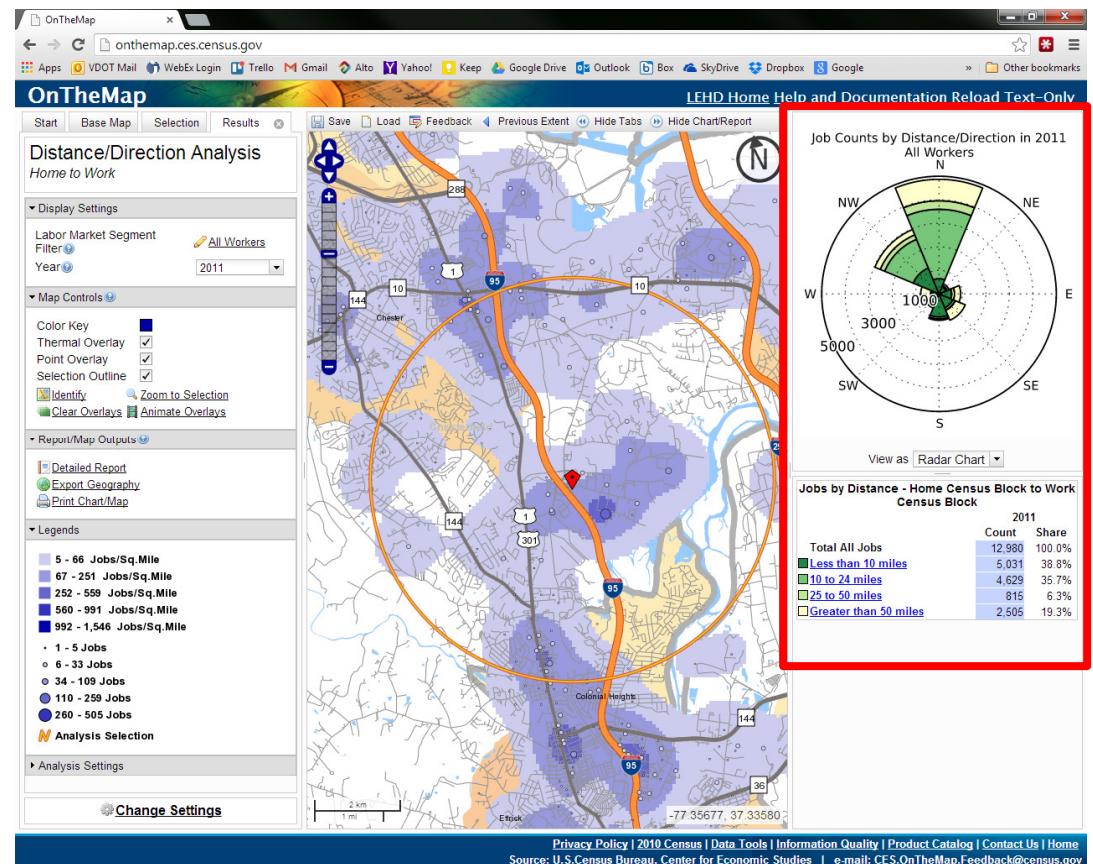
Widen 4 lane Interstate to 6 lanes

- Person Throughput
 - Maximum demand determine to be from 5-6PM – 1,979 passenger car for EB and 2,335 passenger car for WB (trucks converted to passenger car equivalents)
 - $V/C = 1.24$ for EB and 1.46 for WB
 - Facility was over at capacity – so person throughput increases. *Increase in person throughput is 2,316*
- Decrease in person hours of delay
 - Using Volume/Delay function – calculate before and after speed
 - No-Build $V/C = 1.24$ for EB and 1.46 for WB – 52.82 MPH for EB and 42.48 MPH for WB
 - Build $V/C = 0.82$ for EB and 0.97 for WB – 66.74 MPH for EB and 62.92 MPH for WB
 - Using length of project and speed change the *decrease in person hours of delay = 106.45 person hours*

Congestion Example

Expand Park and Ride Lot

- **Person Throughput**
 - New lot is adding 1000 spaces
 - Statewide average parking space occupancy = 75%
 - Assumption – 750 vehicles removed from roadway
 - Need to determine corridor(s) served and corridor length
- **Census On the Map tool**
 - Allows you to analyze areas to get information on commute distance and direction
- **Person hours of delay**
 - Remove demand from corridor served and calculate improvement in speed



Congestion - Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Increase Person Throughput	Score Decrease Person Hour Delay	Raw Congestion Score
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	39.64	100.00	69.82
27	Improve traffic flow in the area and to alleviate traffic delays caused by turning movements, improving substandard geometry and roadway width. (1.468 mi.)	\$ 80,000,000	\$ 57,000,000	A	96.58	35.32	65.95
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	22.75	85.56	54.16
1	Extend an existing 4 lane urban route approximately 1 mile with sidewalk	\$ 70,000,000	\$ 55,000,000	A	100.00	0.04	50.02
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	32.56	49.04	40.80
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	\$ 73,000,000	\$ 73,000,000	A	55.54	26.03	40.78
11	To widen 4.5 miles of an Interstate from 4 to 6 lanes. To improve safety and access to the interstate with some ramp improvements at an interchange with a secondary road.	\$ 37,000,000	\$ 28,000,000	B	67.45	11.54	39.50
17	Construct New 4-Lane Limited Access facility	\$ 26,000,000	\$ 21,000,000	D	59.45	0.26	29.85
23	Construct one HOV + one SOV lane for 4.7 mi.	\$ 73,000,000	\$ 73,000,000	A	25.89	21.18	23.54
15	Widening to allow for 4 lane facility with Continuous Right Turn Lane and raised median to improve access management and traffic flow.	\$ 12,000,000	\$ 8,000,000	D	21.95	23.08	22.51

Congestion - Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Increase Person Throughput	Score Decrease Person Hour Delay	Raw Congestion Score
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	\$ 20,000,000	\$ 20,000,000	C	0.00	0.00	0.00
14	Interchange Improvement to Relocate Signalized Intersection further from Interstate ramps to accomodate increased truck and traffic capacity and improve efficiency of freight traffic in proximity to the interchange.	\$ 12,200,000	\$ 11,500,000	A	0.00	0.00	0.00
3	Eliminating a drainage problem caused by a large impervious area draining to the site. The vertical alignment will be raised while utilizing curb and gutter to capture the water in one area and construct shoulders and ditches on another portion of the roadway.	\$ 4,600,000	\$ 2,100,000	D	0.00	0.02	0.01
2	Widen rural primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 25,000,000	\$ 20,000,000	D	0.00	0.02	0.01
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.06	0.00	0.03
25	This project consists of an interstate widening to provide a 6.9 mile long truck climbing lane to improve safety and operations, and reduce congestion along the interstate segment.	\$ 81,000,000	\$ 27,000,000	D	0.00	0.05	0.03
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shouders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.03	0.05	0.04
9	Construction of acceleration & deceleration lanes including right turn lanes, entrance consolidation and relocation	\$ 19,000,000	\$ 18,500,000	C	0.00	0.27	0.13
35	Widen NHS primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 43,000,000	\$ 40,000,000	C	0.47	0.04	0.25
18	Reconstruct Intersection to accomodate heavy truck movements and install bike / ped features	\$ 900,000	\$ 30,000	D	0.47	0.08	0.27

Challenges - Congestion

- **Simplified approach to improve consistency – does not account for redistribution of traffic based on improvement**
 - **Statewide travel demand model under development and will be available for second round of scoring**
- **New location facilities require using regional travel demand model**
 - **Raises question of consistency**
- **Transit/TDM projects require assumptions on diversion and length of segment served**
- **Method for intersection and interchanges uses overall V/C ratio to estimate throughput and delay – may miss specific movements that are over capacity**

Safety

- **Decrease in Fatal and Severe Injury Crashes**
- **Decrease in Fatal and Severe Injury Crash Rate**

Fatal/Severe Injury Crashes and Crash Rate

- **Highway Projects**
 - Compile fatal/severe crash data for project limits
 - Based on project scope select Crash Modification Factor
 - Use CMF to calculate reduction in crashes and rate
- **Transit/Travel Demand Management/New Location**
 - Identify corridor served
 - Use ridership/volume reduction to calculate reduction in VMT
 - Use VMT reduction to calculate crash reduction

Safety – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Reduce Fatal Severe Injury Crashes	Score Reduce Fatal Severe Injury Crash Rate	Raw Safety Score
13	Reconstruction of interstate ramps and adjoining primary routes; including new roundabout and new location roadway. Improvements reduce backup on interstate, improves access to existing/planned development and addresses safety issues.	\$ 48,000,000	\$ 34,000,000	B	28.57	100.00	64.29
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	\$ 20,000,000	\$ 20,000,000	C	40.00	88.06	64.03
14	Interchange Improvement to Relocate Signalized Intersection further from Interstate ramps to accommodate increased truck and traffic capacity and improve efficiency of freight traffic in proximity to the interchange.	\$ 12,200,000	\$ 11,500,000	A	28.57	78.28	53.43
25	This project consists of an interstate widening to provide a 6.9 mile long truck climbing lane to improve safety and operations, and reduce congestion along the interstate segment.	\$ 81,000,000	\$ 27,000,000	D	100.00	4.51	52.26
16	Widen five miles of interstate to provide a long truck climbing lane in mountainous terrain. Improvements include an additional southbound travel lane, and improved median and shoulders. Improvement addresses safety and operational issues, and reduces congestion.	\$ 90,000,000	\$ 17,000,000	D	80.00	9.44	44.72
33	The main road will be widened from from two lanes to four lanes and a center median will be added. The existing 2 lane bridge over the interstate will be replaced with a 4 lane bridge. An adjacent side street will be extended to intersect the main road with a new roundabout. This will provide a new connection between the main road and an adjacent heavily traveled primary route.	\$ 44,000,000	\$ 35,000,000	A	60.97	24.44	42.71
5	Widen 2.2 miles of urban primary route from two-lanes with center turn lane to four-lanes with curb, gutter, raised median, continuous turn lanes and some sidewalk. Improvement connects two existing four-lane segments of roadway, improves access to existing/planned development and facilitates safer bicycle and pedestrian usage.	\$ 47,000,000	\$ 31,000,000	B	53.14	25.83	39.49
2	Widen rural primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 25,000,000	\$ 20,000,000	D	28.57	20.69	24.63
17	Construct New 4-Lane Limited Access facility	\$ 26,000,000	\$ 21,000,000	D	40.74	6.76	23.75
21	Re-design and reconfigure existing interchange and ramps to reduce congestion	\$ 9,000,000	\$ 9,000,000	C	9.54	37.49	23.51

Safety – Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Reduce Fatal Severe Injury Crashes	Score Reduce Fatal Severe Injury Crash Rate	Raw Safety Score
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.00	0.00	0.00
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shoulders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.00	0.00	0.00
9	Construction of acceleration & deceleration lanes including right turn lanes, entrance consolidation and relocation	\$ 19,000,000	\$ 18,500,000	C	0.00	0.00	0.00
29	Intersection improvements at interchange ramps; includes adding turn lanes, reconfiguring the existing signal, adding pedestrian accommodations and installing continuous curb and gutter. Improvement addresses safety and operational issues, and better facilitates pedestrian usage.	\$ 3,300,000	\$ 3,200,000	C	0.00	0.00	0.00
4	Reconstruct existing partial interchange to add full movements; including mainline auxiliary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	0.00	0.00	0.00
12	Interchange improvement project to increase capacity over the interstate from a 2-lane facility to 4-lane divided facility with a multi-use trail. Project also improves safety and access to the interstate with ramp improvements.	\$ 33,000,000	\$ 17,000,000	C	0.00	0.00	0.00
1	Extend an existing 4 lane urban route approximately 1 mile with sidewalk	\$ 70,000,000	\$ 55,000,000	A	0.00	0.00	0.00
31	This project consists of a new 0.6 mile segment of a 4-lane divided arterial with sidewalk and bicycle lanes to complete a new east-west urban connector.	\$ 10,200,000	\$ 7,600,000	C	0.57	0.43	0.50
37	Train station in planned community	\$ 15,000,000	\$ 10,700,000	A	1.09	0.03	1.09
32	To use shoulders on the NB as travel lanes to alleviate the impacts of the extended queues on the interstate. (1.8 mi.)	\$ 20,000,000	\$ 20,000,000	A	3.83	0.31	2.07

Challenges - Safety

- **Crash Modification Factors do not exist for all project types**
- **Currently working to develop a more comprehensive list to be used for HB2**
- **Randomness of Fatal and Severe injury crashes can make it difficult to establish clear trend and result in low numbers depending on number of years analyzed**
 - **Fatal and severe injuries represent 6% of total crashes**
 - **If moderate injuries are included increases to 25% of total crashes**
 - **Using 3 year annual average crash data resulted in:**
 - Project average of 3 crashes per year; maximum was 25 crashes per year
 - Five projects with no crashes and 17 with one or less crashes per year
 - **Use 5 year crash data for full implementation in October**

Accessibility

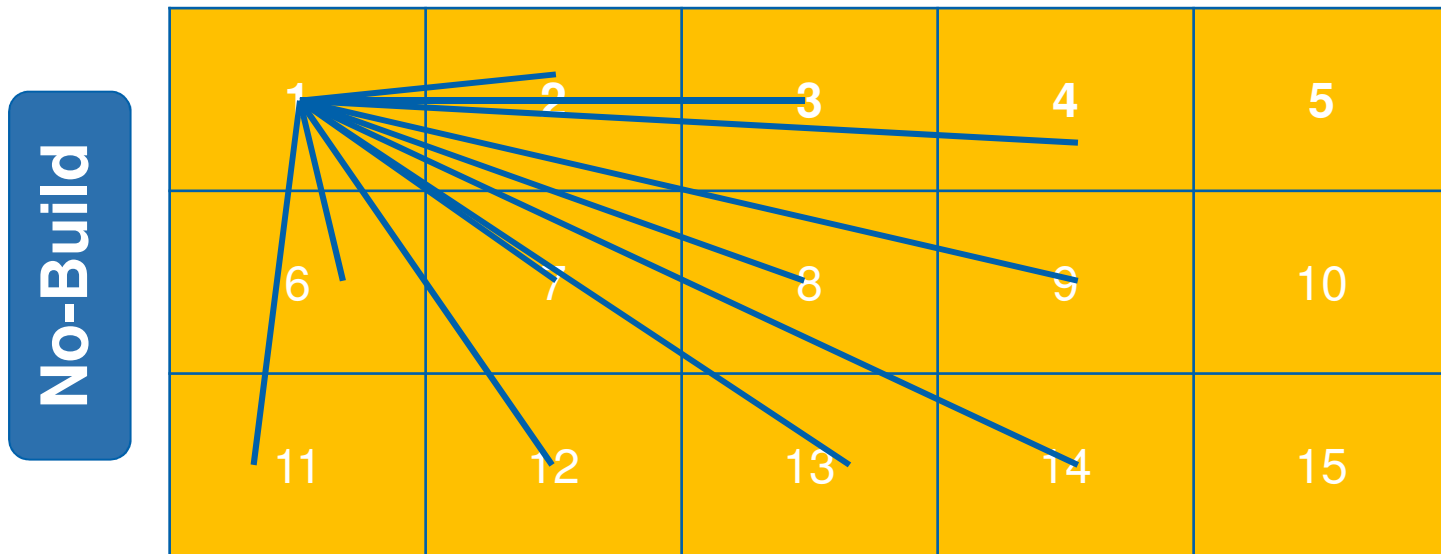
- **Increased Access to Jobs**
- **Increased Disadvantaged Population Access to Jobs**
- **Access to Travel Options**

Access to Jobs

- **All Projects**
 - Using analysis for congestion measures – select hour with greatest increase in speed
 - Also consider reduced travel distances from new facilities and changes in land development patterns
 - Use improvement in speed to code improvement into Accessibility GIS tool – conduct before and after analysis to get change in cumulative job access
- **Accessibility Tool**
 - GIS based model
 - Analysis done at Census block group level – job access between each block group within 45 minutes
 - Decay factor applied based on travel time

Access to Jobs

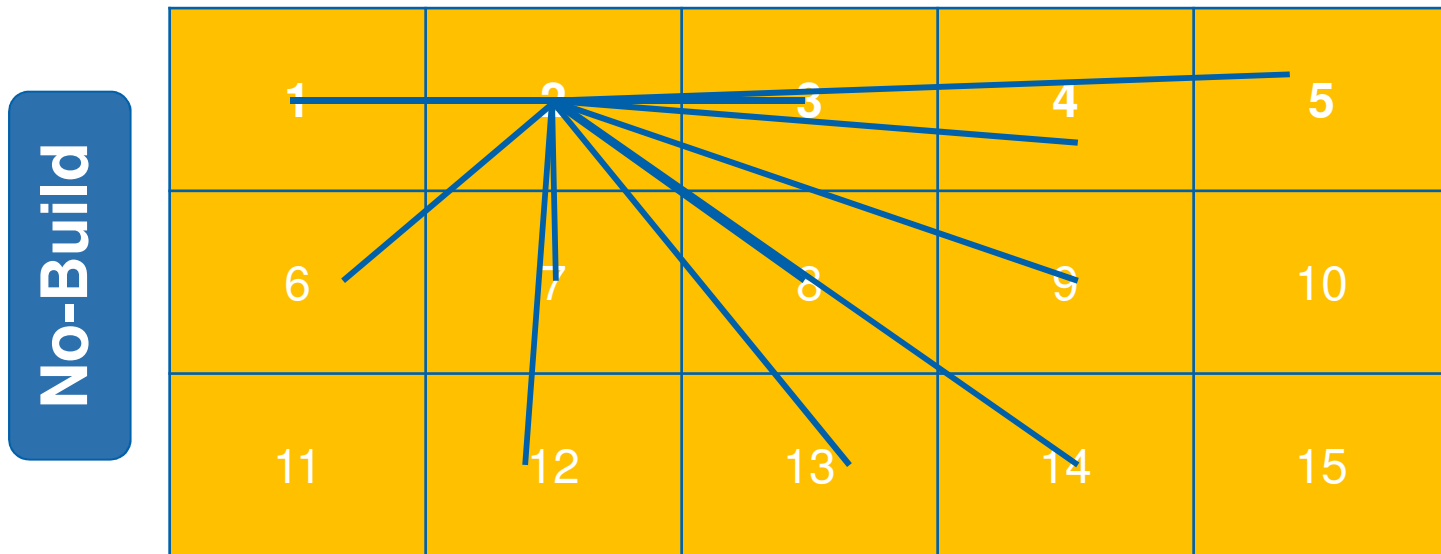
- Accessibility Tool



Tool analyzes existing accessibility to jobs

Access to Jobs

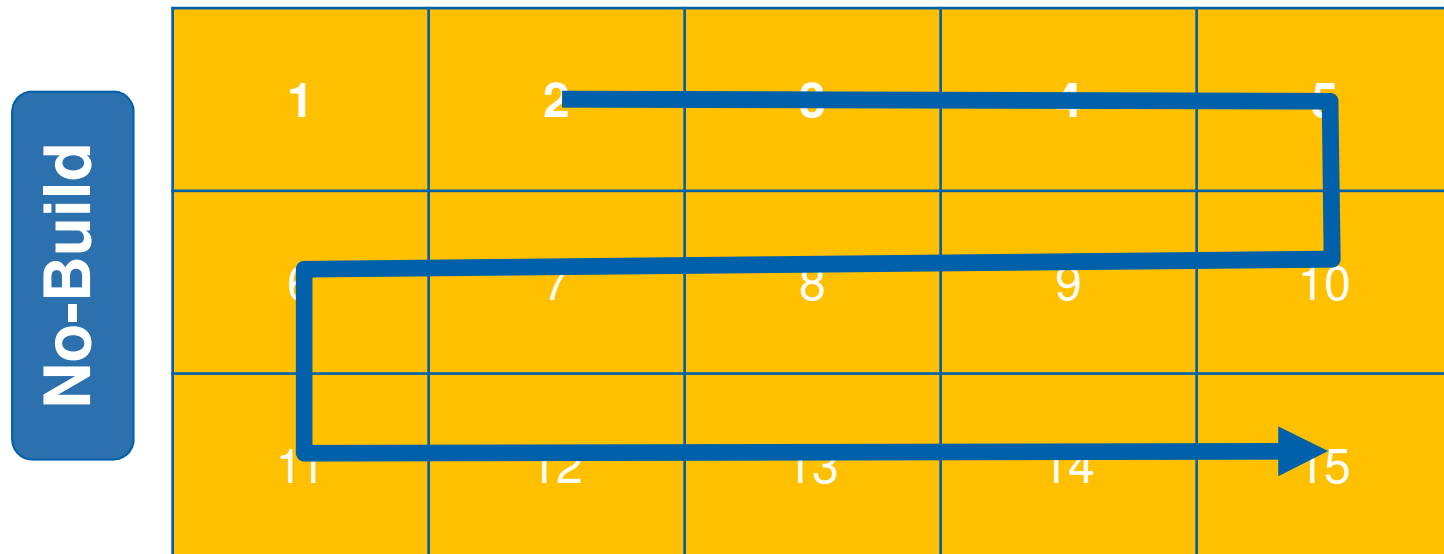
- Accessibility Tool



Tool moves to next block, assessing existing accessibility

Access to Jobs

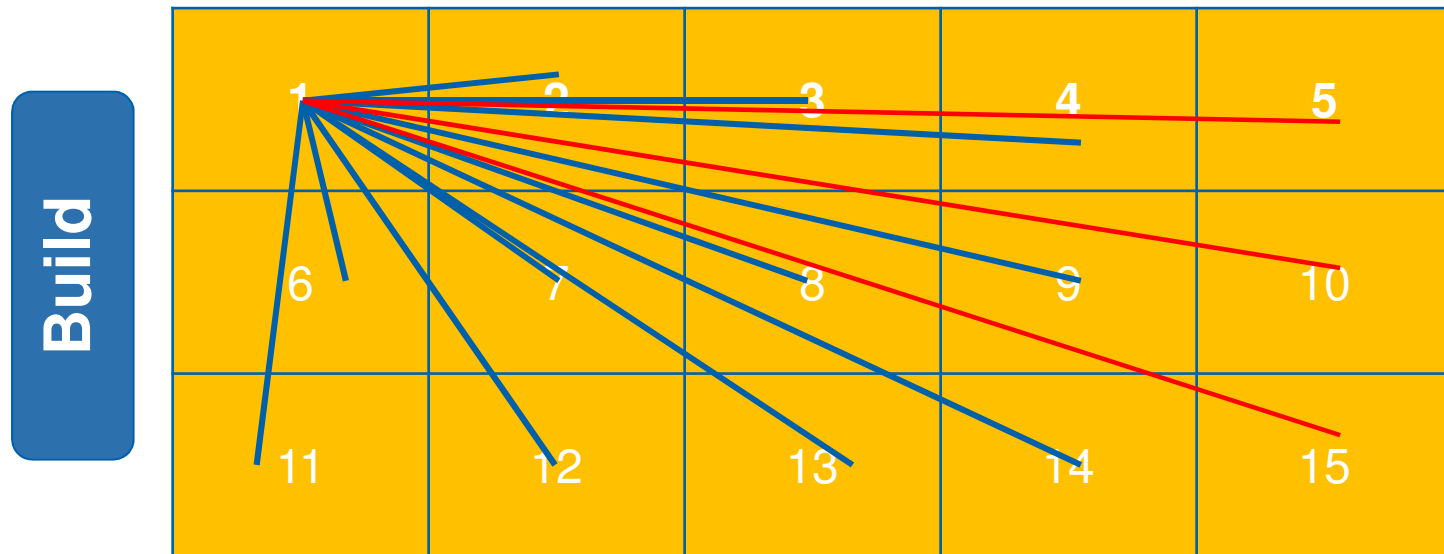
- Accessibility Tool



Process is repeated for all blocks to establish existing accessibility to jobs

Access to Jobs

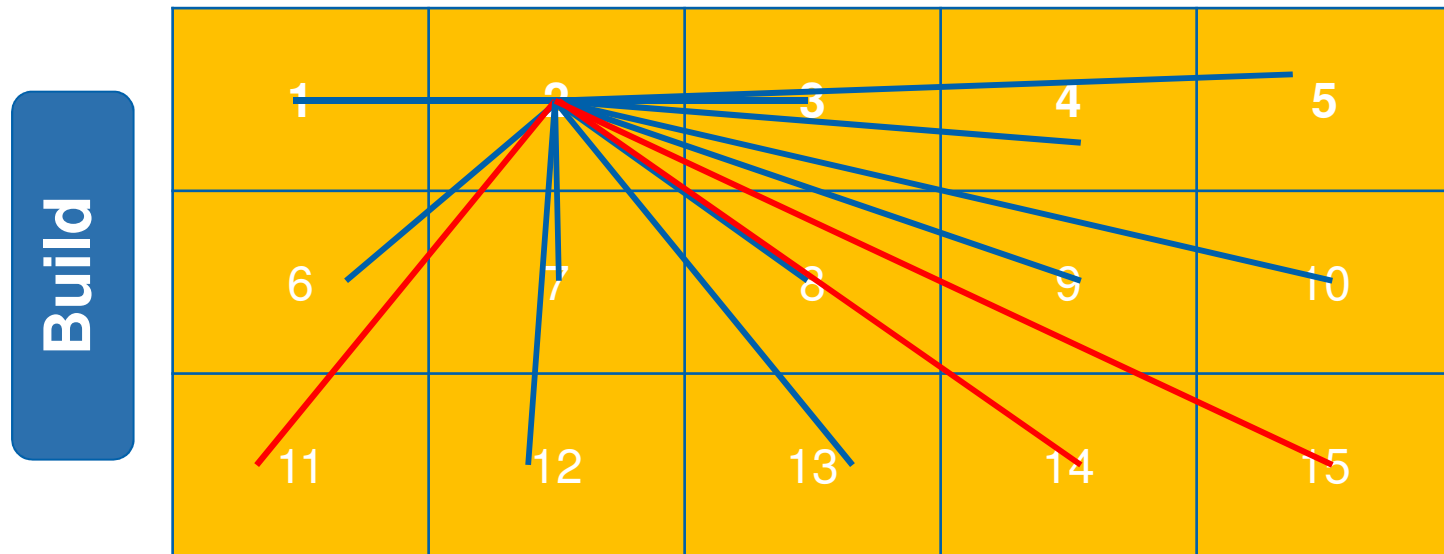
- Accessibility Tool



Tool then analyzes change in access to jobs based on proposed improvement

Access to Jobs

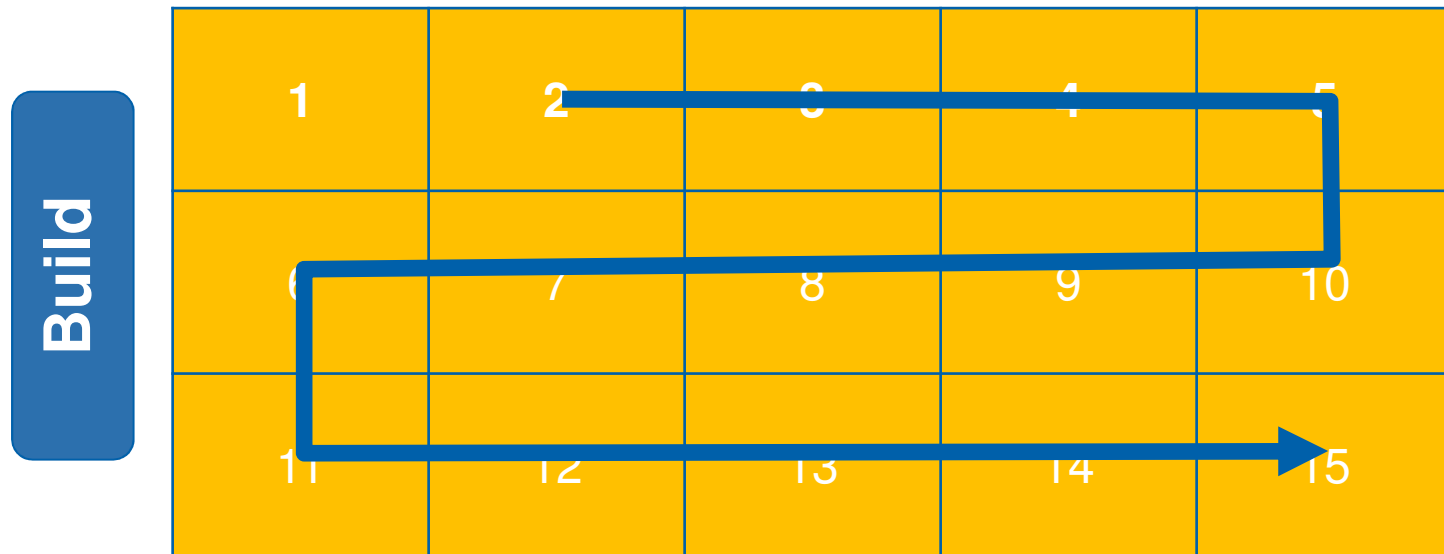
- Accessibility Tool



**Tool moves to next block, calculating
change in job access**

Access to Jobs

- Accessibility Tool



Process is repeated for all blocks – increase in access for each block is summed and used to score projects

Disadvantaged Access to Jobs

- Similar process in previous slides used for disadvantaged access to jobs
- Main difference is the utilization of disadvantaged population data in the calculation
- Disadvantaged population
 - Low income, elderly, minority, and Limited English Proficiency population percentage by Census Block Group
 - Compared block group and identified block groups in the 75th percentile of the region – regions defined as PDC/MPO/NVTA

Access to Travel Options

- **Projects receive points based on features that enhance multimodal access (Max 5 points)**
 - Transit
 - Park and Ride
 - Bike
 - Pedestrian
 - HOV/HOT
 - Real time traveler info or wayfinding
- **Scaled by the number of anticipated Non-SOV users**
 - Transit Users + Bike Users + Pedestrians + HOV/Park and Ride

Accessibility – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Access to Jobs	Score Disadvantaged Access to Jobs	Score Multimodal Access	Raw Accessibility Score
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	100.00	100.00	61.87	92.37
30	Improve capacity deficiency by adding an auxiliary lane. (0.625 mi.)	\$ 15,800,000	\$ 15,700,000	A	31.64	47.98	0.00	28.58
32	To use shoulders on the NB as travel lanes to alleviate the impacts of the extended queues on the interstate. (1.8 mi.)	\$ 20,000,000	\$ 20,000,000	A	33.06	26.15	0.00	25.07
23	Construct one HOV + one SOV lane for 4.7 mi.	\$ 73,000,000	\$ 73,000,000	A	1.03	1.38	100.00	20.90
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	0.02	0.03	87.85	17.59
37	Train station in planned community	\$ 15,000,000	\$ 10,700,000	A	8.50	11.64	30.15	13.45
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	3.02	1.39	19.46	5.98
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	\$ 73,000,000	\$ 73,000,000	A	0.04	0.10	20.58	4.16
4	Reconstruct existing partial interchange to add full movements; including mainline auxillary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	0.05	0.09	17.55	3.56
27	Improve traffic flow in the area and to alleviate traffic delays caused by turning movements, improving substandard geometry and roadway width. (1.468 mi.)	\$ 80,000,000	\$ 57,000,000	A	3.39	4.46	0.00	2.93

Accessibility – Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Access to Jobs	Score Disadvantaged Access to Jobs	Score Multimodal Access	Raw Accessibility Score
31	This project consists of a new 0.6 mile segment of a 4-lane divided arterial with sidewalk and bicycle lanes to complete a new east-west urban connector.	\$ 10,200,000	\$ 7,600,000	C	0.00	0.01	0.00	0.00
3	Eliminating a drainage problem caused by a large impervious area draining to the site. The vertical alignment will be raised while utilizing curb and gutter to capture the water in one area and construct shoulders and ditches on another portion of the roadway.	\$ 4,600,000	\$ 2,100,000	D	0.00	0.00	0.00	0.00
21	Re-design and reconfigure existing interchange and ramps to reduce congestion	\$ 9,000,000	\$ 9,000,000	C	0.00	0.01	0.00	0.00
17	Construct New 4-Lane Limited Access facility	\$ 26,000,000	\$ 21,000,000	D	0.00	0.00	0.00	0.00
2	Widen rural primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 25,000,000	\$ 20,000,000	D	0.00	0.00	0.00	0.00
25	This project consists of an interstate widening to provide a 6.9 mile long truck climbing lane to improve safety and operations, and reduce congestion along the interstate segment.	\$ 81,000,000	\$ 27,000,000	D	0.00	0.00	0.00	0.00
14	Interchange Improvement to Relocate Signalized Intersection further from Interstate ramps to accomodate increased truck and traffic capacity and improve efficiency of freight traffic in proximity to the interchange.	\$ 12,200,000	\$ 11,500,000	A	0.00	0.00	0.00	0.00
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	\$ 20,000,000	\$ 20,000,000	C	0.00	0.00	0.00	0.00
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.00	0.00	0.07	0.01
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shouders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.01	0.00	0.03	0.01

Challenges/Observations - Accessibility

- Transit module still under development and testing – used highway module to assess transit projects
- Processing time – projects can be run in batches of 10-15 projects – requires several hours of processing
- Results seem to correlate with job density

Economic Development

- **Square Footage of Site Development Supported**
- **Intermodal Access**

Square Footage of Development Supported

- For each project, development sites are identified that the project supports
- Proposed transportation improvement is evaluated on:
 - Consistency with Local Comp Plan/Local Economic Development Strategy – up to 1 point
 - Consistency with Regional Economic Development Strategy – up to 1 point
- Each development site is evaluated on:
 - Consistency with local comp plan/zoning – up to 1 point
 - Development status – up to 1 point
 - Site utilities – up to 1 point
- Max 5 points per site – used to weight square footage

Square Footage of Development Supported

- **Adjusting Weighted Square Footage**

- **Two Adjustment**

- Distance from project in miles (except sites less than 1 mile)
 - Type of access provided

Project provides a new, direct (physically to the site), primary access to the site that does not exist today	100%
Project improves existing access (or relocates existing access) to the site directly (Site must be physically adjacent to the project)	100%
Project enhances economic development by improving congestion, mobility, access, or operations in the vicinity of the site but the site is not physically adjacent to the project	50%

- **Formula – (Points) x (Square Footage) / (Distance) x (Access Adjustment)**

Development Name	Total Points	Square Footage	Distance	Site Access	Access Adjustment	Adjusted Square Footage
Development A	5	250000	2	Project enhances economic development by improving congestion, mobility, access, or operations in the vicinity of the site but the site is not physically adjacent to the project	50%	312500
Development B	5	250000	0.2	Project improves existing access (or relocates existing access) to the site directly (Site must be physically adjacent to the project)	100%	1250000

Intermodal Access

- **Project can get up to 6 points**
 - **Improve access to distribution centers or intermodal/manufacturing facilities**
 - Within 1 mile – 2 points
 - 1 to 3 miles – 1 point
 - **Improve STAA Truck Route**
 - Improvement to STAA route - 2 points,
 - Improve access to STAA route – 1 point
 - **Improve access or reduce congestion around port/airports**
 - Within 1 mile - 2 points
 - 1-3 miles – 1 point
- **Tonnage – IHS Transearch data was used to calculate daily tonnage on the project**

	Improve Access to distro, intermodal and manufacturing	Improve STAA truck route	Improve access reduce congestion ports/airports	Tonnage (1000's) per day	Measure Scaled by tonnage
Project A	2.00	2.00	0.00	163.07	652.28
Project B	1.00	2.00	0.00	208.15	624.45
Project C	2.00	1.00	0.00	4.77	14.31

Economic Development – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Square Feet of Site	Score Intermodal Access	Raw Economic Development
11	To widen 4.5 miles of an Interstate from 4 to 6 lanes. To improve safety and access to the interstate with some ramp improvements at an interchange with a secondary road.	\$ 37,000,000	\$ 28,000,000	B	100.00	62.13	88.64
26	Replace existing at-grade intersection with grade separated interchange; including two roundabouts, and relocation of connecting roadways and multi-use path. Improvements address safety and congestion issues, and enhance access to major existing/planned development areas.	\$ 52,000,000	\$ 47,000,000	C	52.16	13.99	40.71
24	Reconstruct interchange to accommodate increased traffic volumes and future growth. The north bound and south bound bridges will be replaced, on and off ramps will be realigned and reconstructed, and intersections and mainline of the intersecting secondary route will be widened and signalized.	\$ 48,000,000	\$ 29,000,000	D	14.80	100.00	40.36
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	54.80	0.00	38.36
4	Reconstruct existing partial interchange to add full movements; including mainline auxiliary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	47.34	11.99	36.73
23	Construct one HOV + one SOV lane for 4.7 mi.	\$ 73,000,000	\$ 73,000,000	A	28.90	40.28	32.31
16	Widen five miles of interstate to provide a long truck climbing lane in mountainous terrain. Improvements include an additional southbound travel lane, and improved median and shoulders. Improvement addresses safety and operational issues, and reduces congestion.	\$ 90,000,000	\$ 17,000,000	D	2.00	95.73	30.12
25	This project consists of an interstate widening to provide a 6.9 mile long truck climbing lane to improve safety and operations, and reduce congestion along the interstate segment.	\$ 81,000,000	\$ 27,000,000	D	1.75	83.68	26.33
9	Construction of acceleration & deceleration lanes including right turn lanes, entrance consolidation and relocation	\$ 19,000,000	\$ 18,500,000	C	21.57	29.93	24.07
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	\$ 73,000,000	\$ 73,000,000	A	16.39	40.28	23.56

Economic Development – Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Square Feet of Site	Score Intermodal Access	Raw Economic Development
1	Extend an existing 4 lane urban route approximately 1 mile with sidewalk	\$ 70,000,000	\$ 55,000,000	A	0.01	0.00	0.01
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shoulders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.11	0.10	0.11
17	Construct New 4-Lane Limited Access facility	\$ 26,000,000	\$ 21,000,000	D	0.02	0.40	0.14
18	Reconstruct Intersection to accommodate heavy truck movements and install bike / ped features	\$ 900,000	\$ 30,000	D	0.04	1.29	0.41
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.04	1.98	0.62
35	Widen NHS primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 43,000,000	\$ 40,000,000	C	0.08	2.43	0.78
32	To use shoulders on the NB as travel lanes to alleviate the impacts of the extended queues on the interstate. (1.8 mi.)	\$ 20,000,000	\$ 20,000,000	A	1.22	0.00	0.85
29	Intersection improvements at interchange ramps; includes adding turn lanes, reconfiguring the existing signal, adding pedestrian accommodations and installing continuous curb and gutter. Improvement addresses safety and operational issues, and better facilitates pedestrian usage.	\$ 3,300,000	\$ 3,200,000	C	0.34	2.20	0.89
2	Widen rural primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 25,000,000	\$ 20,000,000	D	1.76	0.64	1.42
5	Widen 2.2 miles of urban primary route from two-lanes with center turn lane to four-lanes with curb, gutter, raised median, continuous turn lanes and some sidewalk. Improvement connects two existing four-lane segments of roadway, improves access to existing/planned development and facilitates safer bicycle and pedestrian usage.	\$ 47,000,000	\$ 31,000,000	B	0.10	6.25	1.95

Challenges – Economic Development

- **Consistency in what constitutes an eligible site for economic development or how project would impact economic development**
 - Distance from project – where to draw the line
 - Ability to QA/QC data from applicants to ensure consistent and prevent gaming the system
 - Type of project
 - Park and ride lot/Bus Service versus Rail Transit/Highway Improvement
- **Incomplete statewide dataset for all distribution centers, intermodal facilities, and manufacturing facilities**
- **Transearch tonnage data included estimated truck volumes**
 - adjusted tonnage data based on actual truck volumes

Environment

- **Air Quality and GHG Emissions**

Environment

- **Air Quality/Energy**
 - **Points awarded based on:**
 - Providing bicycle or pedestrian facilities
 - Improvements for transit
 - Addressing freight bottlenecks
 - New or expanded Park and Ride lot
 - Provisions for hybrid/electric vehicles or energy efficient infrastructure
 - **Points scaled based on number of non-SOV users and truck volume**

Environment – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Air Quality/Energy	Raw Environment Score
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	100.00	100.00
23	Construct one HOV + one SOV lane for 4.7 mi.	\$ 73,000,000	\$ 73,000,000	A	53.85	53.85
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	33.31	33.31
37	Train station in planned community	\$ 15,000,000	\$ 10,700,000	A	28.41	28.41
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	20.96	20.96
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	\$ 73,000,000	\$ 73,000,000	A	13.86	13.86
4	Reconstruct existing partial interchange to add full movements; including mainline auxillary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	11.81	11.81
25	This project consists of an interstate widening to provide a 6.9 mile long truck climbing lane to improve safety and operations, and reduce congestion along the interstate segment.	\$ 81,000,000	\$ 27,000,000	D	9.36	9.36
26	Replace existing at-grade intersection with grade seperated interchange; including two roundabouts, and relocation of connecting roadways and multi-use path. Improvements address safety and congestion issues, and enhance access to major existing/planned development areas.	\$ 52,000,000	\$ 47,000,000	C	9.16	9.16
16	Widen five miles of interstate to provide a long truck climbing lane in mountainious terrain. Improvements include an additional southbound travel lane, and improved median and shoulders. Improvement addresses safety and operational issues, and reduces congestion.	\$ 90,000,000	\$ 17,000,000	D	8.31	8.31

Environment – Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Air Quality/Energy	Raw Environment Score
17	Construct New 4-Lane Limited Access facility	\$ 26,000,000	\$ 21,000,000	D	0.00	0.00
32	To use shoulders on the NB as travel lanes to alleviate the impacts of the extended queues on the interstate. (1.8 mi.)	\$ 20,000,000	\$ 20,000,000	A	0.00	0.00
2	Widen rural primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 25,000,000	\$ 20,000,000	D	0.00	0.00
30	Improve capacity deficiency by adding an auxiliary lane. (0.625 mi.)	\$ 15,800,000	\$ 15,700,000	A	0.00	0.00
3	Eliminating a drainage problem caused by a large impervious area draining to the site. The vertical alignment will be raised while utilizing curb and gutter to capture the water in one area and construct shoulders and ditches on another portion of the roadway.	\$ 4,600,000	\$ 2,100,000	D	0.00	0.00
31	This project consists of a new 0.6 mile segment of a 4-lane divided arterial with sidewalk and bicycle lanes to complete a new east-west urban connector.	\$ 10,200,000	\$ 7,600,000	C	0.00	0.00
15	Widening to allow for 4 lane facility with Continuous Right Turn Lane and raised median to improve access management and traffic flow.	\$ 12,000,000	\$ 8,000,000	D	0.00	0.00
36	Widen 1 mile of a primary route from 4 to 6 lanes	\$ 10,400,000	\$ 5,400,000	B	0.00	0.00
14	Interchange Improvement to Relocate Signalized Intersection further from Interstate ramps to accomodate increased truck and traffic capacity and improve efficiency of freight traffic in proximity to the interchange.	\$ 12,200,000	\$ 11,500,000	A	0.00	0.00
12	Interchange improvement project to increase capacity over the interstate from a 2-lane facility to 4-lane divided facility with a multi-use trail. Project also improves safety and access to the interstate with ramp improvements.	\$ 33,000,000	\$ 17,000,000	C	0.00	0.00

Challenges - Environment

- Input from applicants that will be used to assign points needs to be consistent
- During pilot, we refined the definitions to determine if project is:
 - Providing bicycle or pedestrian facilities
 - Providing improvements for transit
- Pilot scoring did not consider impact to natural and cultural resources

Land Use

- **Local/Regional Land Use Policies**
 - *Only applicable in area types A and B*

Land Use

- **Local/Regional Land Use Policies**
 - **Points awarded based on:**
 - Promoting walkable bicycle friendly mixed use development
 - Supporting in-fill development
 - Reducing regional VMT – calculated using MPO plan and regional model
 - Promoting designated Urban Development Areas (UDA)
 - Having a access management plan or corridor overlay in place
 - **Points scaled based on number of non-SOV users**

Land Use – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Land Use Policy	Raw Land Use Score
23	Construct one HOV + one SOV lane for 4.7 mi.	\$ 73,000,000	\$ 73,000,000	A	100.00	100.00
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	87.85	87.85
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	61.87	61.87
4	Reconstruct existing partial interchange to add full movements; including mainline auxiliary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	43.87	43.87
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	\$ 73,000,000	\$ 73,000,000	A	30.88	30.88
37	Train station in planned community	\$ 15,000,000	\$ 10,700,000	A	30.15	30.15
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	29.19	29.19
33	The main road will be widened from from two lanes to four lanes and a center median will be added. The existing 2 lane bridge over the interstate will be replaced with a 4 lane bridge. An adjacent side street will be extended to intersect the main road with a new roundabout. This will provide a new connection between the main road and an adjacent heavily traveled primary route.	\$ 44,000,000	\$ 35,000,000	A	24.18	24.18
13	Reconstruction of interstate ramps and adjoining primary routes; including new roundabout and new location roadway. Improvements reduce backup on interstate, improves access to existing/planned development and addresses safety issues.	\$ 48,000,000	\$ 34,000,000	B	18.56	18.56
5	Widen 2.2 miles of urban primary route from two-lanes with center turn lane to four-lanes with curb, gutter, raised median, continuous turn lanes and some sidewalk. Improvement connects two existing four-lane segments of roadway, improves access to existing/planned development and facilitates safer bicycle and pedestrian usage.	\$ 47,000,000	\$ 31,000,000	B	7.65	7.65

Land Use – Bottom 9

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Score Land Use Policy	Raw Land Use Score
36	Widen 1 mile of a primary route from 4 to 6 lanes	\$ 10,400,000	\$ 5,400,000	B	0.00	0.00
11	To widen 4.5 miles of an Interstate from 4 to 6 lanes. To improve safety and access to the interstate with some ramp improvements at an interchange with a secondary road.	\$ 37,000,000	\$ 28,000,000	B	0.00	0.00
30	Improve capacity deficiency by adding an auxiliary lane. (0.625 mi.)	\$ 15,800,000	\$ 15,700,000	A	0.00	0.00
32	To use shoulders on the NB as travel lanes to alleviate the impacts of the extended queues on the interstate. (1.8 mi.)	\$ 20,000,000	\$ 20,000,000	A	0.00	0.00
14	Interchange Improvement to Relocate Signalized Intersection further from Interstate ramps to accommodate increased truck and traffic capacity and improve efficiency of freight traffic in proximity to the interchange.	\$ 12,200,000	\$ 11,500,000	A	0.00	0.00
27	Improve traffic flow in the area and to alleviate traffic delays caused by turning movements, improving substandard geometry and roadway width. (1.468 mi.)	\$ 80,000,000	\$ 57,000,000	A	0.00	0.00
6	construct interchange and ramps to replace at grade intersection.	\$ 32,000,000	\$ 28,000,000	A	1.80	1.80
10	Widen urban primary route from 2 to 4 lanes - with sidewalks.	\$ 22,000,000	\$ 4,000,000	A	2.70	2.70
1	Extend an existing 4 lane urban route approximately 1 mile with sidewalk	\$ 70,000,000	\$ 55,000,000	A	5.62	5.62

Challenges - Land Use

- **Based on pilot experience, provided more detailed definitions and guidance to determine if a project:**
 - **Promotes walkable/bicycle-friendly mixed-use development**
 - Does the transportation project enhance a walkable/bicycle friendly environment that is within or directly adjacent to a place zoned for mixed use development?
 - Examples of these projects can include: bicycle and pedestrian facilities, improvements to grid of streets, a multimodal boulevard, or transit center. For more information, refer to DRPT Multimodal System Design Guidelines.
 - **Supports in-fill development**
 - “In-fill development” includes development or redevelopment that occurs on an underutilized or vacant tract of land encompassed by a larger area that is mostly developed.
 - Points awarded for active (1 pt) or proposed (0.5 pts) commercial or residential in-fill projects
 - **Promotes designated Urban Development Areas (UDA)**
 - Improvement of transportation for designated growth areas (map to be provided)
 - Consistency with and support of Traditional Neighborhood Development design components

FINAL RESULTS

Final Results – Raw Score – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Total Raw Score
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	60.37
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	46.74
23	Construct one HOV + one SOV lane for 4.7 mi.	\$ 73,000,000	\$ 73,000,000	A	33.77
11	To widen 4.5 miles of an Interstate from 4 to 6 lanes. To improve safety and access to the interstate with some ramp improvements at an interchange with a secondary road.	\$ 37,000,000	\$ 28,000,000	B	27.42
27	Improve traffic flow in the area and to alleviate traffic delays caused by turning movements, improving substandard geometry and roadway width. (1.468 mi.)	\$ 80,000,000	\$ 57,000,000	A	26.27
25	This project consists of an interstate widening to provide a 6.9 mile long truck climbing lane to improve safety and operations, and reduce congestion along the interstate segment.	\$ 81,000,000	\$ 27,000,000	D	25.83
16	Widen five miles of interstate to provide a long truck climbing lane in mountainous terrain. Improvements include an additional southbound travel lane, and improved median and shoulders. Improvement addresses safety and operational issues, and reduces congestion.	\$ 90,000,000	\$ 17,000,000	D	24.91
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	24.55
28	Reconstruct Interchange to improve traffic flow. (0.838 mi.)	\$ 73,000,000	\$ 73,000,000	A	23.28
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	\$ 20,000,000	\$ 20,000,000	C	19.66

Final Results – Raw Score – Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Total Raw Score
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shoulders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.05
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.23
29	Intersection improvements at interchange ramps; includes adding turn lanes, reconfiguring the existing signal, adding pedestrian accommodations and installing continuous curb and gutter. Improvement addresses safety and operational issues, and better facilitates pedestrian usage.	\$ 3,300,000	\$ 3,200,000	C	1.36
35	Widen NHS primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 43,000,000	\$ 40,000,000	C	1.79
31	This project consists of a new 0.6 mile segment of a 4-lane divided arterial with sidewalk and bicycle lanes to complete a new east-west urban connector.	\$ 10,200,000	\$ 7,600,000	C	2.56
3	Eliminating a drainage problem caused by a large impervious area draining to the site. The vertical alignment will be raised while utilizing curb and gutter to capture the water in one area and construct shoulders and ditches on another portion of the roadway.	\$ 4,600,000	\$ 2,100,000	D	3.34
10	Widen urban primary route from 2 to 4 lanes - with sidewalks.	\$ 22,000,000	\$ 4,000,000	A	3.56
6	Construct interchange and ramps to replace at grade intersection.	\$ 32,000,000	\$ 28,000,000	A	3.98
12	Interchange improvement project to increase capacity over the interstate from a 2-lane facility to 4-lane divided facility with a multi-use trail. Project also improves safety and access to the interstate with ramp improvements.	\$ 33,000,000	\$ 17,000,000	C	4.64
18	Reconstruct Intersection to accomodate heavy truck movements and install bike / ped features	\$ 900,000	\$ 30,000	D	5.72

Final Results – Score/Total Cost – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Total Raw Score	Raw Score Rank	Weighted Score Divided by Total Cost	Weighted Score Divided by Total Cost Rank
18	Reconstruct Intersection to accommodate heavy truck movements and install bike / ped features	\$ 900,000	\$ 30,000	D	5.72	29	63.58	1
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	60.37	1	62.23	2
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	46.74	2	36.52	3
7	Improving traffic flow near Interstate interchange by widening and adding capacity on the cross route and providing better access to the Interstate on-ramps.	\$ 6,100,000	\$ 2,600,000	D	14.24	15	23.35	4
21	Re-design and reconfigure existing interchange and ramps to reduce congestion	\$ 9,000,000	\$ 9,000,000	C	11.53	19	12.81	5
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	\$ 20,000,000	\$ 20,000,000	C	19.66	10	9.83	6
30	Improve capacity deficiency by adding an auxiliary lane. (0.625 mi.)	\$ 15,800,000	\$ 15,700,000	A	13.55	17	8.58	7
37	Train station in planned community	\$ 15,000,000	\$ 10,700,000	A	11.82	18	7.88	8
11	To widen 4.5 miles of an Interstate from 4 to 6 lanes. To improve safety and access to the interstate with some ramp improvements at an interchange with a secondary road.	\$ 37,000,000	\$ 28,000,000	B	27.42	4	7.41	9
3	Eliminating a drainage problem caused by a large impervious area draining to the site. The vertical alignment will be raised while utilizing curb and gutter to capture the water in one area and construct shoulders and ditches on another portion of the roadway.	\$ 4,600,000	\$ 2,100,000	D	3.34	33	7.27	10

Final Results – Score/Total Cost– Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Total Raw Score	Raw Score Rank	Weighted Score Divided by Total Cost	Weighted Score Divided by Total Cost Rank
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shoulders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.05	38	0.03	38
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.23	37	0.10	37
35	Widen NHS primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 43,000,000	\$ 40,000,000	C	1.79	35	0.42	36
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	24.55	8	1.12	35
6	construct interchange and ramps to replace at grade intersection.	\$ 32,000,000	\$ 28,000,000	A	3.98	31	1.24	34
12	Interchange improvement project to increase capacity over the interstate from a 2-lane facility to 4-lane divided facility with a multi-use trail. Project also improves safety and access to the interstate with ramp improvements.	\$ 33,000,000	\$ 17,000,000	C	4.64	30	1.41	33
10	Widen urban primary route from 2 to 4 lanes - with sidewalks.	\$ 22,000,000	\$ 4,000,000	A	3.56	32	1.62	32
33	The main road will be widened from from two lanes to four lanes and a center median will be added. The existing 2 lane bridge over the interstate will be replaced with a 4 lane bridge. An adjacent side street will be extended to intersect the main road with a new roundabout. This will provide a new connection between the main road and an adjacent heavily traveled primary route.	\$ 44,000,000	\$ 35,000,000	A	8.70	23	1.98	31
5	Widen 2.2 miles of urban primary route from two-lanes with center turn lane to four-lanes with curb, gutter, raised median, continuous turn lanes and some sidewalk. Improvement connects two existing four-lane segments of roadway, improves access to existing/planned development and facilitates safer bicycle and pedestrian usage.	\$ 47,000,000	\$ 31,000,000	B	9.85	22	2.10	30
4	Reconstruct existing partial interchange to add full movements; including mainline auxiliary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	15.14	14	2.37	29

Final Results – Score/HB2 Cost – Top 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Total Raw Score	Raw Score Rank	Weighted Score Divided by Total Cost	Weighted Score Divided by Total Cost Rank	Weighted Score Divided by HB2 Cost	Weighted Score Divided by HB2 Cost Rank
18	Reconstruct Intersection to accommodate heavy truck movements and install bike / ped features	\$ 900,000	\$ 30,000	D	5.72	29	63.58	1	1907.30	1
34	Expansion of Existing Commuter Lot to increase capacity for commuters in support of adjacent interstate improvements	\$ 12,800,000	\$ 1,500,000	A	46.74	2	36.52	3	311.62	2
38	15 expansion buses	\$ 9,700,000	\$ 5,300,000	A	60.37	1	62.23	2	113.90	3
7	Improving traffic flow near Interstate interchange by widening and adding capacity on the cross route and providing better access to the Interstate on-ramps.	\$ 6,100,000	\$ 2,600,000	D	14.24	15	23.35	4	54.78	4
3	Eliminating a drainage problem caused by a large impervious area draining to the site. The vertical alignment will be raised while utilizing curb and gutter to capture the water in one area and construct shoulders and ditches on another portion of the roadway.	\$ 4,600,000	\$ 2,100,000	D	3.34	33	7.27	10	15.93	5
16	Widen five miles of interstate to provide a long truck climbing lane in mountainous terrain. Improvements include an additional southbound travel lane, and improved median and shoulders. Improvement addresses safety and operational issues, and reduces congestion.	\$ 90,000,000	\$ 17,000,000	D	24.91	7	2.77	25	14.65	6
21	Re-design and reconfigure existing interchange and ramps to reduce congestion	\$ 9,000,000	\$ 9,000,000	C	11.53	19	12.81	5	12.81	7
36	Widen 1 mile of a primary route from 4 to 6 lanes	\$ 10,400,000	\$ 5,400,000	B	6.75	26	6.49	11	12.50	8
37	Train station in planned community	\$ 15,000,000	\$ 10,700,000	A	11.82	18	7.88	8	11.05	9
19	Interchange improvement to relocate and reconstruct three interchange ramp movements and install a new roundabout where the ramp terminals intersect a multilane arterial.	\$ 20,000,000	\$ 20,000,000	C	19.66	10	9.83	6	9.83	10

Final Results – Score/HB2 Cost– Bottom 10

Project ID	Generic Description	Total Cost	HB2 Cost	New Typology	Total Raw Score	Raw Score Rank	Weighted Score Divided by Total Cost	Weighted Score Divided by Total Cost Rank	Weighted Score Divided by HB2 Cost	Weighted Score Divided by HB2 Cost Rank
22	Reconstruction of narrow two-lane roadway to current standards (12' travel lanes and 5' paved shoulders) to improve safety and capacity, and better facilitate bicycle usage. Due to planned development in the area this roadway is expected to experience significant increase in truck traffic .	\$ 18,000,000	\$ 2,000,000	D	0.05	38	0.03	38	0.24	38
35	Widen NHS primary route from 2 to 4 lanes - addresses route continuity - currently 4-lanes on both ends.	\$ 43,000,000	\$ 40,000,000	C	1.79	35	0.42	36	0.45	37
6	construct interchange and ramps to replace at grade intersection.	\$ 32,000,000	\$ 28,000,000	A	3.98	31	1.24	34	1.42	36
8	Reconstruct the Interchange. Reconstruction may include the addition of exclusive HOV access ramps within the interchange or in close proximity to the interchange. (1.153 mi.)	\$ 220,000,000	\$ 170,000,000	A	24.55	8	1.12	35	1.44	35
20	Replace Bridge and reconstruct Approaches over river	\$ 24,000,000	\$ 1,000,000	D	0.23	37	0.10	37	2.31	34
4	Reconstruct existing partial interchange to add full movements; including mainline auxiliary lanes between two interchanges and multi-use trail crossing interstate. Improvements enhance safety and facilitate improved access to existing/planned development.	\$ 64,000,000	\$ 64,000,000	B	15.14	14	2.37	29	2.37	33
33	The main road will be widened from from two lanes to four lanes and a center median will be added. The existing 2 lane bridge over the interstate will be replaced with a 4 lane bridge. An adjacent side street will be extended to intersect the main road with a new roundabout. This will provide a new connection between the main road and an adjacent heavily traveled primary route.	\$ 44,000,000	\$ 35,000,000	A	8.70	23	1.98	31	2.49	32
12	Interchange improvement project to increase capacity over the interstate from a 2-lane facility to 4-lane divided facility with a multi-use trail. Project also improves safety and access to the interstate with ramp improvements.	\$ 33,000,000	\$ 17,000,000	C	4.64	30	1.41	33	2.73	31
26	Replace existing at-grade intersection with grade separated interchange; including two roundabouts, and relocation of connecting roadways and multi-use path. Improvements address safety and congestion issues, and enhance access to major existing/planned development areas.	\$ 52,000,000	\$ 47,000,000	C	14.15	16	2.72	27	3.01	30
5	Widen 2.2 miles of urban primary route from two-lanes with center turn lane to four-lanes with curb, gutter, raised median, continuous turn lanes and some sidewalk. Improvement connects two existing four-lane segments of roadway, improves access to existing/planned development and facilitates safer bicycle and pedestrian usage.	\$ 47,000,000	\$ 31,000,000	B	9.85	22	2.10	30	3.18	29

Next Steps

- **Today - Updated Policy Guide Appendices posted to HB2 Website (virginiaHB2.org)**
- **Consideration of additional changes requested by Board**
- **June CTB – Final process considered by Board**
- **HB2 Team will continue to refine and test processes to improve consistency and time/staff burdens to evaluate projects**

Questions and Discussion
