VTrans Update:
Vulnerability Assessment (Flooding and Sea Level Rise)
Mid-Term Needs

Commonwealth Transportation Board Workshop
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Jitender Ramchandani, AICP, PMP – Office of Intermodal Planning and Investment

June 18, 2019
**Purpose**

- Provide an update and seek feedback on activities conducted and completed since October 2018
  - Trends Analysis – Vulnerability Assessment
    - VTrans Vision and Goals
    - Mid-Term Needs Assessment
    - Outreach and Engagement
    - Schedule & Next Steps
## Planning Horizons

<table>
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<tr>
<th>Mid-Term Needs</th>
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TRENDS ANALYSIS:
VTRANS VULNERABILITY ASSESSMENT
(SCOPE – FLOODING AND SEA LEVEL RISE)
VTRANS VULNERABILITY ASSESSMENT (SCOPE – FLOODING AND SEA LEVEL RISE)

• Objective:
  • Conduct a screening-level analysis of the vulnerability of Virginia’s multimodal transportation system to current and future flood hazards.
  • Understand the magnitude of needs required to preserve a resilient and reliable transportation system.

• Hazards:
  • Sea level rise, storm surge, inland/riverine flooding
Executive Order Number 24 (2018): Increasing Virginia’s Resilience to Sea Level Rise and Natural Hazards

“This increase in extreme weather events and natural disasters will continue to have a profound impact on Virginia. It threatens ...our ports, military installations, transportation infrastructure, tourism assets, farms, and forests.”

“The Chief Resilience Officer shall work collaboratively within state government and with assistance from regional, state, and national experts and stakeholders, to issue, within 180 days from issuance of this Order, a regional or statewide sea level rise projection......In creating this standard, the Chief Resilience Officer shall consult with: the Secretary of Administration, the Secretary of Commerce and Trade, the Secretary of Finance, the Secretary of Transportation, and the Virginia Institute of Marine Science” (VIMS).

A Memorandum of Understanding (MOU) is being developed between the Secretary of Natural Resources (Chief Resilience Officer), Secretary of Transportation, and VIMS.
VTRANS VULNERABILITY ASSESSMENT

• DEFINE VULNERABILITY & RESILIENCE
  – Important to establish a common nomenclature and foundational definitions of these terms.
  – No standard definition for resilience in the transportation or infrastructure context. However, the definitions used are fundamentally similar across the literature.
    ○ Definition of Resiliency in FHWA Order 5520 (2014): Transportation System Preparedness and Resilience to Climate Change and Extreme Weather Events - Resilience or resiliency is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.
  – Conducting a review of existing definitions of vulnerability & resilience to inform recommended definitions for VTrans.
V Trans Vulnerability Assessment

- Vulnerability (FHWA): A function of an asset or systems exposure, sensitivity and adaptive capacity.

**Exposure**: whether the asset or system is located in an area experiencing direct effects of climate variables.

**Sensitivity**: how the asset or system fares when exposed to a climate variable.

**Adaptive Capacity**: the system’s ability to adjust to or cope with existing climate variability or future climate impacts.
## Vulnerability Assessment (Definition of Resilience)

### Examples of existing definitions of resilience

<table>
<thead>
<tr>
<th>Agency</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads Planning District Commission</td>
<td>The ability to recovery quickly with minimal lasting damage from an event</td>
</tr>
<tr>
<td>Minnesota DOT</td>
<td>Reducing vulnerability and ensuring redundancy and reliability to meet essential travel needs</td>
</tr>
<tr>
<td>Wisconsin DOT</td>
<td>A resilient transportation system is able to quickly respond to unexpected conditions and return to its usual operational state</td>
</tr>
<tr>
<td>USGCRP</td>
<td>A capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment</td>
</tr>
<tr>
<td>Colorado DOT</td>
<td>Resiliency incorporates extreme weather, economic adversity, emergency management, and security</td>
</tr>
<tr>
<td>Rockingham Planning Commission (Exeter, NH)</td>
<td>Capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment</td>
</tr>
<tr>
<td>Arkansas DOT</td>
<td>The ability to reduce the possibility of failure, adapt and recover from a disruptive event and/or gradual external changes over time. It also implies transformation, so not only is the infrastructure service able to survive or recover but it can adapt to a changing environment in which it operates</td>
</tr>
<tr>
<td>Delaware DOT</td>
<td>Encompass[ing] the ability to withstand and recover from an incident in order to provide critical transportation services during the incident and through the recovery process</td>
</tr>
<tr>
<td>Caltrans</td>
<td><em>Resilient transportation facilities:</em> Transportation facilities that are designed and operated to reduce the likelihood of disruption or damage due to changing weather conditions.</td>
</tr>
</tbody>
</table>
**VTRANS VULNERABILITY ASSESSMENT (LITERATURE REVIEW)**

• **Objective:**
  - Ensure consistency in the methodology and data used with other assessments.
  - Build upon the findings of past studies:

  • **Multi-state and statewide assessments**
    - Commonwealth of Virginia Hazard Mitigation Plan
    - Recurrent Flooding Study for Tidewater Virginia
    - Virginia and the Surging Sea: A vulnerability assessment with projections for sea level rise and coastal flood risk
    - Climate Change Vulnerabilities in the Coastal Mid-Atlantic Region

  • **Local assessments**
    - Numerous Hampton Roads studies on sea level rise
    - Eastern Shore of Virginia Transportation Infrastructure Inundation Vulnerability Assessment
VTRANS VULNERABILITY ASSESSMENT (OUTCOMES)

- Maps and spreadsheets/charts of most and least vulnerable assets
  - For example, Maryland DOT State Highway Administration's results are visualized as follows:

![Graph showing vulnerability scores and frequency](source: MDOT SHA)
REAFFIRMATION OF VTRANS GUIDING PRINCIPLES, VISION, GOALS & OBJECTIVES
GP 1: Optimize Return on Investments
Implement the right solution at the right price, striving to meet current needs while advancing long-term prosperity and livability.

GP 2: Ensure Safety, Security, and Resiliency
Provide a transportation system that is safe for all users, responds immediately to short-term shocks such as weather events or security emergencies, and adapts effectively to long-term stressors such as sea level rise.

GP 3: Efficiently Deliver Programs
Deliver high-quality projects and programs in a cost-effective and timely manner.

GP 4: Consider Operational Improvements and Demand Management First
Maximize capacity of the transportation network through increased use of technology and operational improvements as well as managing demand for the system before investing in major capacity expansions.
GP5: Ensure Transparency and Accountability, and Promote Performance Management
Work openly with partners and engage stakeholders in project development and implementation, and establish performance targets that consider the needs of all communities, measure progress towards targets, and to adjust programs and policies as necessary to achieve the established targets.

GP6: Improve Coordination Between Transportation and Land Use
Encourage local governments to plan and manage transportation-efficient land development by providing incentives, technical support, and collaborative initiatives.

GP7: Ensure Efficient Intermodal Connections
Provide seamless connections between modes of transportation to harness synergies
Virginia’s multimodal transportation system will be *Good for Business, Good for Communities, and Good to Go*. Virginians will benefit from a sustainable, reliable transportation system that advances Virginia businesses, attracts a 21st century workforce, and promotes healthy communities where Virginians of all ages and abilities can thrive.
• Received a handful of comments suggestions.
  o Drop “Good to go”
  o Add “Equity or Fairness”, “Good for Mobility”
  o Include environmental values in vision and goals
VTTrans Goals

- Goal A: Economic Competitiveness and Prosperity
- Goal B: Accessible and Connected Places
- Goal C: Safety for All Users
- Goal D: Proactive System Management
- Goal E: Healthy Communities and Sustainable Transportation Communities
MID-TERM NEEDS ASSESSMENT
• **Corridors of Statewide Significance (CoSS)** [Code of Virginia § 33.2-353]
  – Serve inter-regional travel

• **Regional Networks** [Code of Virginia in § 33.2-353]
  – Serve commuters, intra-regional, and local travel

• **Urban Development Areas (UDA)** [Code of Virginia § 33.2-353 and § 15.2-2223.1]
  – Designated by local governments
  – Intended to promote walkable development and traditional neighborhood design

• **Safety**

• **Additional work underway to identify needs associated with local economic and industrial development areas**
Corridors of Statewide Significance

Travel Markets:

Corridors of Statewide Significance serve inter-regional travel.
Corridors of Statewide Significance* Corridors of Statewide Significance serve inter-regional travel.

Regional Networks serve commuters, intra-regional and local travel.

*Thin lines of same color represent Corridor Component Facilities

Airports
Ports
Rail Network
Regional Networks
Corridors of Statewide Significance:

- Coastal Corridor
- Crescent Corridor
- East-West Corridor
- Eastern Shore Corridor
- Heartland Corridor
- North Carolina to West Virginia Corridor
- North-South Corridor
- Northern Virginia Corridor
- Seminole Corridor
- Southside Corridor
- Washington to North Carolina Corridor
- Western Mountain Corridor

*Thin lines of same color represent Corridor Component Facilities

Travel Markets:

Corridors of Statewide Significance serve inter-regional travel.

Regional Networks serve commuters, intra-regional and local travel.

Urban Development Areas are designated by local governments and are intended to promote walkable development and traditional neighborhood design.
## Mid-Term Needs vs. Long-Term Needs

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<td>7 - 10 year time horizon</td>
<td>10 + year time horizon</td>
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<tr>
<td>Performance measures with current data to determine</td>
<td>Performance measures through scenario analysis with forecast data to determine</td>
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Mid-Term Needs Approach:

- Validate and build upon needs identified in VTrans2040 (travel markets)
- Tie measures to VTrans Goals and Objectives
- Introduce new/improved data sources and new measures in line with federal performance reporting requirements
- Coordinate with regional and local stakeholders to update needs
Mid-Term Needs Approach by Travel Markets:

• Corridors of Statewide Significance (CoSS) – more data-driven, smaller segments than last time
• Regional Networks (RN) – build on VTrans2040, verify, update, confirm/revise
• Urban Development Areas (UDAs) – build on VTrans2040, verify, update, confirm/revise
• Safety – Potential for Safety Improvements (PSI) statewide
Goal A: Economic Competitiveness and Prosperity
Goal B: Accessible and Connected Places
Goal C: Safety for All Users
Goal D: Proactive System Management
Goal E: Healthy Communities and Sustainable Transportation Communities

Goals with measures that will be used for identification of Mid-term Needs
Goals with measures that will be used for trends analysis
**Mid-Term Needs Assessment | Draft Needs Identification Measures**

<table>
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<tr>
<th>Goal</th>
<th>Mid-Term Needs Measures</th>
</tr>
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<tr>
<td>Economic Competitiveness</td>
<td>Congestion measure(s)</td>
</tr>
<tr>
<td></td>
<td>Reliability measure(s)</td>
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<tr>
<td></td>
<td>Economic development measure</td>
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<tr>
<td></td>
<td>Passenger Rail On-time Performance</td>
</tr>
<tr>
<td>Accessible Places</td>
<td>Accessibility measure(s)</td>
</tr>
<tr>
<td></td>
<td>Disadvantaged communities beyond ¼ mile access to transit</td>
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<tr>
<td>Safety</td>
<td>PSI – Potential for safety improvements</td>
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</tbody>
</table>
### MID-TERM NEEDS ASSESSMENT | DRAFT TRENDS ANALYSIS MEASURES

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<tr>
<th>Goal</th>
<th>Mid-Term Measures for Trends Analysis</th>
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<tr>
<td><strong>Proactive System Management</strong></td>
<td></td>
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<tr>
<td>Percentage of bridge deck area in good condition</td>
<td></td>
</tr>
<tr>
<td>Percentage of bridge deck area in poor condition</td>
<td></td>
</tr>
<tr>
<td>Percentage of roadway pavement in good condition</td>
<td></td>
</tr>
<tr>
<td>Percentage of roadway pavement in poor condition</td>
<td></td>
</tr>
<tr>
<td>Rolling Stock: The percentage of revenue vehicles (by type) that exceed the useful life benchmark (ULB).</td>
<td></td>
</tr>
<tr>
<td>Equipment: The percentage of non-revenue service vehicles (by type) that exceed the ULB.</td>
<td></td>
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<tr>
<td>Facilities: The percentage of facilities (by group) that are rated less than 3.0 on the Transit Economic Requirements Model (TERM) Scale.</td>
<td></td>
</tr>
<tr>
<td>Infrastructure: The percentage of track segments (by mode) that have performance restrictions.</td>
<td></td>
</tr>
<tr>
<td>Goal</td>
<td>Mid-Term Measures for Trends Analysis</td>
</tr>
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<td>------</td>
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<tr>
<td>Healthy / Sustainable Communities</td>
<td>Per Capita VMT</td>
</tr>
<tr>
<td></td>
<td>Percentage of passenger fleet composed of low-emitting vehicles (hybrids or electric vehicles)</td>
</tr>
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**Mid-Term Needs Assessment | Summary Review**

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<tr>
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<th>Regional Networks</th>
<th>UDA</th>
<th>Safety (Statewide)</th>
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<td><strong>Starting Point</strong></td>
<td>Full Analysis of CoSS</td>
<td>VTrans2040 RN needs</td>
<td>VTrans2040 UDA needs</td>
<td>Full analysis of PSI locations</td>
</tr>
<tr>
<td><strong>How will measures be used?</strong></td>
<td>Identification of new needs</td>
<td>Confirmation of previously identified needs and identification of new needs</td>
<td>Needs must support UDA legislative requirements (<a href="#">§ 15.2-2223.1</a>)</td>
<td>Identification of new needs</td>
</tr>
<tr>
<td><strong>Stakeholder engagement required</strong></td>
<td>Review and comment on identified needs</td>
<td>Regional workshops for needs identification with MPOs, PDCs, and localities</td>
<td>Survey/Needs questionnaire with localities</td>
<td>Review and comment on identified needs</td>
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OUTREACH AND ENGAGEMENT
COORDINATION WITH MODAL AGENCIES

• Management-level internal group
• Representation from DRPT and VDOT multimodal divisions
• Objective is inform VTrans development, developed a shared understanding and coordination of policies and priorities
OUTREACH AND ENGAGEMENT – PUBLIC OPEN HOUSES

• Spring 2019 Open House Attendance
  – Nine in-person meetings
  – One online meeting
• Facebook Ad Promotion
  – Total Reach: > 200,000
  – Total Link Clicks: > 5,000
• ~ 8,000 VTrans page views
  – Online meeting visited by over 3,000
OUTREACH AND ENGAGEMENT – MPOs AND PDCs

• Round 1 – VTrans Kickoff and Approach [Nov 2018 – Feb 2019]
  – 21 Meetings
  – 13 MPOs
  – 7 PDCs
  – State Bicycle/Pedestrian Advisory Committee
  – NVTA
  – VAMPO

• Round 2 – Mid-Term Needs Assessment [May – June 2019]
  – 17 Meetings
  – 14 MPOs
  – 1 PDC
  – NVTA
  – 1 online meeting
  – VAMPO and VAPDC
• Include routes that are currently outside Regional Networks (RN) Areas
• Include need associated with activity centers that are outside Regional Networks (RN) areas
• Revisit CoSS designation
• Include vulnerability analysis related considerations in needs identification
• General questions about how I-81 and I-95 corridor plans relate to VTrans
SCHEDULE AND NEXT STEPS
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<th>Date</th>
<th>VTrans Task</th>
<th>Public and Agency Feedback</th>
<th>Opportunities for CTB to Engage</th>
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<td>July</td>
<td>July CTB Workshop: Present Performance Measures for VTrans Needs Identification</td>
<td>Opportunity for public and agencies to comment</td>
<td>Review and provide direction</td>
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<td>Mid-July - early August</td>
<td>Regional Workshops: Draft Mid-Term Needs development</td>
<td>Local and regional entities provide input on draft mid-term needs assessment</td>
<td>Attend and provide direction at Regional Workshops</td>
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<td>October</td>
<td>October CTB Workshop: Present draft needs and any feedback we’ve heard</td>
<td>Opportunity for public and agencies to comment</td>
<td>Review and provide direction</td>
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<td>September to November</td>
<td>OIPI Staff visits to MPO’s: Discuss draft Mid-Term Needs</td>
<td>Feedback from PDCs without MPOs; localities that are not represented on MPO boards</td>
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## Next Steps | Schedule and Milestones

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<td>October/November</td>
<td>Fall Transportation Meetings</td>
<td>Attend/Provide comments</td>
<td>Attend and provide direction at Regional Workshops</td>
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<tr>
<td>December 11&lt;sup&gt;th&lt;/sup&gt;</td>
<td>December CTB Meeting: CTB takes action on Vision, Goals, Objectives, measures, needs methodology, and Mid-term Needs list</td>
<td>Opportunity for public and agencies to comment</td>
<td>Attend and take action</td>
</tr>
<tr>
<td>Before end of 2019</td>
<td>Upon CTB’s approval, publish final approved list of Mid-Term Needs</td>
<td>N/A</td>
<td>N/A</td>
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