



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

1. Workforce of Tomorrow  
*Robert Cary, Virginia Department of Transportation*  
*Geoff Rothermel, Deloitte Consulting*
2. Contract Evaluation Processes  
*Harold Caples, Virginia Department of Transportation*
3. Progressive Design Build  
*Shailendra Patel, Virginia Department of Transportation*
4. Transit Funding and Reform Update  
*Jennifer DeBruhl, Virginia Department of Rail & Public Transportation*
5. Preliminary FY 2020 – 2025 Commonwealth  
Transportation Fund (CTF) Six-Year Financial Plan Assumptions  
*John Lawson, Virginia Department of Transportation*
6. SMARTSCALE Round 3  
*Nick Donohue, Deputy Secretary of Transportation*
7. 66 Inside the Beltway Update  
*Nick Donohue, Deputy Secretary of Transportation*
8. Legislative Update.  
*Nick Donohue, Deputy Secretary of Transportation*  
*JoAnne Maxwell, Virginia Department of Transportation*

Agenda  
Meeting of the Commonwealth Transportation Board  
Workshop Session  
January 15, 2019  
Page 2

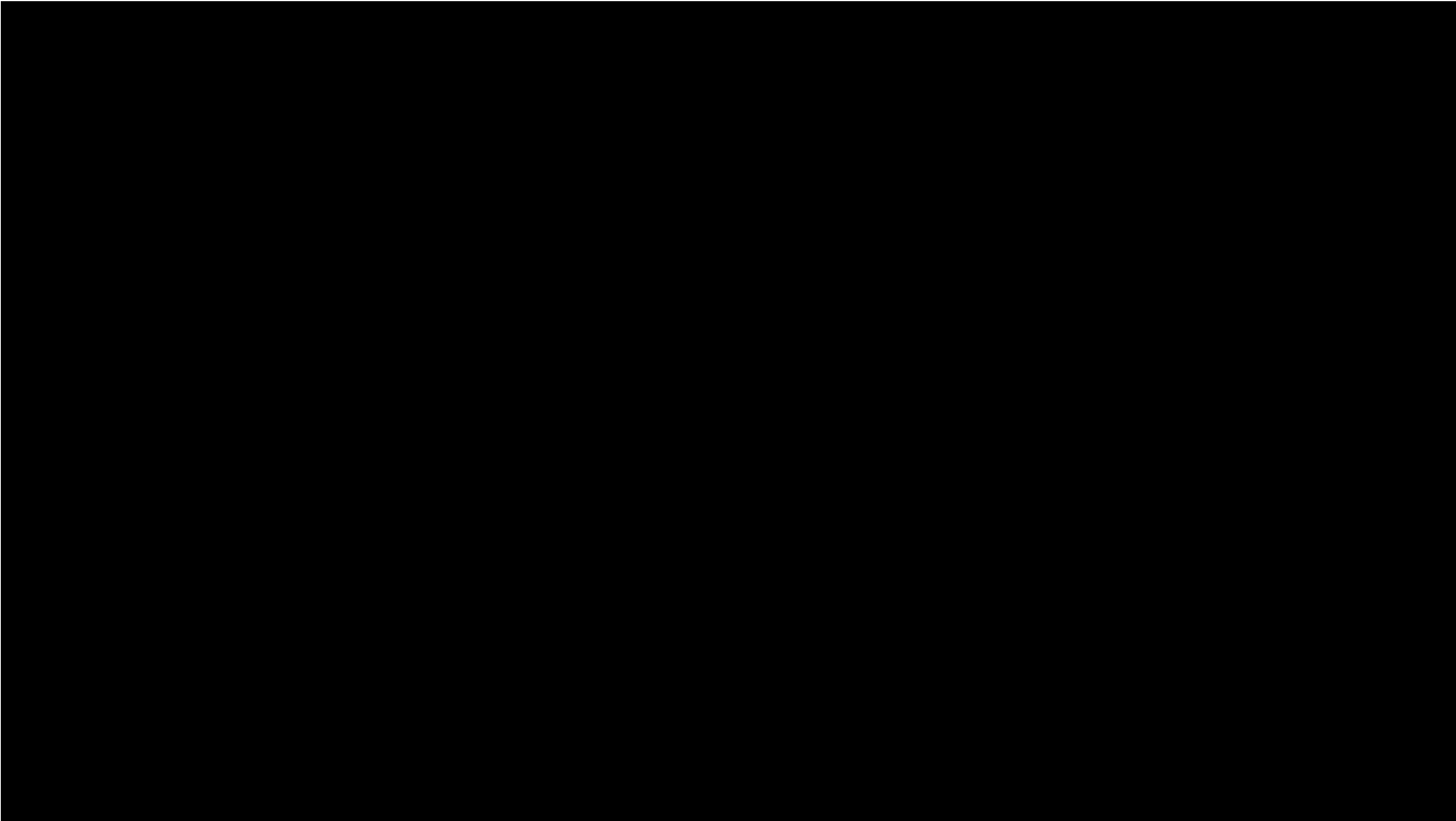
9. ITTF Program FY20-24  
*Cathy McGhee, Director, Research and Innovation*
  
10. Safety Performance Management.  
*Nick Donohue, Deputy Secretary of Transportation*  
*Margie Ray, Office Intermodal Planning and Investment*
  
11. Director's Items  
*Jennifer Mitchell, Virginia Department of Rail & Public Transportation*
  
12. Commissioner's Items  
*Stephen Brich, Virginia Department of Transportation*
  
13. Secretary's Items  
*Shannon Valentine, Secretary of Transportation*  
*## #*



## Virginia Department of Transportation Workforce of Tomorrow

Presentation for the CTB

January 15<sup>th</sup>, 2019



# Macro Trends in Transportation

Five macro trends will shape the future of transportation and fundamentally redefine the role of DOTs

**We define Macro Trends as the broadest forces shaping the future of transportation.**

These trends will continue to evolve the future of mobility in 5, 10, 20 years and beyond.

## **Social**

Mobility preferences are shifting in response to changing demographics – urbanization is decreasing generational demands for personal vehicles and creating diverging needs across urban and rural areas.

## **Technology**

Across the transportation ecosystem, emerging technologies are changing the design and implementation of transportation solutions.

## **Economic**

Alternative revenue streams and monetization structures are shifting investment strategies and enabling new technologies.

## **Environmental**

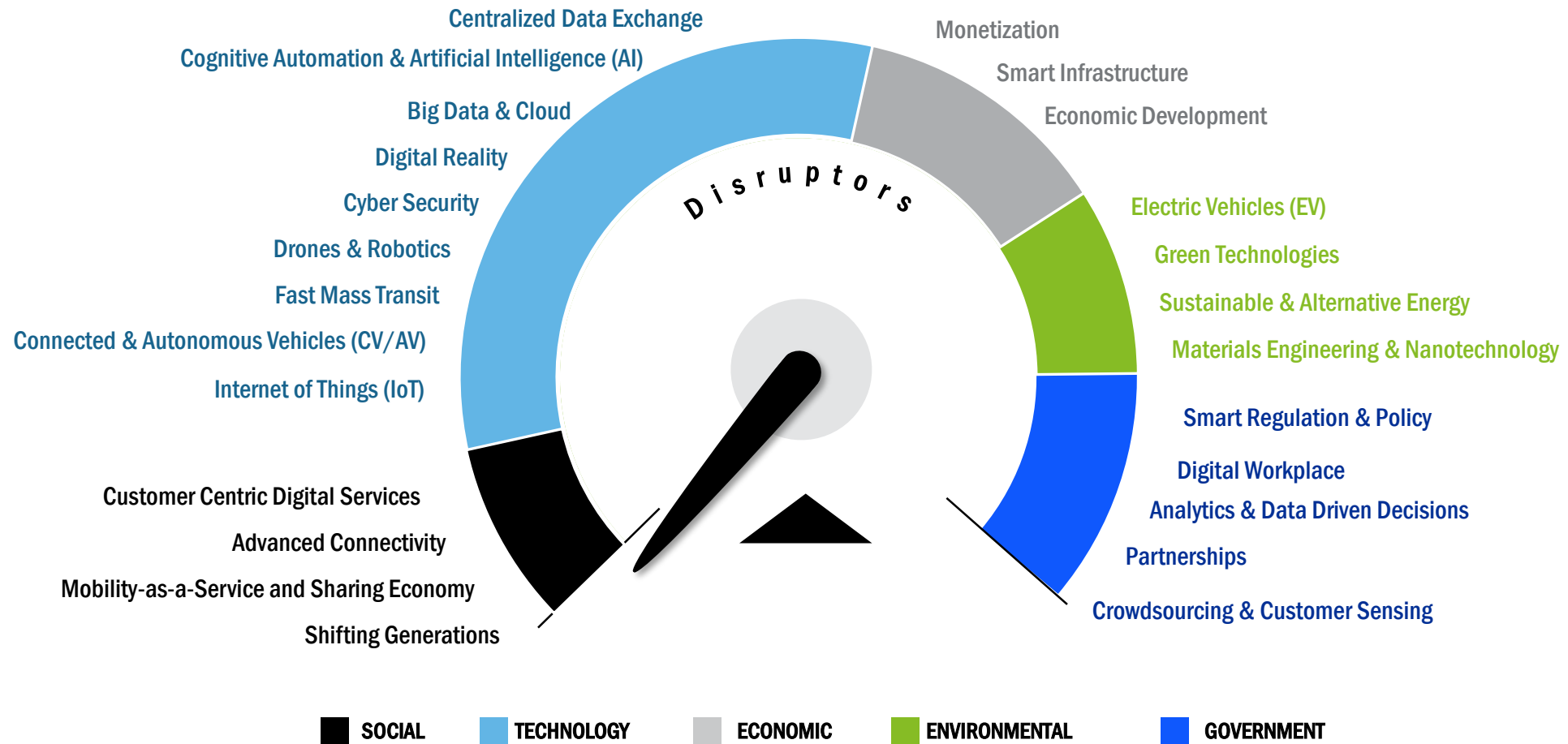
Global recognition of resource dependencies and environmental impacts are putting pressure on transportation agencies and driving the development of alternatives.

## **Government**

Government is increasingly expected to integrate data, digital, and design to deliver transparent services, facilitate economic development and enhance quality of life.

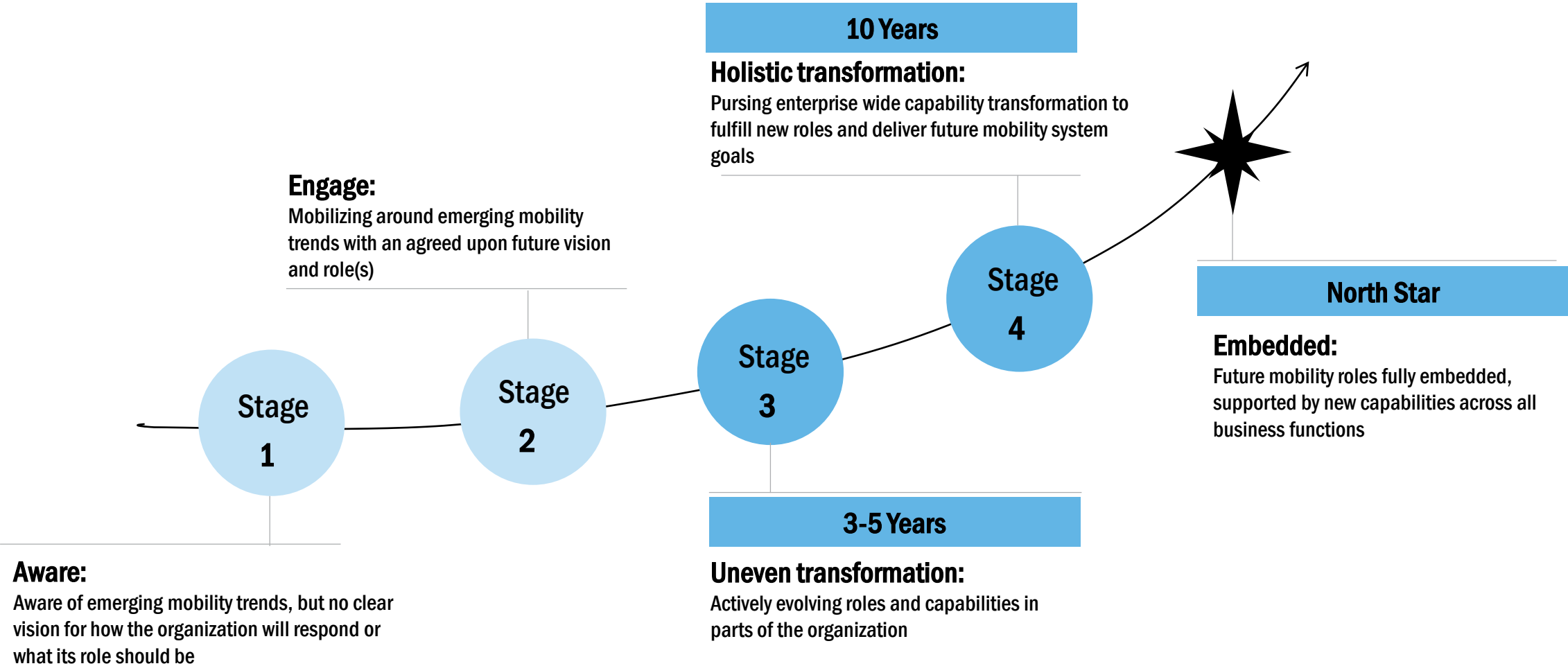
# Transportation Disruptors

Underpinning macro trends are 25 significant internal and external forces challenging DOTs to operate in new ways



# The Transportation Maturity Curve

Most state DOTs and transportation agencies around the world are operating at stage 1 or stage 2 – but VDOT is out ahead



# 3 Dimensions of VDOT's Path

Reaching the North Star requires VDOT to make bold moves across the 3 dimensions



## WORK

The fundamental nature of the work performed to achieve mission outcomes

- **HOW** is the nature of the work performed changing to achieve new business goals?
- **WHAT** work may be augmented by digital and other technologies and what are the workforce implications?



## WORKFORCE

The portfolio of talent and skills tapped to perform the work

- **WHO** is best to perform the current and future work and what skills are necessary?
- **HOW** do you close the gap between current and future skills by tapping into alternative talent pools and upskilling the current workforce?



## WORKPLACE

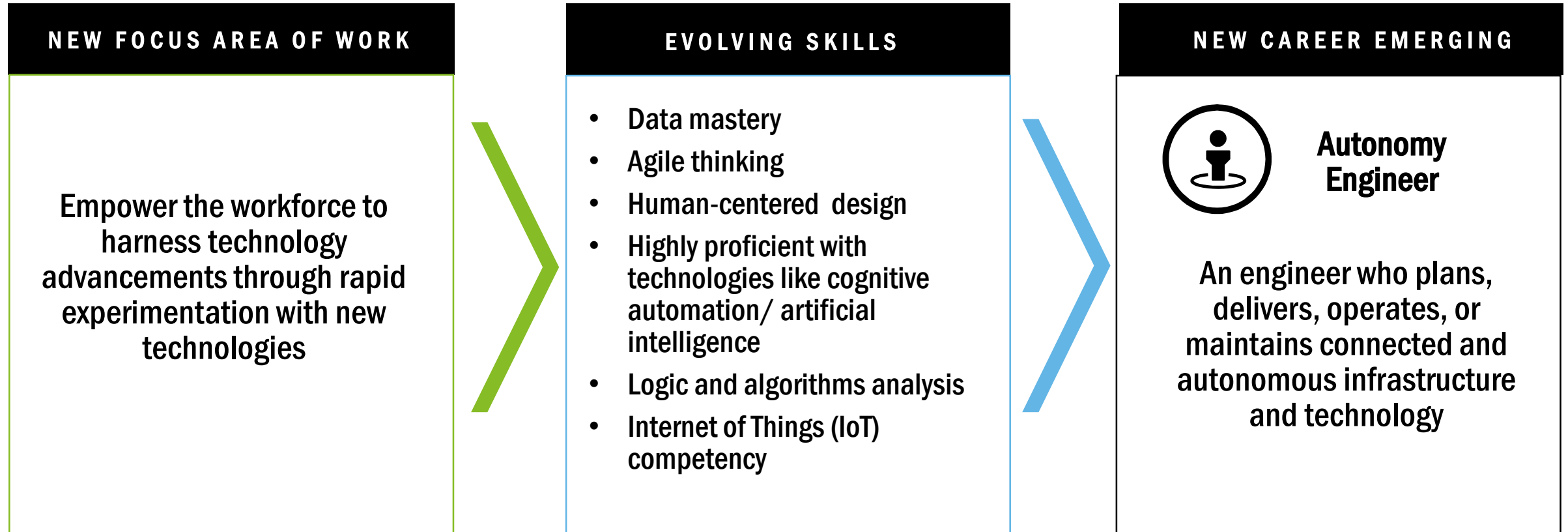
The environment and policies – not just the physical structures or location – utilized to maximize collaboration and consistency of the talent experience and efficiency and cost-effectiveness for VDOT

- **WHERE** is best to perform the work to maximize return on investment (e.g., in office vs. virtual)?
- **WHAT** physical design and technology maximizes productivity?



# A Sample “Net New” Career

An **Autonomy Engineer** is an illustrative example of a “net new” career resulting from emerging technologies



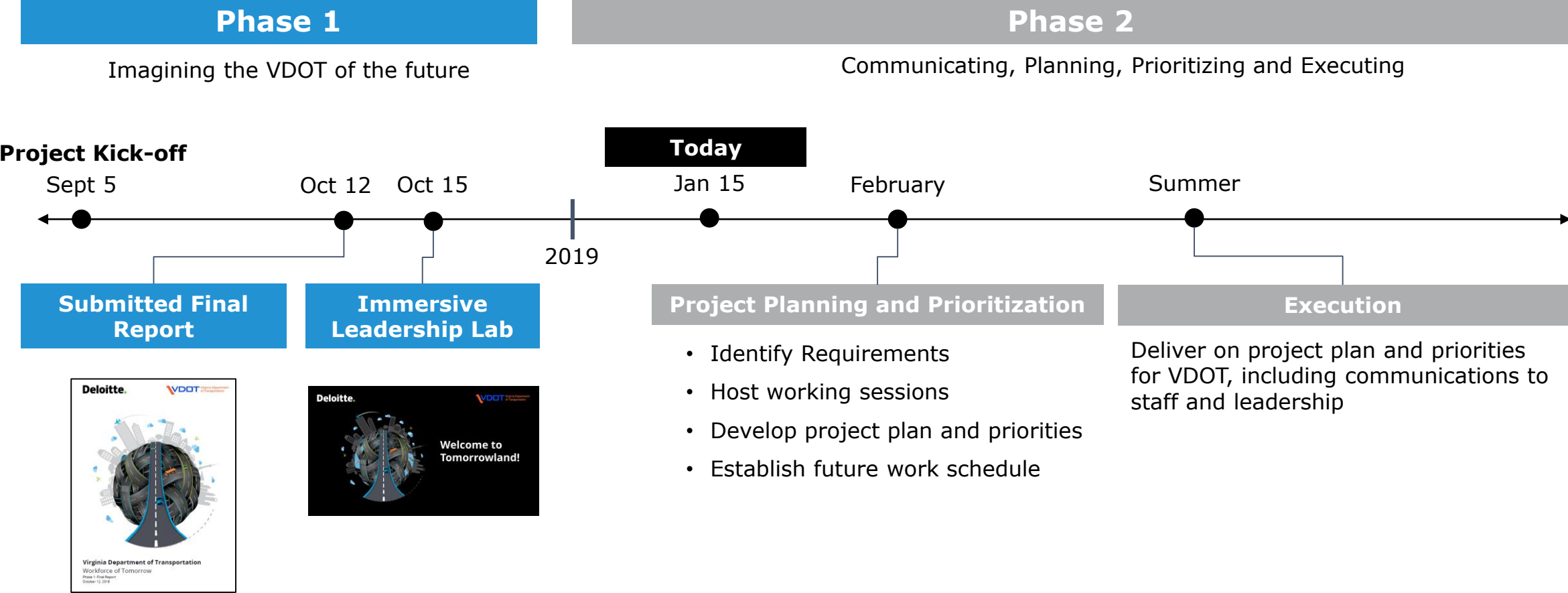
# Next Steps

VDOT looks at disruptors as opportunities

- 1** Communicate the vision with VDOT employees and key stakeholders
- 2** Validate linkages between North Star and VDOT's strategic priorities
- 3** Prioritize key opportunities across work, workforce, and workplace to achieve North Star

# Planning for the Workforce of Tomorrow

Deloitte is working with VDOT to imagine the future and develop a plan to get there





# CONTRACT EVALUATION PROCESSES

 Harold Caples, P.E.

January 15, 2019

# Summary of Current Processes Followed for All Contracts

# Current Processes

- **Project cost estimation**
- **Bid analysis**
- **Bid award/reject recommendations**

# Estimates

## Location and Design Estimate

- **Developed by district using historical price data from previous two years**
- **Created and updated throughout project development and finalized prior to submission for advertisement**
- **Is the publicly-shown estimate (e.g., Commonwealth Transportation Board and Commissioner)**



# Estimates (cont.)

## Evaluative Estimate

- **Developed by Construction Division (using similar process as private contractor)**
- **Estimate of labor/equipment/materials based on project specific information. Estimation may involve obtaining supplier quotes and using location-specific historical price data.**
- **Used to establish baseline against which bids are compared**
- **Developed at the same time contractors are preparing bids. Estimate is not finalized until a week prior to bid letting**
- **Evaluative estimate is confidential (limited internal availability, not available to public—exempt from FOIA)**

# Bid Analysis

**Bid results publicly read, as submitted, and then determined to be within or in excess of the range of the evaluative estimate**

**Central Office Construction Division staff perform bid analysis**

- **Bidders evaluated for their eligibility to bid on VDOT contracts**
  - **Prequalification Status, VSBEP Status**
- **Contract value and bid prices evaluated for:**
  - **Bid irregularities**
  - **Unbalanced bidding**
  - **Token bids**

# Bid Analysis (cont.)

## Additional factors considered when bids exceed the range of the evaluative estimate

- Need and urgency of project (e.g., safety concerns, structurally deficient)
- Availability of competition
- Geographic constraints (e.g., travel distance, topography)
- Market conditions
- Schedule and phasing requirements
- Ambiguity in proposal and/or construction plans

# Recommendation Process

**Staff makes initial recommendation for award or rejection based on low bidder's total bid and considering individual unit prices**

**State Contract Engineer evaluates staff members' initial recommendation based on bid and unit prices of all bidders, agency need, and other extenuating circumstances and finalizes recommendation:**

- **Reject; Do not re-advertise**
- **Reject; Re-advertise with or without plan revisions**
- **Award; Enter into memorandum of understanding with low bidder**
- **Award**

## Recommendation Process (cont.)

**State Contract Engineer meets with Deputy Chief Engineer and other staff members to discuss bid results and finalize recommendations to award and/or reject**

**The CTB's and Commissioner's ballots are developed for projects recommended for award. All rejections (around 5% on average) are excluded from the ballots**

- **Ballots detail project information, number of bidders, low bid, and district's location and design estimate for comparison (ballots are public documents)**

**Questions?**



# PROGRESSIVE DESIGN-BUILD

Commonwealth Transportation Board

Shailendra Patel, P.E., DBIA  
State Alternative Project Delivery Engineer

January 15, 2019



# VDOT Project Delivery Options

- **Design-Bid-Build**
- **Emergency Force Account**
- **Public Private Transportation Act**
  - **Design-Build-Finance-Operate-Maintain**
  - **Design-Build-Operate-Maintain**
  - **Design-Build-Finance**
- **Design-Build**
  - **Lump Sum**
  - **Fixed Price**
  - **Best Value**
  - **Guaranteed Maximum Price**

# VDOT's Design-Build Program

- **VDOT's design-build program has steadily grown since 2004**
  - **Nationally recognized program**
    - VDOT named 2016 Transportation Owner of the Year by Design-Build Institute of America (DBIA)
  - **VDOT D-B Project Awards**
    - 27/244 Interchange – 2016 DBIA Merit Award (Transportation)
    - I-64 Capacity Improvements, Segment I – 2018 DBIA Merit Award (Transportation)
    - I-66/Route 15 Interchange – 2018 DBIA Project of the Year Award (All Sectors)
    - DBIA Mid-Atlantic Chapter – Numerous Awards
- **Next Step**
  - **Add Progressive Design-Build delivery option**

# Design-Bid-Build Attributes

- **No contractor involvement during design development**
- **Price is the only consideration for selection**
- **Project is totally defined at time of award**
- **No contractor involvement in ROW acquisition**

# Design-Build Attributes (VDOT's Two-Phase Best Value)

- **Some early contractor involvement**
  - **Proprietary meetings**
- **Opportunities for innovation**
  - **Alternative Technical Concepts**
- **Risk transfer in ROW acquisition and Utility Relocation**
- **VDOT selects the most highly qualified teams**

# Progressive Design-Build (PDB)

**A procurement tool that provides the following benefits on high risk, complex projects:**

- **Involvement of most qualified Design-Builder at the earliest point of project development**
- **Collaboration with the Design-Builder on key scope and risk issues**
- **Owner's involvement in the selection of subconsultants, subcontractors, vendors and suppliers (including DBE & SWaM)**
- **Transparency in cost development using open-book pricing**

**As a result, PDB reduces project risk for Owner and Design-Builder**

# PDB Advantages

- **Design-Builder becomes a strategic partner in planning and project definition**
- **Allows involvement of public and private stakeholders throughout design development**
- **Single point responsibility avoids Spearin liability (errors and omissions) as there is no design “handoff”**
- **Potential cost & schedule savings**
  - **Preliminary Engineering - No duplication of effort as bridging documents are not required**
  - **Use of early work packages (R/W acquisition and utility relocation)**
- **Expedited procurement**

# When to use PDB

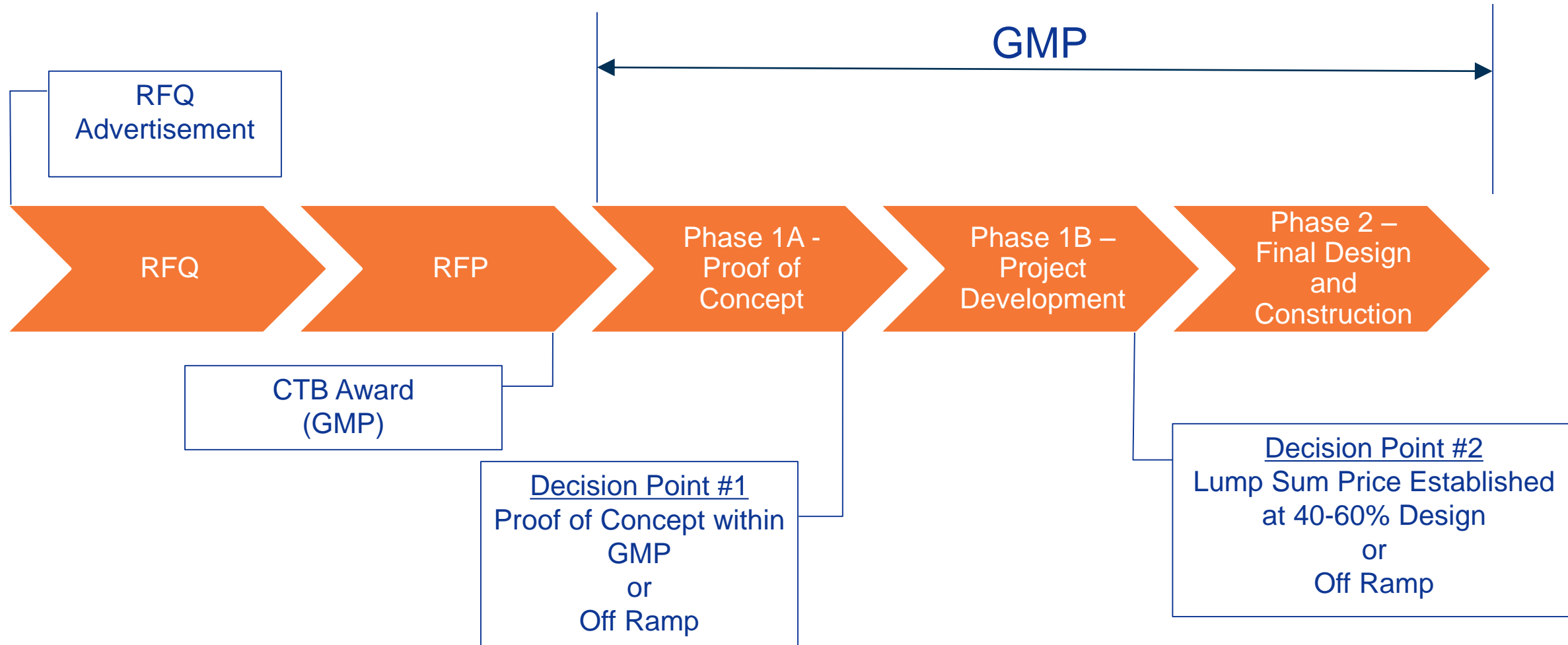
- **Design and Construction Challenges**
  - Interface with other planned construction
  - Need for early contractor involvement
  - Unproven technology
  - Operational impacts during construction
  - Input on specific performance parameters
  - Urban areas with dense commercial and residential development
- **Environmental Challenges**
  - NEPA
  - Permits
  - 4F Properties
  - HAZMAT
  - USACE

# When to use PDB

- **Right of Way Challenges**
  - Large number of parcels impacted
  - Federal and State property
  - Third Parties (railroad and transit authorities)
- **Utility Challenges**
  - High volume
  - Unknown and/or dark utilities
- **Stakeholder Involvement**
  - Extensive input during design development
    - Advisory panels
    - Business entities, developers
    - Military, municipalities, governmental agencies, Homeowners Associations, Architecture Review Boards
    - Public transit and airports



# Progressive Design-Build Process



# PDB – Open Book Pricing

- **Collaborative effort between Owner and Design-Builder**
- **Ongoing and transparent cost estimating process**
  - **Goal is to stay below established GMP**
- **Similar to existing escrow information**
  - **Real time quotes from Design-Builder, subcontractors and subconsultants**
    - Quantity take-offs
    - Crew size and shifts
    - Equipment
    - Direct labor
    - Indirect costs
    - Bond rates
    - Insurance costs
    - Mark-up and contingency
- **Better understanding of risk**
- **High confidence in price throughout process**

# Owner's Off-Ramp Rights

- **Operates as a termination for convenience**
- **Commercial terms generally include:**
  - **Right to use work product**
    - Design-Builder is paid for services rendered; VDOT owns design
  - **Right to contract directly with designer to finish the design**
  - **Right to use any other type of delivery system**

# Next Steps

- **CTB Policy Change is Required**
  - **Amendment to Design-Build Objective Criteria**
    - Expedited Schedule
    - Established Budget
    - Well Defined Scope
    - Risk Analysis
    - Pre-Qualification of Design-Build Firm
    - Competitive Bidding Process Basis for Award
      - Lump Sum
      - Fixed Price
      - Best Value
      - **Guaranteed Maximum Price**



Making Efficient + Responsible Investments In Transit

# Transit Funding and Reform Update

Commonwealth Transportation Board – January 15, 2019

Jennifer DeBruhl  
Chief of Public Transportation



# Statewide Transit Operating Funds

---

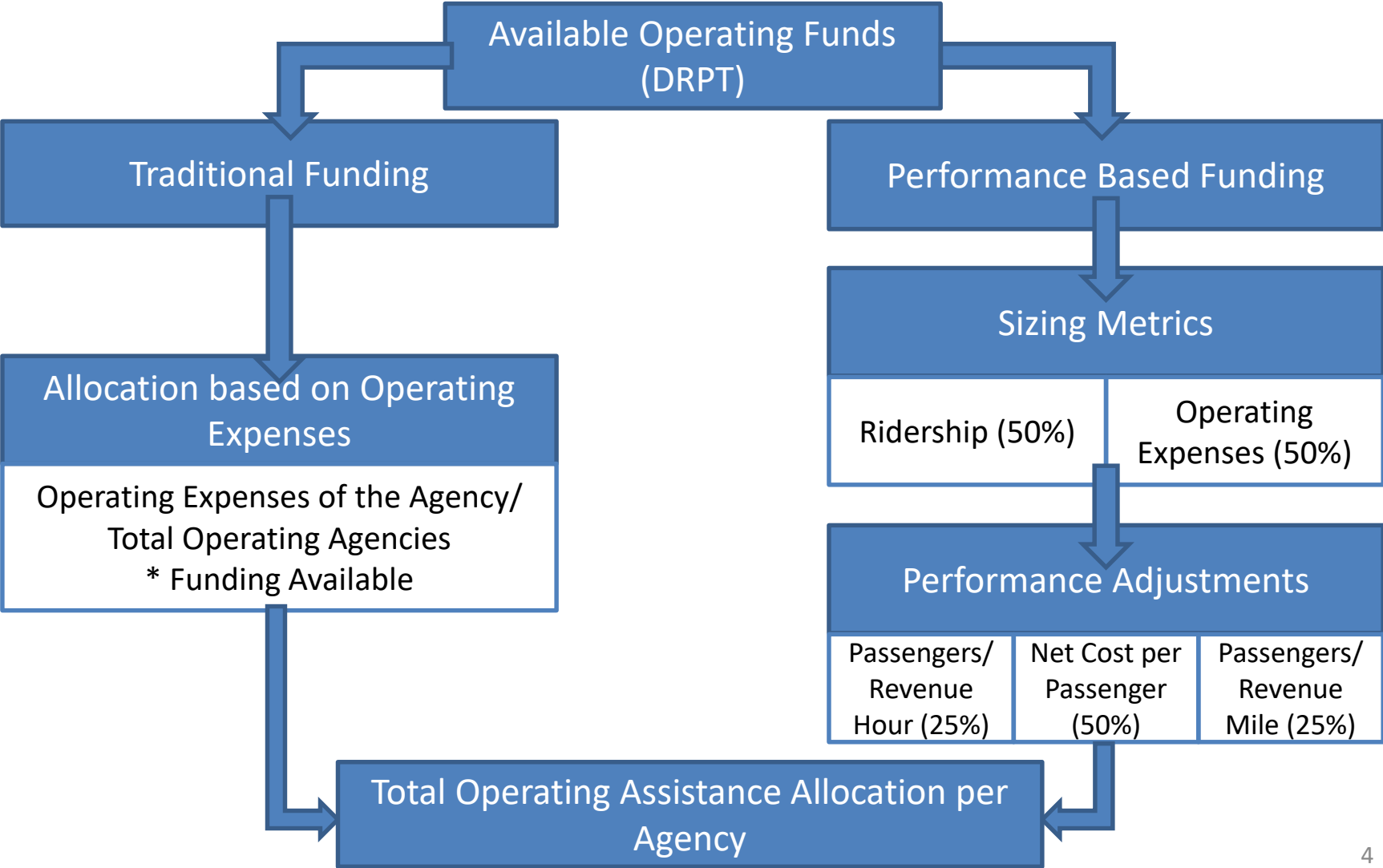
- **Effective July 1, 2019**
- **100% of Statewide Operating Funds:**
  - » *Allocated on the basis of service delivery factors*
  - » *Made available for public comment at least one year before application*
- **Current Factors:**
  - » *Passengers Per Revenue Hour*
  - » *Passengers Per Revenue Mile*
  - » *Net Cost Per Passenger*
- **Builds upon the work that began with TSDAC and legislation dating back to 2011**

# Operating Assistance – Current Status

---

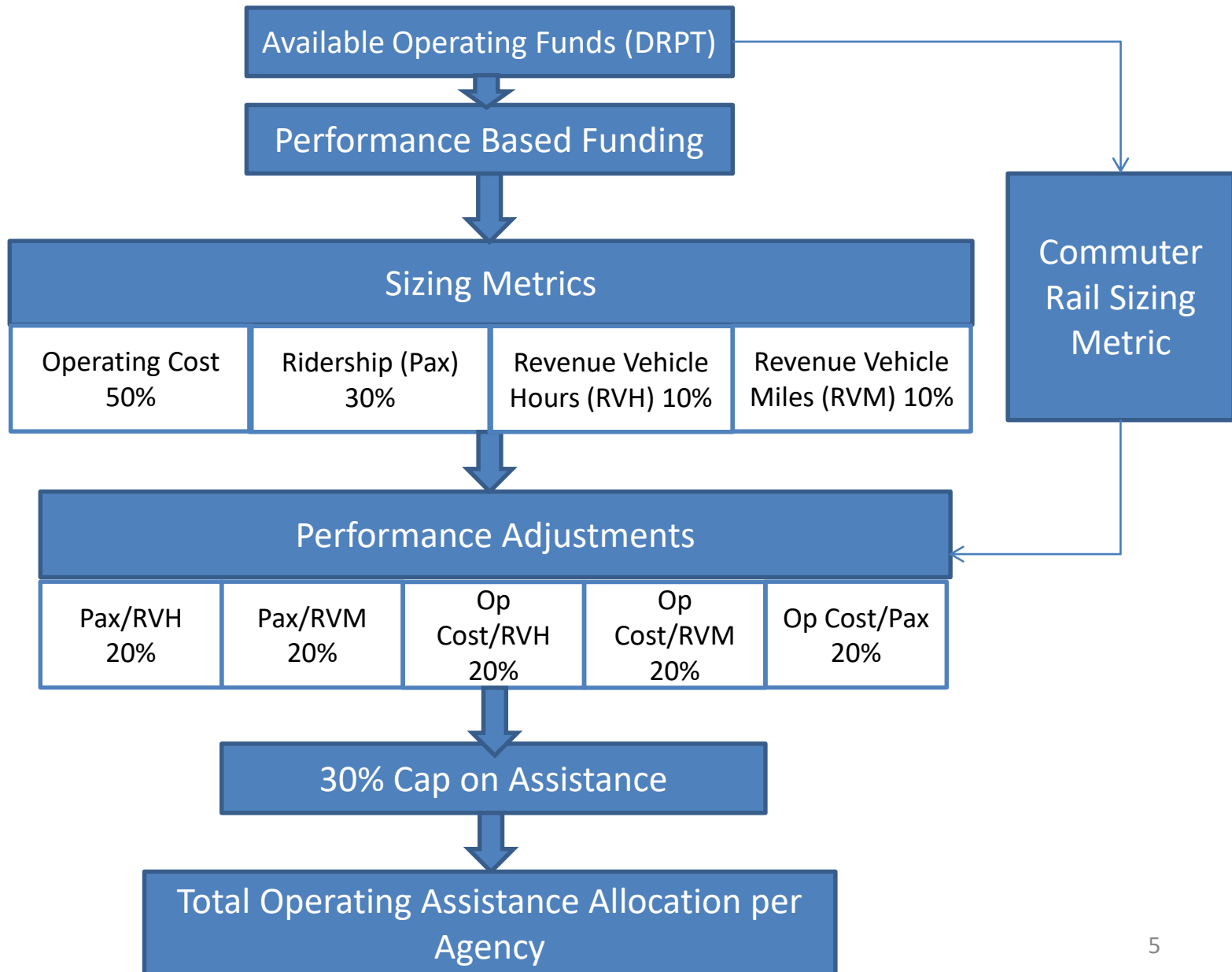
- **Draft CTB Policy**
  - » *Consistent with December CTB Briefing*
  - » *Coordinated with TSDAC – reflects discussion at their December 3 meeting*
- **Draft Guidance Document**
  - » *Provides definitions for all metrics to ensure consistency in calculation*
- **Released for public comment on December 20th**
  - » *Comment period open for 45 days (until February 3<sup>rd</sup>)*

# Current Operating Assistance Allocation Methodology





# Proposed Operating Assistance Allocation Methodology

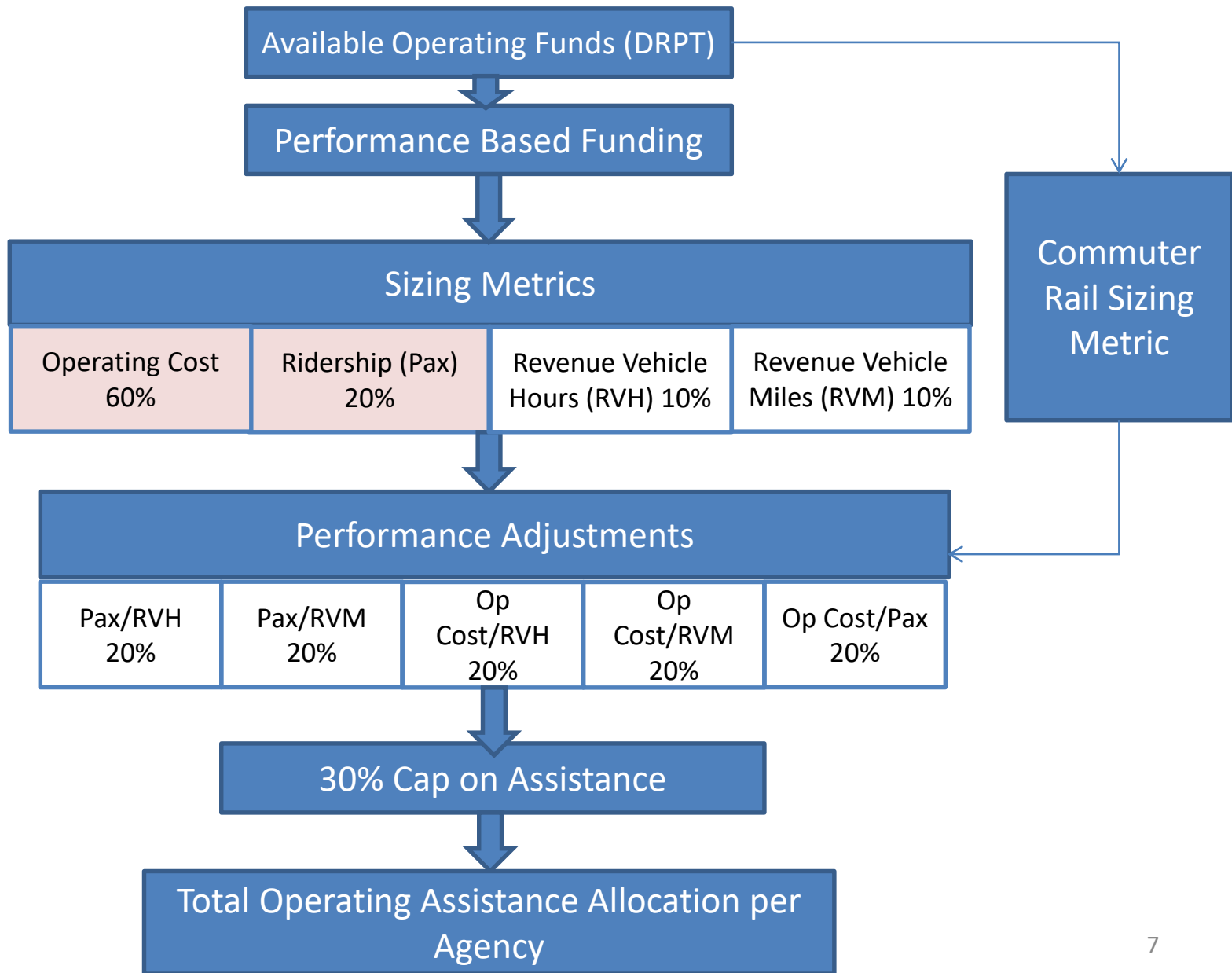


# Transition Plan for FY20

---

- **§ 33.2-1526.1** – Provides for a one year notification prior to implementation of new measures by Board
- Legislative change applies to FY20 funding (exception provided for FY19 only)
- Request to phase implementation to help mitigate potential negative impacts late in the budget cycle
- Modified metrics would apply to FY20 funding only
- TSDAC has requested consideration of an additional transition year in FY2021, with modified metrics

# Proposed Operating Assistance Allocation Methodology – FY2020



# Operating Assistance Next Steps

---

- January/February — Legislator outreach on draft CTB policy for operating allocation
- February 20<sup>th</sup> — Action on CTB policy for operating allocation



Making Efficient + Responsible Investments In Transit

# Transit Funding and Reform Update

Commonwealth Transportation Board – January 15, 2019

Jennifer DeBruhl  
Chief of Public Transportation



**RESOLUTION  
OF THE  
COMMONWEALTH TRANSPORTATION BOARD**

**February 20, 2019**

**MOTION**

**Made By: Seconded By: Action:**

**Title: Policy for the Implementation of Performance Based State Transit Operating Allocation**

**WHEREAS**, Section 33.2-1526.1 of the *Code of Virginia* provides that the Commonwealth Transportation Board shall allocate thirty-one percent of the Commonwealth Mass Transit Fund to support operating costs of transit providers; and

**WHEREAS**, Section 33.2-1526.1 of the *Code of Virginia* provides that the Commonwealth Transportation Board shall establish service delivery factors, based on effectiveness and efficiency, to guide the relative distribution of such funding; and

**WHEREAS**, the Department of Rail and Public Transportation has consulted with the Transit Service Delivery Advisory Committee in the development of this performance based allocation process; and

**WHEREAS**, the Transit Service Delivery Advisory Committee adopted the following policy objectives to guide their deliberations: promoting fiscal responsibility, incentivizing efficient operations, supporting robust transit service, rewarding higher patronage, promoting mobility, supporting a social safety net, and utilizing data that exists for all agencies; and

**WHEREAS**, the Commonwealth Transportation Board adopted Strategic Planning Guidelines on October 30, 2018, which are intended to guide urban transit agencies through an evaluation of their services that would ultimately improve system performance over time; and

**WHEREAS**, the Department of Rail and Public Transportation has solicited input from localities, metropolitan planning organizations, transit authorities, and other stakeholders in the development of the performance based allocation process; and

**NOW THEREFORE BE IT RESOLVED**, the Commonwealth Transportation Board hereby adopts the following policy for the allocation of operating funding pursuant to subdivision C of 33.2-1526.1 of the *Code of Virginia*:

1. For the purposes of system sizing the following metrics will be applied:

**Bus Systems:**

Operating Cost (50%)

Ridership (30%)  
Revenue Vehicle Hours (10%)  
Revenue Vehicle Miles (10%)

2. A funding pool shall be created, for the purpose of allocating funds to commuter rail systems based on the performance of commuter rail systems, relative to all other modes on the basis of:

Passenger Miles Traveled (33%)  
Revenue Vehicle Hours (33%)  
Revenue Vehicle Miles (33%)

3. For the purpose of performance adjustment the following metrics will be applied to all systems:

Passengers per Revenue Vehicle Hour (20%)  
Passengers per Revenue Vehicle Mile (20%)  
Operating Cost per Revenue Vehicle Hour (20%)  
Operating Cost per Revenue Vehicle Mile (20%)  
Operating Cost per Passenger (20%)

4. In order to ensure an even distribution of funding, the share of state operating assistance will be capped at 30% of an agency's operating cost. Unallocated balances remaining after applying the cap will be run through the performance based formula to ensure full allocation of the available operating funding.

**BE IT FURTHER RESOLVED**, the Board recognizes the potential impacts associated with implementation of this policy and hereby adopts the following policy for the allocation of operating funding for fiscal year 2020 only:

1. For the purposes of system sizing the following metrics will be applied in FY2020:

Bus Systems:

Operating Cost (60%)  
Ridership (20%)  
Revenue Vehicle Hours (10%)  
Revenue Vehicle Miles (10%)

2. The Transit Service Delivery Advisory Committee encouraged the Board to consider a second transition year in FY2021.

**BE IT FURTHER RESOLVED**, the Board hereby directs the Director of the Department of Rail and Public Transportation to take all actions necessary to implement and

administer this policy and process, including, but not limited to preparation of program guidance and outreach consistent with this resolution.

**BE IT FURTHER RESOLVED**, the Board hereby directs the Director of the Department of Rail and Public Transportation to analyze the outcomes of this process on an annual basis and to revisit the process at least every three years, in consultation with the Transit Service Delivery Advisory Committee, transit agencies, metropolitan planning organizations, and local governments prior to making recommendations to the Commonwealth Transportation Board.

DRAFT - Pending Public Comment





Virginia Department of Rail and Public Transportation

---

# **Performance-Based Operating Assistance Allocation Guidance**

DRAFT – December 19, 2018

*Fiscal Year 2020*

**July 1, 2019 – June 30, 2020**

# CONTENTS

<b>Introduction and Overview</b> .....	2
TSDAC Recommendation .....	Error! Bookmark not defined.
<b>Operating Assistance Methodology</b> .....	2
Proposed Process.....	2
Transition Methodology (FY2020 and FY2021) .....	5

DRAFT

## INTRODUCTION AND OVERVIEW

Virginia's Department of Rail and Public Transportation (DRPT) allocates operating assistance funding to transit agencies across the Commonwealth through an allocation process based on the Code of Virginia and Commonwealth Transportation Board (CTB) policy. Beginning in Fiscal Year (FY) 2020 the entirety of each transit agency's allocation will be based on a new performance-based methodology.

This document describes the proposed methodology for allocating state operating assistance grants in Fiscal Year 2020 and future years.

DRPT, working with Virginia's Transit Service Delivery Advisory Committee (TSDAC), has developed a proposed methodology for allocating operating assistance funding to comply with a 2018 legislative mandate to base grant amounts on each agency's performance (Section 33.2-1526.1 of the *Code of Virginia*). This recommendation is subject to review and approval by the Commonwealth Transportation Board.

The metrics and their weights were considered during several meetings of the TSDAC and CTB in 2018. The proposed methodology balances the need for reliable annual funding as well as the availability and reliability of performance data to support the six policy goals TSDAC identified:

- Promote Fiscal Responsibility
- Support Robust Transit Service
- Improve Transit Patronage
- Incentivize Efficient Operations
- Promote Mobility
- Support Social Safety Net

## OPERATING ASSISTANCE METHODOLOGY

### PROPOSED PROCESS

The proposed performance-based operating allocation methodology would allocate operating assistance based on a combination of an agency's sizing and performance factors. Sizing factors represent an agency's relative size to other agencies across the Commonwealth. Performance factors represent an agency's performance trend for a given metric relative to statewide trends for all agencies.

The data required from each agency to compute the operating allocation formula includes:

- **Operating Cost for System Sizing:** Most recent audited operating cost available, net of depreciation, projects funded in other DRPT programs, and non-transit related expenses. New transit service will be based on budgeted operating costs for the year of implementation until audited operating costs are available.
- **Operating Cost for Performance Metric:** Total operating costs less depreciation, ineligible costs, and costs not related to transit.
- **Ridership** – Unlinked Passenger Trips - Number of passengers who board public transportation vehicles, regardless of whether a passenger is transferring from another transit vehicle.

- **Revenue Vehicle Hours (RVH)** - Hours traveled by revenue vehicles (buses, vans, railcars, etc.) while in revenue service.
- **Revenue Vehicle Miles (RVM)** - Miles traveled by revenue vehicles while in revenue service.
- **Passenger Miles Traveled (PMT)** - Cumulative sum of the distances traveled by each passenger. This metric is used for calculation of the Commuter Rail Pool, and is estimated for small transit agencies based on reported ridership relative to statewide average distance traveled by commuter rail and commuter bus agency passengers.

---

## COMMUTER RAIL POOL

Due to the unique cost structure of Commuter Rail compared to other transit services, Commuter Rail receives a unique treatment in the sizing process. Currently, the only Commuter Rail agency in the Commonwealth of Virginia is Virginia Railway Express (VRE). The **size-weight** for the Commuter Rail pool is calculated by taking the percentage of VRE's Passenger Miles Traveled, Revenue Vehicle Hours, and Revenue Vehicle Miles compared to statewide totals. Each factor is weighted at 1/3 (33.33%) and multiplied by the total amount of operating assistance available statewide.

- 33.33% Passenger Miles Traveled
- 33.33% Revenue Vehicle Hours
- 33.33% Revenue Vehicle Miles

Funds not allocated to the Commuter Rail pool are allocated to the remainder of transit agencies on the basis of the sizing factors described below.

The Commuter Rail allocation is then adjusted by the performance metrics to establish the annual allocation.

---

## SIZING

To correlate funding allocations with the relative size of each agency, a **size-weight** factor is calculated with a combination of sizing metrics, at specific percentage weights. The size-weight for each metric is computed in the following manner:

$$\text{Agency Size-Weight} = (\text{Sum of Agency Sizing Metric} / \text{Statewide Totals}) * \text{Weight}$$

The proposed sizing metrics and weights for the sizing formula are:

- 50% Operating Cost
- 30% Ridership
- 10% Revenue Vehicle Hours
- 10% Revenue Vehicle Miles

If the statewide sum of agency size-weights does not equal 100%, then the ratios are normalized such that the statewide sum of size-weights for all agencies totals 100%.

$$\text{Agency Normalized Size-Weight} = \text{Agency Size-Weight} / \text{Sum of Statewide Size-Weights}$$

---

## PERFORMANCE ADJUSTMENTS

Once the **normalized size-weight** for each agency has been determined, the size-weight is adjusted by the five **performance metrics**.

The proposed performance metrics are:

- Passengers per Revenue Vehicle Hour
- Passengers per Revenue Vehicle Mile
- Operating Cost per Revenue Vehicle Hour
- Operating Cost per Revenue Vehicle Mile
- Operating Cost per Passenger

For each performance metric, three years of historical data plus the most recent year of data is used to calculate performance trends for each agency and statewide. Each agency's three-year trend in year-over-year percentage change relative to the statewide trend is calculated. The formula for this trend is:

**Trend Factors** = 3-Year Average of (Annual Change in each Agency's Performance Metric / Annual Change in Statewide Performance Metric)

For Passengers per Revenue Vehicle Hour and Passengers per Revenue Vehicle Mile, these **trend factors** are then multiplied by the size-weight to compute a **size-performance weight**.

**Size-Performance Weight** = Agency Size-Weight \* Trend Factor

For Operating Cost per Revenue Vehicle Hour, Operating Cost per Revenue Vehicle Mile, and Operating Cost per Passenger, an inverse function is used, and the size-weight is multiplied by 1 divided by the trend factor, to incentivize decreasing Cost trends.

**Size-Performance Weight** = (Agency Size-Weight \* 1) / Operating Cost-based Trend Factor

All size-performance weights are then normalized such that the statewide sum of size-weights for all agencies for each metric are equal to 100%.

**Agency Normalized Size-Performance Weight** = Agency Size-Performance Weight / Sum of Statewide Size-Performance Weights

---

## FUNDING ALLOCATIONS

At this stage, each agency has 5 normalized size-performance weight factors. These factors are multiplied by their weight (20% for each performance metric), summed, and multiplied by total available funding. This sum is the agency's total operating assistance allocation.

**Agency Funding Allocation** = Available Funding \*  
[(Passengers per RVH Normalized Size-Performance Weight \* 20%) +  
(Passengers per RVM Normalized Size-Performance Weight \* 20%) +  
(Operating Cost per RVH Normalized Size-Performance Weight \* 20%) +  
(Operating Cost per RVM Normalized Size-Performance Weight \* 20%) +  
(Operating Cost per Passenger Normalized Size-Performance Weight \* 20%)]

---

## FUNDING CAP

A cap on funding allocations is used to minimize the volatility of funding received by each agency. The cap is proposed to be set at 30% of an Agency's latest year of operating costs. The recommended percentage is informed by the highest operating assistance grant received under the FY 2019 allocation methodology by Virginia transit agencies, which is generally below 30% of operating costs. After applying this cap to the operating assistance allocation, an unallocated funding pool remains. These funds are proposed to be redistributed to agencies below this cap proportional to their Agency Funding Allocation.

## TRANSITION METHODOLOGY (FY2020)

In order to lessen the impacts of the new methodology on the predictability of agency funding, two transition years are proposed by TSDAC to progressively adjust the sizing metrics. The proposal is for the Operating Cost sizing formula to be weighted at 60% and for Ridership at 20% for FY2020. For FY2021 onward, the Operating Cost sizing formula is proposed to be weighted at 50% and for Ridership at 30%.

SIZING METRICS	TRANSITION YEAR	FUTURE YEARS
	1 FY2020	FY2021 ONWARD
Operating Cost	60%	50%
Ridership	20%	30%
Revenue Vehicle Hours	10%	10%
Revenue Vehicle Miles	10%	10%



Virginia Department of Rail and Public Transportation

600 East Main Street, Suite 2102  
Richmond, VA 23219  
804-786-4440

---



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

5. Preliminary FY 2020 – 2025 Commonwealth Transportation Fund (CTF) Six-Year Financial Plan Assumptions  
*John Lawson, Virginia Department of Transportation*

*This presentation is currently unavailable.*





## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

6. SMARTSCALE Round 3  
*Nick Donohue, Deputy Secretary of Transportation*

*This presentation is currently unavailable*



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

7. 66 Inside the Beltway Update  
*Nick Donohue, Deputy Secretary of Transportation*  
*This presentation is currently unavilable*



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

8. **Legislative Update.**  
*Nick Donohue, Deputy Secretary of Transportation*  
*JoAnne Maxwell, Virginia Department of Transportation*

*This presentation is currently unavailable.*



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

**Innovation and Technology Transportation Fund**

Catherine C. McGhee, P.E.  
Director of Research and Innovation

# Innovation and Technology Transportation Fund

- The ITTF provides funding specifically for the purposes of funding pilot programs and fully developed initiatives pertaining to high-tech infrastructure improvements with a focus on:
  - Reducing congestion
  - Improving mobility
  - Improving safety
  - Providing up-to-date travel data
  - Improving emergency response

# Proposed Projects

- **Thirteen projects are proposed that provide a mix of:**
  - **Interstate vs. arterial**
  - **Multimodal approaches**
  - **Demonstrations of proven technology and piloting of experimental approaches**
- **All projects will be evaluated to enable deployment in other regions**

# Northern Virginia Regional Multi-Modal Mobility Program (RM3P)

- Builds off an Integrated Corridor Management planning grant
- Includes four distinct but inter-related tasks
  - Enhance commuter parking data
  - Develop a Mobility as a Service (MaaS) Dynamic Service Gap Dashboard
  - Implement an AI-based decision support system with prediction
  - Deploy a data driven tool to incentivize customer mode and route choice

# RM3P – Task 1: Enhance Commuter Parking Data

- Focus on parking facilities in the I-66, Dulles Toll Road, Rt. 7, and I-95 corridors
- Leverage crowdsourcing data to communicate real-time parking availability
- Use artificial intelligence with historical parking trends and current status to predict parking availability for trip planning
- Goal – decrease single occupant vehicle use
- Total cost: \$4.6 million



# RM3P – Task 2: Develop MaaS Dynamic Service Dashboard

- Include traditional and non-traditional Origin-Destination data, fixed route transit routes and schedules into data store
- Overlay O-D data with fixed transit routes to identify service gaps
- Incentivize service providers to meet unmet needs dynamically
- Goal – Encourage transit use
- Total cost: \$2.9 million

# RM3P – Task 3: Implement an AI-based decision support system

- Leverage existing data on incidents, crashes, weather, demand with artificial intelligence to predict potential events
  - Reduce impact by prepositioning assets in “likely” locations, preparing alternate routes
- Total cost: \$6.5 million

# RM3P – Task 4: Deploy a Data-driven Tool to Incentivize Traveler Choice

- Incentive program will be developed to change traveler behavior in response to traffic conditions
- Incentives will be targeted at changing time of travel or route or mode choice
- Partnerships with the private sector and large employers will be key
- Changing the behavior of 5-10% of travelers can be very beneficial
- Total cost: \$1 million

# Performance Parking Deployment in Commercial Corridors

- **Focus on Arlington County's two Metrorail corridors to provide data-driven variable pricing coupled with real-time information**
- **Goal is to reduce congestion as travelers search for available parking (balance demand geographically)**
- **Similar program in San Francisco showed decreases in time to find a parking spot, reduced emissions, and lower vehicle miles traveled**
- **Total cost: \$5.4 million**

# SFpark Evaluation Results

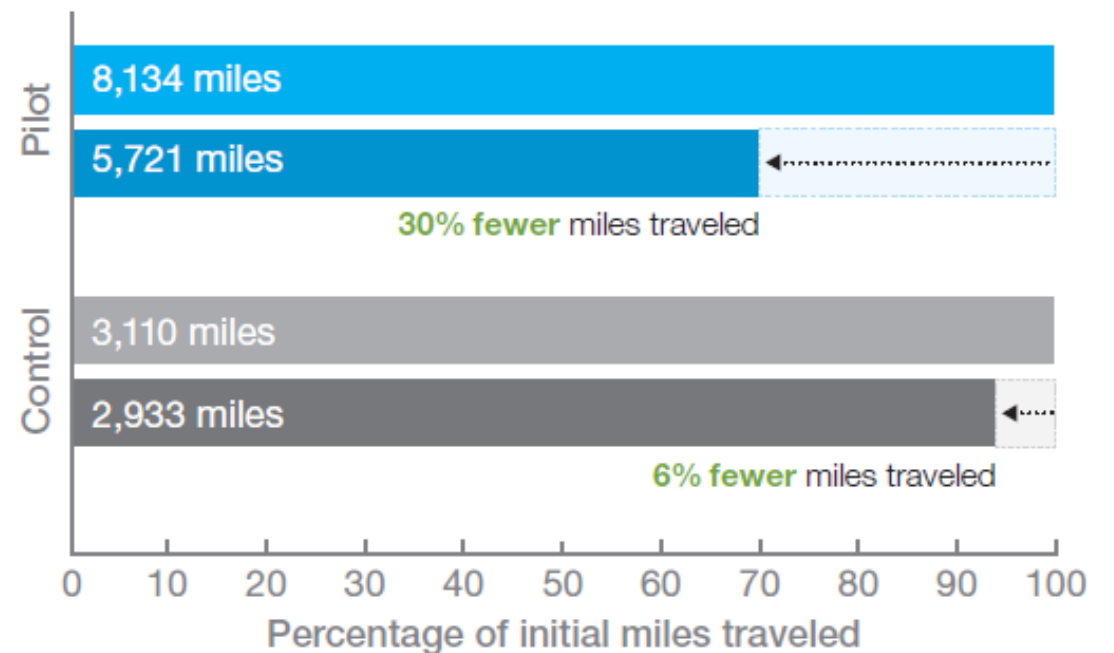
## Hourly parking rates in SFpark areas

Before vs. after (10 rate changes)  
On- and off-street rates



## Daily vehicle miles traveled

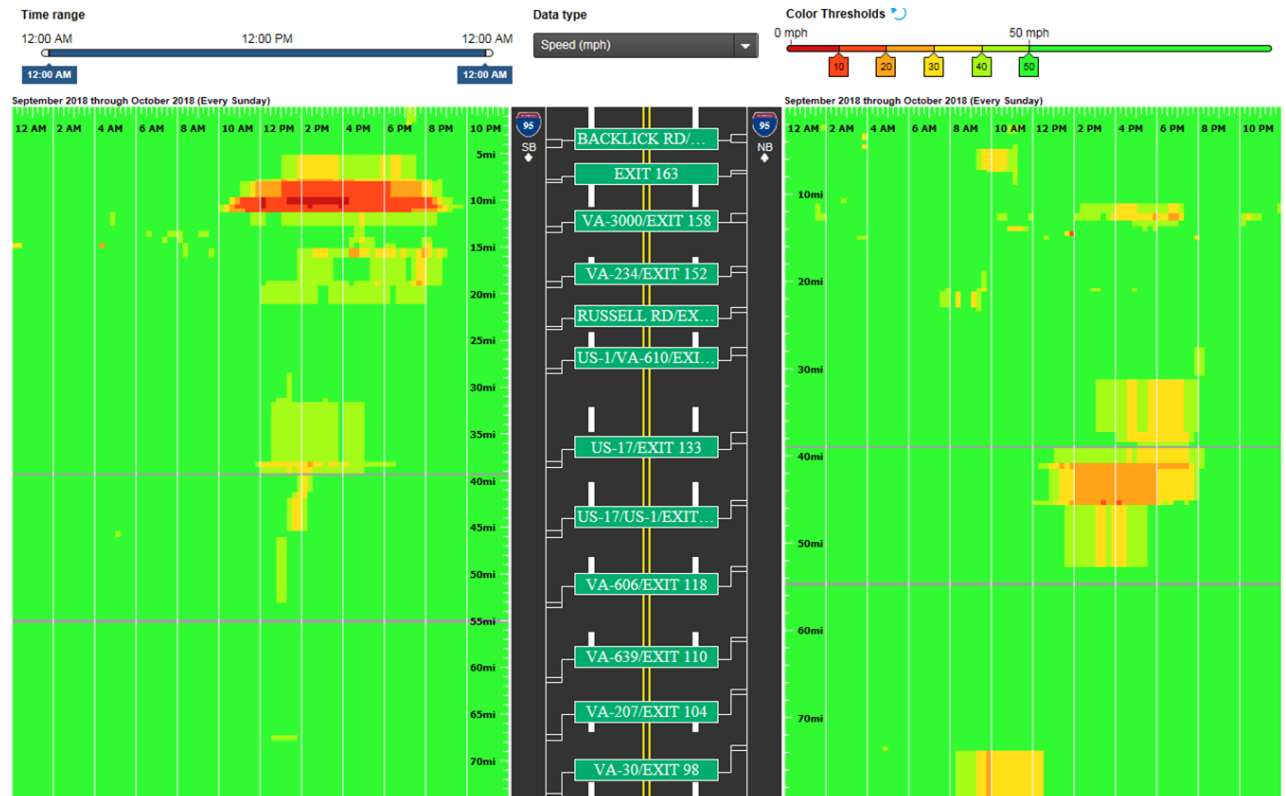
Before vs. after  
Pilot vs. control areas | Weekdays 9am to 6pm



# I-95 Operational Improvements



Sept./Oct. Weekdays



Sept./Oct. Sundays

# I-95 Operational Improvements

- **Differences in geometry, travel patterns (commute vs. non-commute), and congestion intensity will require a range of solutions**
  - **Ramp metering – previous ITTF project has identified 7 ramp locations where metering would be beneficial**
  - **Active traffic management – experience internationally has shown VSL/speed harmonization to be effective in reducing congestion**
  - **Other strategies to include improved incident response, traveler information, etc.**
  - **Total cost: \$ 30 million**

# I-64 Afton Mountain Safety Improvements

- Safety during the PM peak travel westbound is the biggest single concern
- Evaluating a range of potential strategies:
  - ATM designed to mitigate high speeds and speed differentials at the top of the mountain where fog is most likely
  - Speed feedback signs
  - Dynamic signing to alert trucks to travel in the right lane during the PM peak
  - Flashing chevrons, enhanced signs and markings, modified operation of existing fog lights
- Total cost: \$5 million

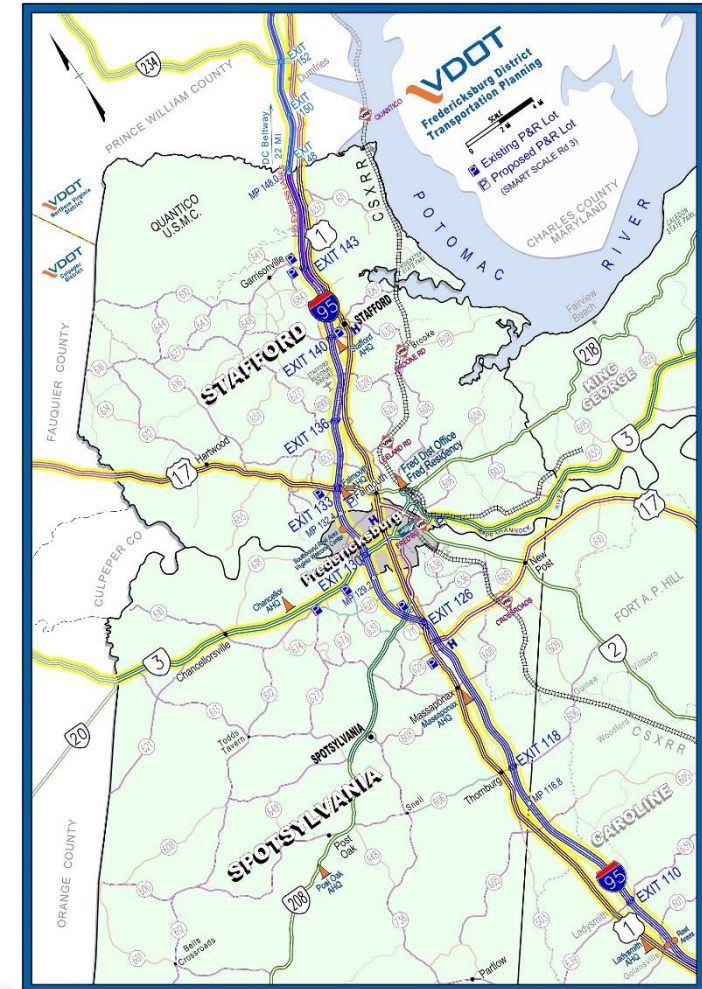


# Innovative Transit Pilots

- **Hanover County Specialized Transit Program**
  - Target ambulatory and non-ambulatory services in rural and suburban areas through partnerships with reservation companies and TNCs to provide services
- **Hampton Roads Microtransit**
  - Provide mobility-on-demand rideshare services using small to medium sized vehicles operating within pre-defined zones
- **Total cost: \$300,000 (\$150,000 each)**

# Parking Demand Management System

- Provide real-time parking information for 8 park & ride lots on I-95 that support VRE
- Sensors at entry and exit
- Real-time information display and publication to portal for further dissemination
- Total Cost: \$1,950,000



# Parking Demand Management System



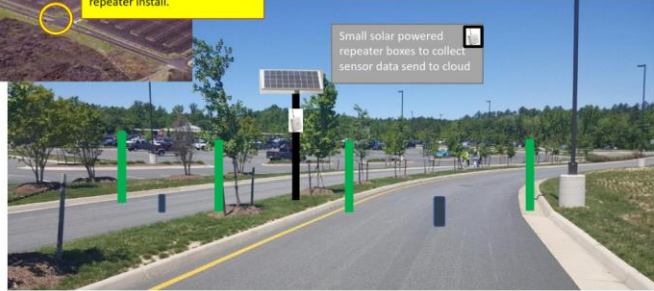
Updated location of sensors and repeater to simplify repeater install.

Installation Requirements:

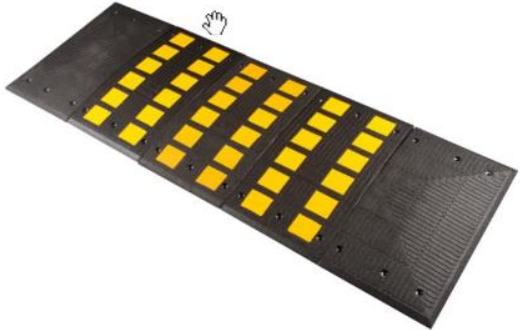
- Install u channel pole for repeater placement
- Assemble & attach repeater and solar panel to pole
- Drill 2 sensor holes & embed sensors
- Diagnostics & testing

Sensors are installed flush with the pavement at entry and exit lanes to count car traffic.

Rubber bendable delineators are installed 12 - 14ft apart to leave room for snow plows and funnel traffic over sensors



Small solar powered repeater boxes to collect sensor data send to cloud



# Data Platform for Safety

- Integrate a variety of data (crash, weather, event, pavement condition, traffic/congestion, etc.) in a data platform to which artificial intelligence tools can be applied.
- Extension of the decision support tool developed in the RM3P project to address a wider range of safety challenges
- Nevada pilot indicated a 17% reduction in crashes
- Total cost: \$2 million

# Pilot Program for Innovation

- **Pilot program in partnership with the Center for Innovative Technology can bridge the gap between VDOT-identified transportation challenges and entrepreneurs who have potential solutions**
- **CTB Subcommittee for Innovation and Technology will help to identify high priority issues to put forward as problem statements**
- **Total cost: \$1.5 million**

# Innovation Program for Localities

- Initiative to fund locally identified innovative strategies that meet the goals of the ITTF program
- Working group of VDOT and DRPT staff will prioritize submitted projects on the basis of congestion relief, safety improvement, innovation, and potential for widespread deployment
- Total cost: \$2 million

# Statewide Technology for Operations

- There are a number of strategies that have been tested or piloted that could result in significant operational improvement statewide
  - Customer service bots – handle routine or low-priority calls during high volume events to free customer service agents for higher priority issues
  - Worker alert system – emergency responders on the roadside are at high risk. Alert system would provide a geo-fenced presence alert through 3<sup>rd</sup> party apps or agency developed systems
  - Virtual ATM – provides benefits of an ATM without the heavy infrastructure investment
- Total cost: \$2 million



# Arterial Operations Dashboard

- Leverage ongoing efforts to upgrade signal controllers and a central signal system
- Dashboard will provide metrics on signal performance and travel time reliability
- Initial deployment on 70 corridor segments (1,128 intersections) including corridors through about 50 localities and towns
- Three to five corridors will combine automated signal performance metrics and travel time metrics to improve real-time operations
- Total cost: \$1.25 million



# High-Speed Communications Upgrades for Signalized Intersections

- Real-time monitoring and operations of traffic signals requires reliable communications between the field controllers and the central system
- Currently, approximately 35% of signals statewide have substandard communications
- Effort will leverage a variety of approaches (VDOT fiber, resource sharing, leased lines, etc) to facilitate effective communications with all intersections
- Total cost: \$4.7 million

# I-81 Operational Improvements

- The I-81 Corridor Improvement Study identified a number of operational strategies targeted at the non-recurring congestion that is common throughout the corridor
- Signal enhancements to facilitate detours when incidents occur is a key element of the operational improvement plan
  - Real-time signal timing modifications to address diverting traffic patterns
  - Real-time monitoring of conditions for operational improvement and traveler information
- Total cost: \$10 million



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



COMMONWEALTH of VIRGINIA

Office of the

SECRETARY of TRANSPORTATION

# Transportation Performance Management Safety Measures

Nick Donohue

Deputy Secretary of Transportation

Margie Ray

Performance Management Manager

January 15, 2019



# Safety Performance Management Measures and Targets

---

- **Board challenged staff to develop a new rigorous data-driven methodology to establish targets**
  - **Understand how the system is working**
  - **Identify and examine trends**
  - **Determine the impact of current investments and strategies**
  - **Provide targets to Board**
- **Board will use information to determine degree to which current policies and investments are meeting goals**

# Safety Performance Management

## Refining Target Setting

---

### Safety Performance Measures:

- **Number of fatalities**
- **Number of severe injuries**
- **Rate of fatalities per 100M vehicle miles traveled**
- **Rate of severe injuries per 100M vehicle miles traveled**
- **Number of non-motorized fatalities and severe injuries**

# Safety Performance Management

## Refining Target Setting

---

**Five steps to develop new target setting methods:**

- 1. Determine crash factors and causes – behavioral, infrastructure and the interaction**
- 2. Determine degree of infrastructure improvements influence on behavioral crashes**
- 3. Evaluate anticipated benefits of recent infrastructure projects**
- 4. Analyze external factors to predict 2019 baseline severe crash safety measure counts**
- 5. Combine the baseline predictions with project benefits to establish data-driven targets.**



# Step 1 - Crash Factors and Causes

## Refining Interaction of Behaviors (2013-2017)

---

- **Critical behaviors to address:**
  - Impairment
  - Distracted
  - Speeding
  - Unbelted Occupants
- **Refined definitions for Impairment, Distraction and Speeding due to variance in these behaviors**





# Defining Targeted Behaviors

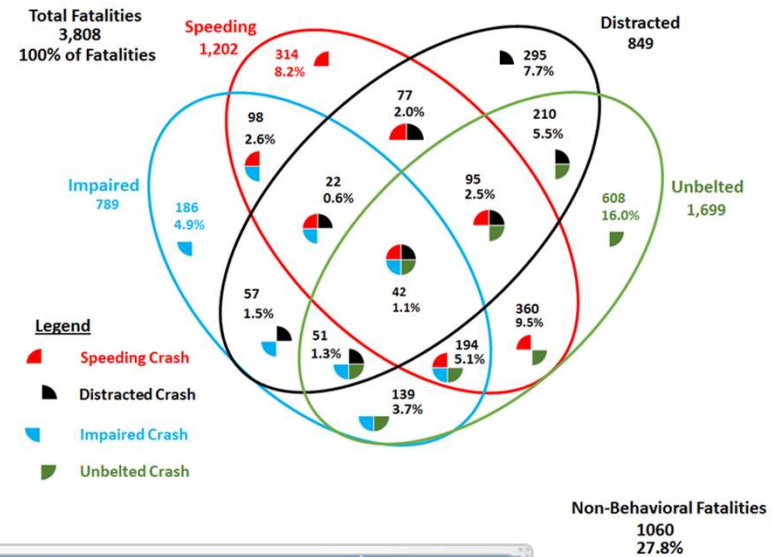


- **Based on new definitions, categorized Speeding levels and Distractions into high, medium, low and no effectiveness of the infrastructure improvements**
- **The effect (high, med, low) of each behavioral factor can be considered as a probability that the improvement expected crash reductions will be successful.**
- **In certain cases, the infrastructure improvement is presumed to have no impact in reducing crashes (i.e. obviously drunk, speeding > 20 mph over speed limit)**

# Results - Crash Causes and Factors

## Refined Interaction Injury Crashes

### Applied New Definitions Further Refining Interaction Between Behaviors



	Fatalities		Serious Injuries	
<b>Behavioral</b>	<b>2,748</b>	<b>72%</b>	<b>21,350</b>	<b>53%</b>
<b>Non-Behavioral</b>	<b>1,060</b>	<b>28%</b>	<b>18,650</b>	<b>47%</b>

# Results - Crash Causes and Factors

## Interaction of Behavioral Factor Effects

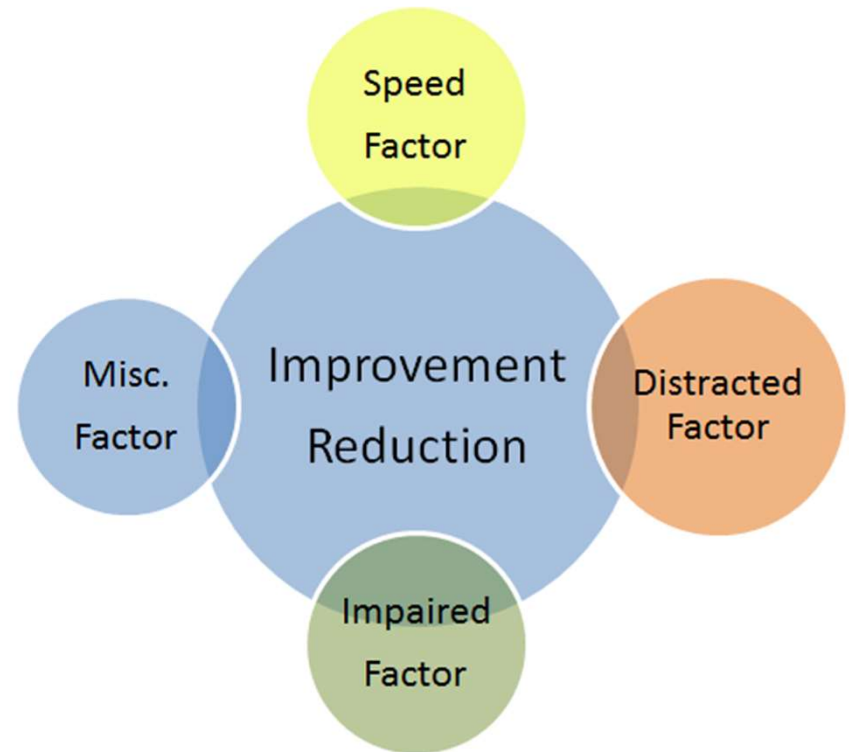
---

Expected improvement reduction for projects is defined by the Crash Modification Factors

$$\text{CMF} = 1 - \% \text{ Reduction}$$

The average reductions are adjusted by all the behaviors present for each crash.

Behavioral factors were multiplied for interaction of effects on expected average CMF reductions.



## Step 2 - Assessment of Behavioral Factors on Infrastructure Improvements

---

- **Conducted detailed assessment of 2,000 randomly selected fatal and serious injury crashes at intersections**
- **Stratified crashes by:**
  - **Severity (fatal or serious injury)**
  - **VDOT Construction District**
  - **Highway Functional Classification**
- **Determined potential effectiveness of countermeasures for various crash types when behavioral factors involved**
- **Developed template to quickly analyze potential improvements and identify opportunities for improvements at locations and utilized to determine expected reductions in recent projects**

# Step 3: Expected Benefits of Projects

## Analysis of Spot and Corridor Projects

- Reviewed 96 SMART SCALE and HSIP projects constructed or to be completed between January 2017 and March 2019
  - 20 SS projects = \$56.2 M
  - 76 HSIP\* projects = \$272.2 M
- Project influence areas consistent with SMART SCALE safety scoring methodology
- Crash years 2010-2017

Projects	F+SI Crashes	F People	SI People	F Ped/Bike People	SI Ped/Bike People
96	1,098	138	1,272	5	47

\* Several HSIP projects are larger corridor projects with a small portion of HSIP funds

# Spot and Corridor Projects Expected Reductions

Description	F People	SI People	F Ped/Bike People	SI Ped/Bike People
2010-2017 Totals	138	1,272	5	47
Final Projection (w/ Factors)	128	1,169	4	43
Reduction	10 (1.3 / Yr)	103 (12.9 / Yr)	1 (0.13 / Yr)	4 (0.5 / Yr)
Percent of Total	7%	8%	16%	8%



# Spot Example Project

- **Route 620 at Route 1 Intersection Improvements (Spotsylvania County)**
  - Add turn lanes
  - Add pedestrian signal heads, sidewalk, crosswalk, multi-use trail
  - Install intersection lighting
- **Est. cost of \$22 million**



Description	SI People	SI Ped/Bike People
2010-2017 Totals	21	1
Final Projection (w/ Factors)	15.0	0.2
Reduction	6.0 (0.75 / Yr)	0.8 (0.13 / Yr)
Percent of Total	29%	83%

## Step 3: Expected Benefits of Projects Analysis of Systemic HSIP Projects

---

- **Low cost improvements systemically spread on network at intersections and curves or on the pavement**
  - 29 HSIP projects = \$29.5 M
- **HSIP projects constructed between January 2017 and March 2019**
- **Crash years 2010-2017**

Projects	F+SI Crashes	F People	SI People	F Ped/Bike People	SI Ped/Bike People
29	2,062	224	2,329	24	73



# Systemic Projects Expected Reductions

Description	F People	SI People	F Ped/Bike People	SI Ped/Bike People
2010-2017 Totals	224	2,255	24	73
Final Projection (w/ Factors)	183	1,807	20	60
Reduction	41 (5.1 / Yr)	448 (56 / Yr)	4 (0.5 / Yr)	13 (1.6 / Yr)
Percent of Total	18%	20%	17%	18%

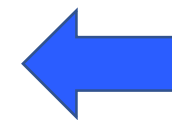


# Corridor Roadway Departure Systemic Project Example

**Centerline Rumble Strips – Hampton Roads District**  
**63.6 miles of roadway, average ADT of 2,380**

**Estimated cost of \$1.12M**

Description	F People	SI People
2010-2017 Totals	16	47
Initial Projection (w/ Adjustment Factors)	12	28
<b>Reduction</b>	<b>4 (0.5 / Yr)</b>	<b>19 (2.4 / Yr)</b>
Percent of Total	25%	40%



Behavioral-Adj  
Reduction

## Step 3: All Projects Expected Reductions

Description	F People	SI People	F Ped/Bike People	SI Ped/Bike People
Spot/Corridor (w/ Factors)	128	1,169	4	43
Reduction	10 (1.3 / Yr)	103 (12.9 / Yr)	1 (0.13 / Yr)	4 (0.5 / Yr)
Systemic (w/ Factors)	183	1,807	20	60
Reduction	41 (5.1 / Yr)	448 (56 / Yr)	4 (0.5 / Yr)	13 (1.6 / Yr)
<b>Total Expected Reductions</b>	<b>51 (6.4 / Yr)</b>	<b>551 (68.9 / Yr)</b>	<b>5 (0.63 / Yr)</b>	<b>17 (2.1 / Yr)</b>

# Step 4: Analyze External Factors to Predict 2019 Baseline

---

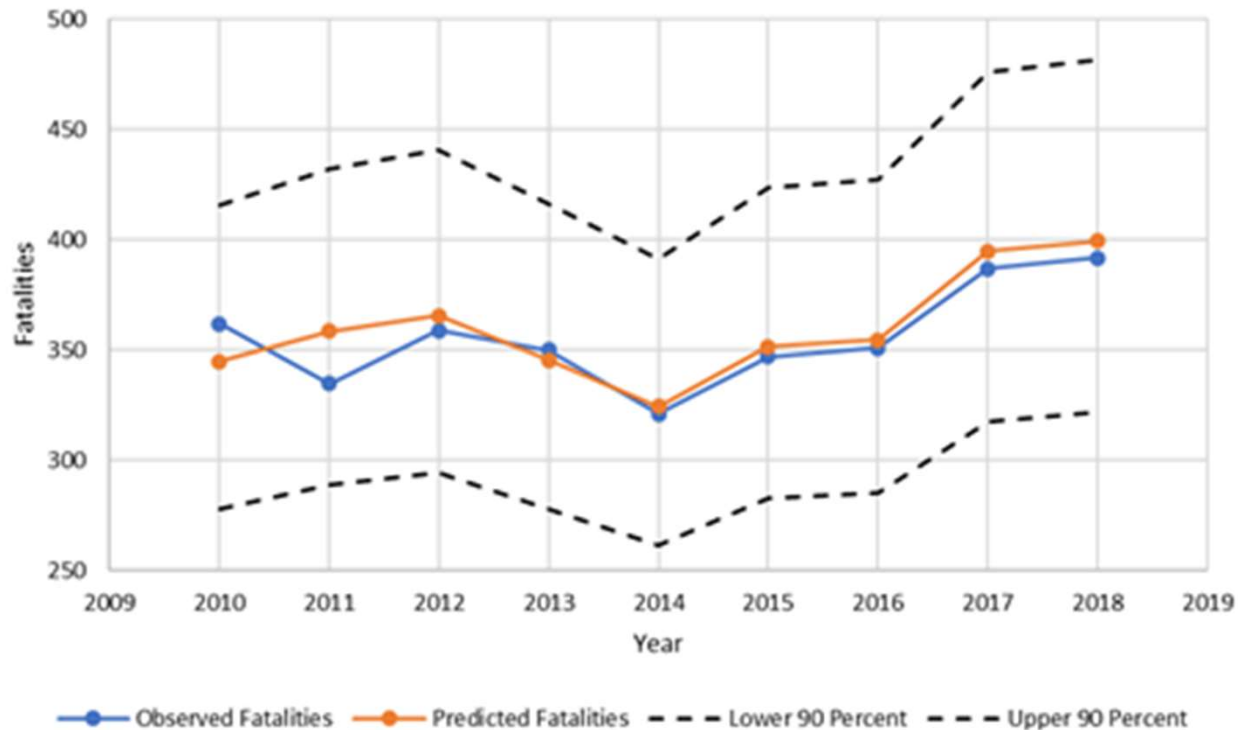
**Assessed models for Fatalities and Serious Injuries, using combinations of the the following external risk factors:**

- **District annual Urban and Rural VMT**
- **District annual Labor Force by age cohort**
- **District annual Unemployed by age cohort (and rate of Emp)**
- **District annual Licenced Drivers by age cohort**
- **Statewide annual alcohol consumption**
  - **Liquor licences by type per district**
- **Statewide annual GDP**
- **District annual Median Household Income by age cohort**
- **District annual Total Population by age cohort**
- **District annual Age of Titled Vehicles (2 year only)**
- **District Weather Influences**
  - **Avg Precipitation**
  - **Avg Snowfall**
  - **Avg Temp**

# Fatality Model Validation

Predicted versus Observed Fatalities by Year  
(January through June only - 2018)

**Absolute and percent differences are acceptable and values are within 90 percent confidence limits.**



# Findings from Model Development and Validation

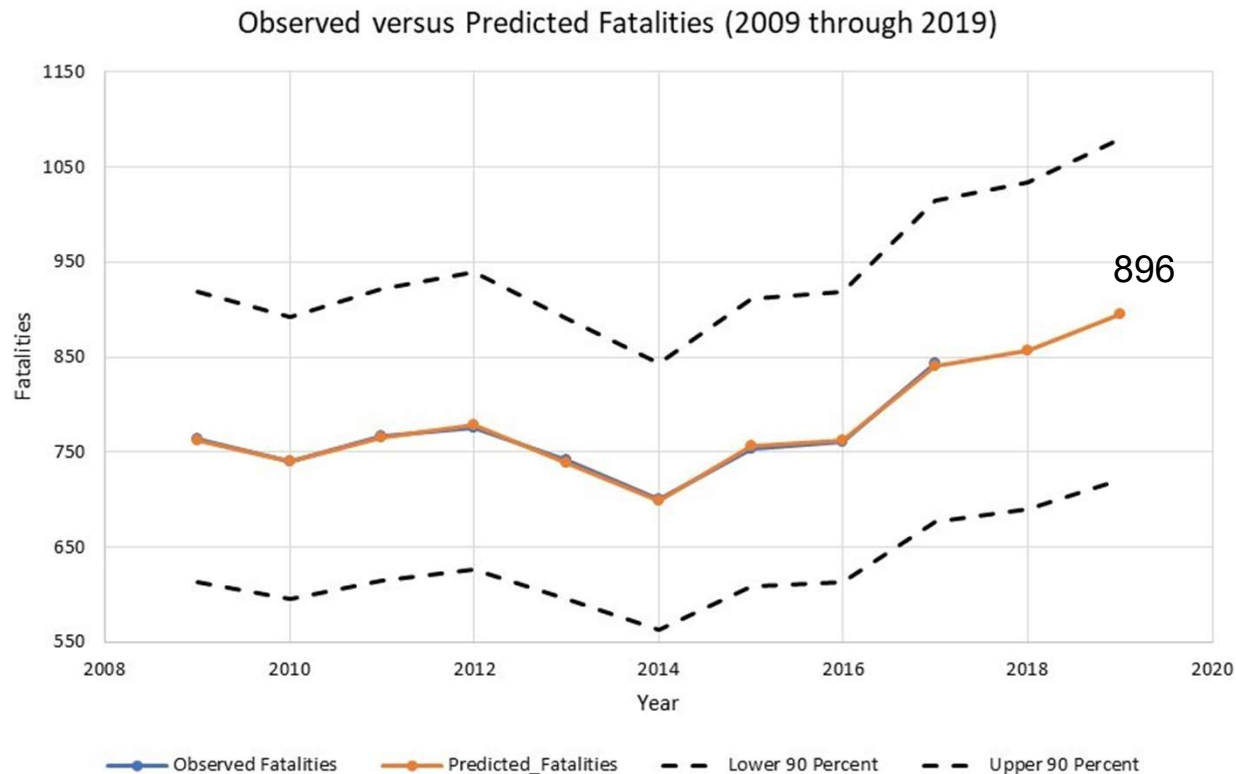
---

- **Local, collector and minor arterial proportion of VMT increases severe crashes**
- **Increasing young population (15-24) increases severe crashes**
- **Increasing aging population (75 plus) increases severe crashes**
  
- **Snowfall in month decreases severe crashes**
- **Increasing rural VMT decreases non-motorized severe crashes**



# Baseline 2019 Fatality Baseline Prediction

Predicting an increase in 2018 and 2019, following recent trends, to 896 fatalities.



## Step 5: Results - 2019 Data-Driven Targets

Combining the baseline predictions with the expected project benefits to establish data-driven targets

Description	F People	F Rate	SI People	SI Rate	F & SI Ped/Bike People
2019 Model Target	896	1.02	7650	8.69	750
Expected Project Reductions	6.4	---	68.9	---	2.73
Revised 2019 Targets	890 <span style="color: red;">↑</span>	---	7581 <span style="color: green;">↓</span>	---	747 <span style="color: red;">↑</span>
<b>Current CTB Approved Targets</b>	<b>840</b>	<b>0.94</b>	<b>7689</b>	<b>8.75</b>	<b>714</b>



# Key Findings

---

- **Most external factors show increasing trends in fatalities**
- **Systemic safety projects provide significant expected benefits in reducing fatalities and serious injuries**
- **Distracted driving plays a significant role in the increase in fatalities**
- **While both the younger and older drivers saw increases in crashes, older drivers are a rapidly growing demographic**

## Next Steps

---

- **Continue to evaluate project investments for consideration of changes and modifications to current proposed projects included in SYIP and future investment strategies**
- **Continue to analyze impact of behavioral programs and other external risk factors**
- **Use prediction model approach and update for observed 2018 results, future baseline conditions and development of 2020 targets**
- **Present proposed 2020 targets for CTB adoption - Spring 2019**



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

### 11. Director's Items

*Jennifer Mitchell, Virginia Department of Rail & Public Transportation*

*This item does not have a presentation associated with it, but rather serves as a time when the Director may provide updates on various items as necessary.*



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

12. Commissioner's Items  
*Stephen Brich, Virginia Department of Transportation*

*This item does not have a presentation associated with it, but rather serves as a time when the Commissioner may provide updates on various items as necessary.*



## COMMONWEALTH of VIRGINIA

### *Commonwealth Transportation Board*

Shannon Valentine  
Chairperson

1401 East Broad Street  
Richmond, Virginia 23219

(804) 786-2701  
Fax: (804) 786-2940

## **COMMONWEALTH TRANSPORTATION BOARD WORKSHOP AGENDA**

VDOT Central Auditorium  
1221 East Broad Street  
Richmond, Virginia 23219

January 15, 2019  
10:00 a.m.

### 13. Secretary's Items

*Shannon Valentine, Secretary of Transportation*

*This item does not have a presentation associated with it, but rather serves as a time when the Secretary may provide updates on various items as necessary.*