SMART SCALE

Funding the Right Transportation Projects in Virginia

SMART SCALE Technical Guide

prepared for

Commonwealth Transportation Board

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1.0 Introduction

Transportation needs will almost always be greater than the funds available to address them. The signing of House Bill 2313 in 2013 created a more sustainable revenue source supporting transportation funding. While the passage of this bill enabled the Commonwealth Transportation Board (CTB) to add significant revenues to Virginia's transportation program, many transportation needs cannot be addressed with available revenues. To find a way to better balance transportation needs and prioritize investments for both urban and rural communities throughout the Commonwealth, new legislation – House Bill 2 – was signed into law in 2014. In 2016, the process was renamed "SMART SCALE, Funding the Right Transportation Projects in Virginia." SMART SCALE stands for System Management and Allocation of Resources for Transportation: Safety, Congestion, Accessibility, Land Use, Economic Development, and Environment.

The purpose of SMART SCALE is to fund the right transportation projects through a prioritization process that evaluates each project's merits using key factors, including improvements to safety, congestion reduction, accessibility, land use, economic development, and the environment. The evaluation focuses on the degree to which a project addresses a problem or need relative to the requested funding for the project.

Prior to implementing SMART SCALE, the Commonwealth utilized a politically driven and opaque transportation funding process that included uncertainty for local communities and businesses. SMART SCALE requires the CTB to develop and implement a quantifiable and transparent prioritization process for making funding decisions for capacity-enhancing projects within the Six-Year Improvement Program (SYIP).

The ultimate goal in implementing SMART SCALE is investing limited tax dollars in the right projects that meet the most critical transportation needs in Virginia. Transparency and accountability are crucial aspects of delivering a process that project sponsors will support. SMART SCALE projects will be evaluated based on a uniform set of applicable statewide measures while recognizing that factors should be valued differently based on regional priorities.

Beginning in 2017, the SMART SCALE process transitioned to a biennial schedule with applications accepted in March of even-numbered years and final project selections made in June of the following odd-numbered year. The SMART SCALE process does not cover all types of projects within the SYIP. Other sources of funding include the State of Good Repair program, the Virginia Highway Safety Improvement Program, the Revenue Sharing Program, the Congestion Mitigation Air Quality Program, the Transportation Alternatives Set-Aside Program, and Regional Surface Transportation Program funds. These are detailed later in this guidance document.

Four rounds of SMART SCALE prioritization have been successfully completed. Since implementing the SMART SCALE process in 2015, information has been collected on lessons learned to identify potential improvements to the application in-take, screening, validation, evaluation process, documentation, and training. This updated Technical Guide reflects these recent improvements.

This Technical Guide document provides detailed information on the CTB's SMART SCALE policy, including process, roles and responsibilities, project eligibility, project readiness requirements, the project application process, evaluation measure definitions, project cost and scoring, and prioritization programming considerations and rules.

1.1 SMART SCALE LEGISLATION REQUIREMENTS

Virginia House Bill 2, signed by Governor Terry McAuliffe on April 6, 2014, and effective as of July 1, 2014 (as defined in § 33.2-214.1), required the development of a prioritization process that the CTB was to use for project selection by July 2016. The prioritization process evaluates projects using the following factor areas: congestion mitigation, economic development, accessibility, safety, environmental quality, and land use coordination (in areas with over 200,000 population). Factor areas are weighted differently across the commonwealth based on specific characteristics and may be weighted differently within each district. Candidate projects are screened to determine if they meet an identified need in VTrans, the Commonwealth's mid- and long-range transportation plan and if they meet eligibility requirements.

Projects are scored based on an objective and fair analysis applied statewide. SMART SCALE also requires that project benefits be analyzed relative to the project cost. CTB policy requires the project benefits to be analyzed relative to the amount of SMART SCALE funds requested, so the final SMART SCALE score is based on the project cost to the state.

In 2017, the General Assembly adopted HB2241/SB1331 (as defined in § 33.2-214.2), updating several items related to SMART SCALE. These bills provide the responsibility for implementing the SMART SCALE process to the Office of Intermodal Planning and Investment (OIPI), which reports to the Secretary of Transportation in their role as the Chairman of the CTB. It also requires that the scores be released at least 150 days prior to the CTB action to include SMART SCALE projects in the SYIP or January of odd-numbered years, ensuring there are always five months for public discussion of the results of the project evaluations.

1.2 FUNDING PROGRAMS

In February 2015, the General Assembly adopted HB1887, which revised the transportation funding formula and provided funding, after specialized programs, distributed as follows: 30% for the State of Good Repair Program (SGR); 20% for the District Grant Program (DGP); 20% for the High-Priority Projects

Program (HPPP); 20% for the Interstate Operations and Enhancement Program; and 10% for the Virginia Highway Safety Program. The DGP and the HPPP support the SMART SCALE prioritization process (see Table 1.1).

The DGP (as defined in § 33.2-371) refers to projects and strategies solicited from local governments that address a need for a corridor of statewide significance, regional network, improvements to promote urban development areas, or safety improvements identified in VTrans, Virginia's Transportation Plan. In this program, candidate projects and strategies from localities within a highway construction district compete for funding against projects and strategies within the same construction district.

The HPPP (as defined in § 33.2-370) refers to regional or statewide significance projects that address a transportation need to be identified for a corridor of statewide significance or a regional network in VTrans, Virginia's Transportation Plan. In this program, projects and strategies compete for funding against projects and strategies submitted statewide.

For both programs, projects and strategies must be screened, evaluated, and selected according to the process established pursuant to SMART SCALE.

Table 1.1 Funding Program Eligibility

Project Type	High Priority Projects Program	District Grant Program*
Addresses Need on Corridor(s) of Statewide Significance	Yes	Yes
Addresses Need on Regional Network(s)	Yes	Yes
Improvement to Support Urban Development Area(s)	No	Yes
Addresses Identified Safety Need	No	Yes

* Only projects submitted by localities are eligible.

1.3 ROLES AND RESPONSIBILITIES

Commonwealth Transportation Board

The CTB establishes the policy and oversees the SMART SCALE project evaluation process. The CTB reviews the scored project list once the evaluation has been released, uses the scoring and other information submitted to the CTB about each project to inform their funding decisions regarding the allocation of funds for the HPPP and the DGP in the SYIP. The CTB is not required to fund the highest-scoring projects and may use other considerations, in addition to the SMART SCALE process, to make final funding decisions. However, if the CTB makes modifications to the staff recommended funding scenario. The member seeking such change must provide a rationale for such modification and seek approval of the board by majority vote.

Office of the Secretary of Transportation

Under the Secretary of Transportation's Office, OIPI manages the implementation of the SMART SCALE process. Both VDOT and DRPT assist the office in the screening and evaluation of applications under the guidance of the Office. The Office provides the final evaluation to the CTB, makes the final evaluation public, and develops the staff-recommended funding scenario for the Board's consideration.

Technical Evaluation Team

A technical evaluation team is responsible for conducting the measure calculations and making qualitative rating assessments for each factor area for each of the submitted, screened projects in the SMART SCALE process. This evaluation team is comprised of technical staff from OIPI, DRPT, and VDOT. The staff appointed to the technical evaluation team includes subject matter experts from both the District and Central Office that are experienced with the data, analytical tools, and qualitative content reported for each measure. Duties of the internal technical evaluation team include:

- Validating project information;
- Evaluating project preparation; and
- Calculating evaluation measures and scores for submitted projects according to the methodologies set out in Appendices A-F.

Ten percent of projects are selected at random for a second evaluation to ensure consistency and quality control. A member of the technical evaluation team not involved in the initial analysis conducts the blind independent evaluation to ensure consistency in the development of assumptions and application of analytical methods.

Applicant Responsibilities

Applicants are responsible for ensuring that all SMART SCALE application requirements are understood. Projects submitted for SMART SCALE funding will be held to a basic standard of development to guarantee they can be evaluated reliably throughout the application process. The SMART SCALE application process is comprised of two parts: (1) A pre-application containing sufficient information for project screening and eligibility review; and (2) the remaining sections needed to complete the validation and evaluation steps. More information on the schedule for application intake can be found in **Section 1.4**.

To ensure the submittal of complete applications, it is strongly recommended that applicants complete the following tasks:

- Reach out to VDOT, DRPT, and OIPI staff early in the process

- Consider using new pre-SYIP project development resources, such as Pathways-4-Planning (P4P) and the SMART Portal Pre-Scoping Module, to help develop more complete applications
- Complete a Pre-Application in March (no new applications may be created after April 1)
- Ensure project meets a VTrans Mid-term (0-10 years) Need
- Ensure project and applicant eligibility requirements have been met
- Ensure project readiness requirements have been met
- Ensure the project is appropriately defined in terms of scope, schedule, and cost estimate
- Submit a completed application by August 1, preferably earlier

Applicants are expected to prioritize the applications they submit. The limit on the number of pre-applications and applications allowed per applicant is based on population thresholds as shown in the table below:

- Localities with a population *below* 200,000, and MPOs/PDCs/Transit agencies that serve a population *below* 500,000, may submit a maximum of four applications and five pre-applications;
- Localities with a population *above* 200,000, and MPOs/PDCs/Transit agencies that serve a population *above* 500,000, may submit a maximum of ten applications and twelve pre-applications; or
- A Board member may allow one additional application from a county within their district if (1) the project is located within a town that is ineligible to submit projects and (2) the county in which the town is located will submit the maximum number of applications allowed. Only one such additional application is allowed per district.

Table 1.2 Application Cap Limits by Population

Localities	MPOs/PDCs/Transit Agencies	Pre-Application Cap	Full Application Cap
Less than 200,000	Less than 500,000	5	4
Greater than or equal to 200,000	Greater than or equal to 500,000	12	10

The source of population data for localities, MPOs, and PDCs is the last preceding United States Census (2020). Application limits for transit agencies were determined based on service area population in the 2020 National Transit Database (NTD). If service area population was not available in NTD, Census 2020 population was used to determine population in jurisdictions served by the transit agency.

The listing of eligible entities, population data and tier/maximum number of applications is available in a spreadsheet that can be downloaded in the Apply section of the webpage.

For information on the required inputs to the SMART SCALE application, refer to **Section 2.4**.

1.4 STAKEHOLDER INPUT

To develop a fair and informed SMART SCALE project prioritization process that would work across all modes and throughout the Commonwealth, extensive stakeholder input was considered in its initial development. Numerous meetings were held to obtain the input of jurisdictions, agency stakeholders, and the public body across the Commonwealth.

Stakeholder engagement continues to be essential for each biennial implementation of the SMART SCALE submission process and evaluation. Collaboration and involvement continue throughout the entire process. At a minimum, the opportunities for stakeholder input include the following:

- Pre-Application and Application phase: Stakeholders have the opportunity to provide input as to what projects the jurisdictions/MPOs/PDCs/transit agencies should consider moving forward in the process through the development of an application for SMART SCALE funds as well as by providing feedback to the CTB during the annual Fall Transportation Meetings. Stakeholders may work with the state to ensure that projects are defined in sufficient detail for SMART SCALE evaluation. All of the applications and supporting analysis will be posted on the SMART SCALE website (smartscale.org) and made available for public review prior to scoring.
- Analysis and Scoring phase: By January of each SMART SCALE cycle, the evaluation of projects selected for SMART SCALE prioritization evaluation will be complete, and results will be made public. Stakeholders have the opportunity to review assumptions and calculations and see each project's score.
- Results and Programming phase: Every year, during the development of the SYIP, stakeholder input is received during public meetings held following the release of the draft SYIP in April. Stakeholders have the opportunity to provide feedback upon the projects that were selected for funding for both grant programs.
- Lessons Learned and Process Improvement Evaluation: Each cycle, applicants are invited to provide feedback on opportunities for improvement to the process. Additionally, as enhancements are considered for process improvements, stakeholder input is requested prior to adoption by the CTB.

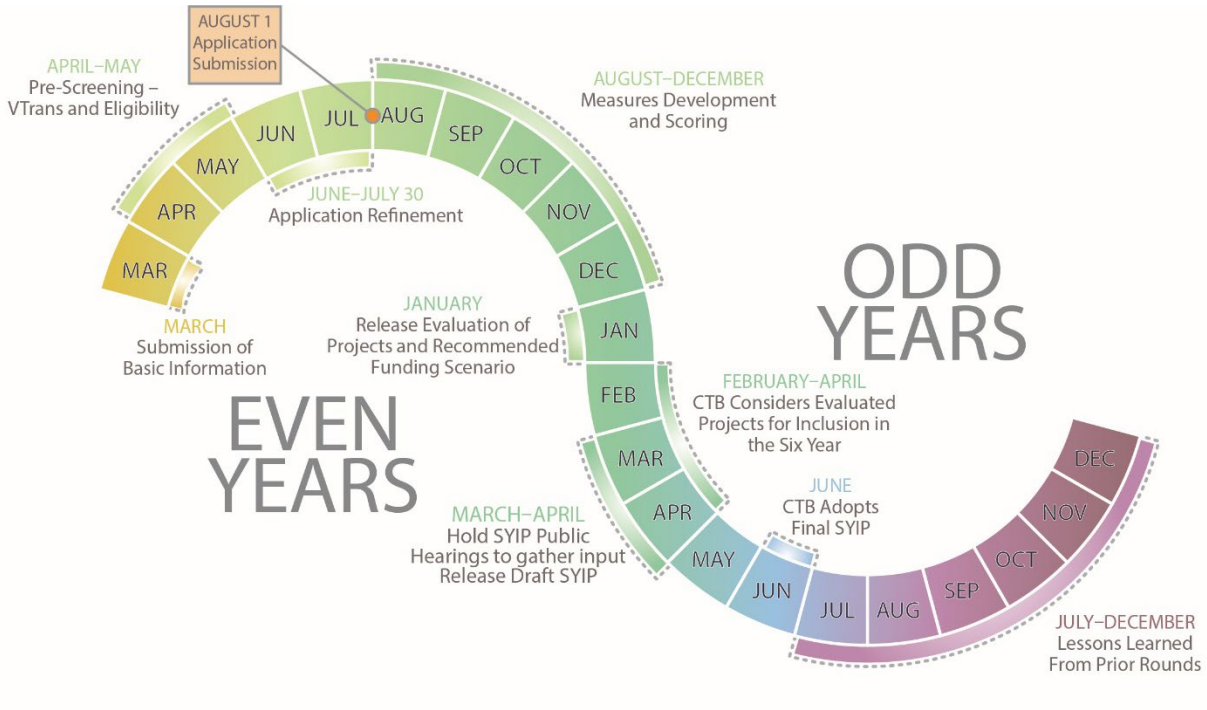
1.5 BIENNIAL SMART SCALE CYCLE

Each year that funding is available, SMART SCALE is planned to operate according to the biennial cycle illustrated in **Figure 1.1**. Applicants now have more than five months to complete their SMART SCALE applications, a significant increase from two months available in previous rounds. Eligible entities can begin creating candidate project applications starting March 1st in even numbered years from eligible entities, with complete project applications due August 1st of the same year.

All project applications must be created by April 1st, with a required minimum level of information to be provided by that date (the pre-application). No new applications can be created after the pre-application period is complete. Applicants will be able to continue editing applications in the system from June 1st until the August 1st submission deadline. From there, OIPI, VDOT and DRPT screen, review/validate and evaluate the projects per the SMART SCALE process over a five-month period from August through December.

At the January CTB meeting, the results of the evaluation are released along with the base scenario. In the spring, the draft SYIP is released by the CTB, followed by public hearings to gather input. In May, the CTB takes action on a final consensus scenario of selection SMART SCALE projects. And finally, in June, the revised final SYIP is released and considered for adoption by the CTB.

Figure 1.1 Anticipated SMART SCALE Biennial Cycle



As currently identified, the application and evaluation process timeline will generally proceed as follows (if day does not fall on business day, the first business day after will be used):

- **Winter/Spring: –** Early coordination with DRPT and VDOT prior to application submissions. Recommend engagement of P4P and Pre-Scoping Module resources.
- **March 1st** - Call for applications and notification of estimated amount of funding available.
- **March 1st through March 31st -** Applicants create pre-application containing sufficient basic project information for project screening and eligibility review.
- **April 1st –** Deadline to complete pre-application. No new applications will be allowed after April 1st.
- **April 1st through May 31st -** Pre-screening to see if project meet VTrans Mid-term Need and are eligible for SMART SCALE funding.
- **June 1 through July 30th** - Application refinement.
- **August 1st –** Final applications due. All applications will be made public after the deadline to submit has passed.
- **August through December –** Submitted projects are screened, evaluated and scored.

- **January CTB Meeting –** Results of SMART SCALE screening and evaluations are made public along with the staff recommended funding scenario.
- **January through June –** SMART SCALE-funded projects will follow existing public comment period and SYIP approval process. The CTB may modify the staff recommended funding scenario through formal action.

2.0 Project Eligibility and Application Process

This section summarizes project eligibility, readiness, needs screening, and application process considerations for SMART SCALE implementation. Prospective projects must meet or exceed certain qualifications to be considered for evaluation in the SMART SCALE process, and sponsors must provide specific information for eligible projects. **Figure 2.1** illustrates the overall screening process for determining whether a project has been developed enough to assess its benefits according to the SMART SCALE evaluation and scoring process.

2.1 ELIGIBILITY REQUIREMENTS

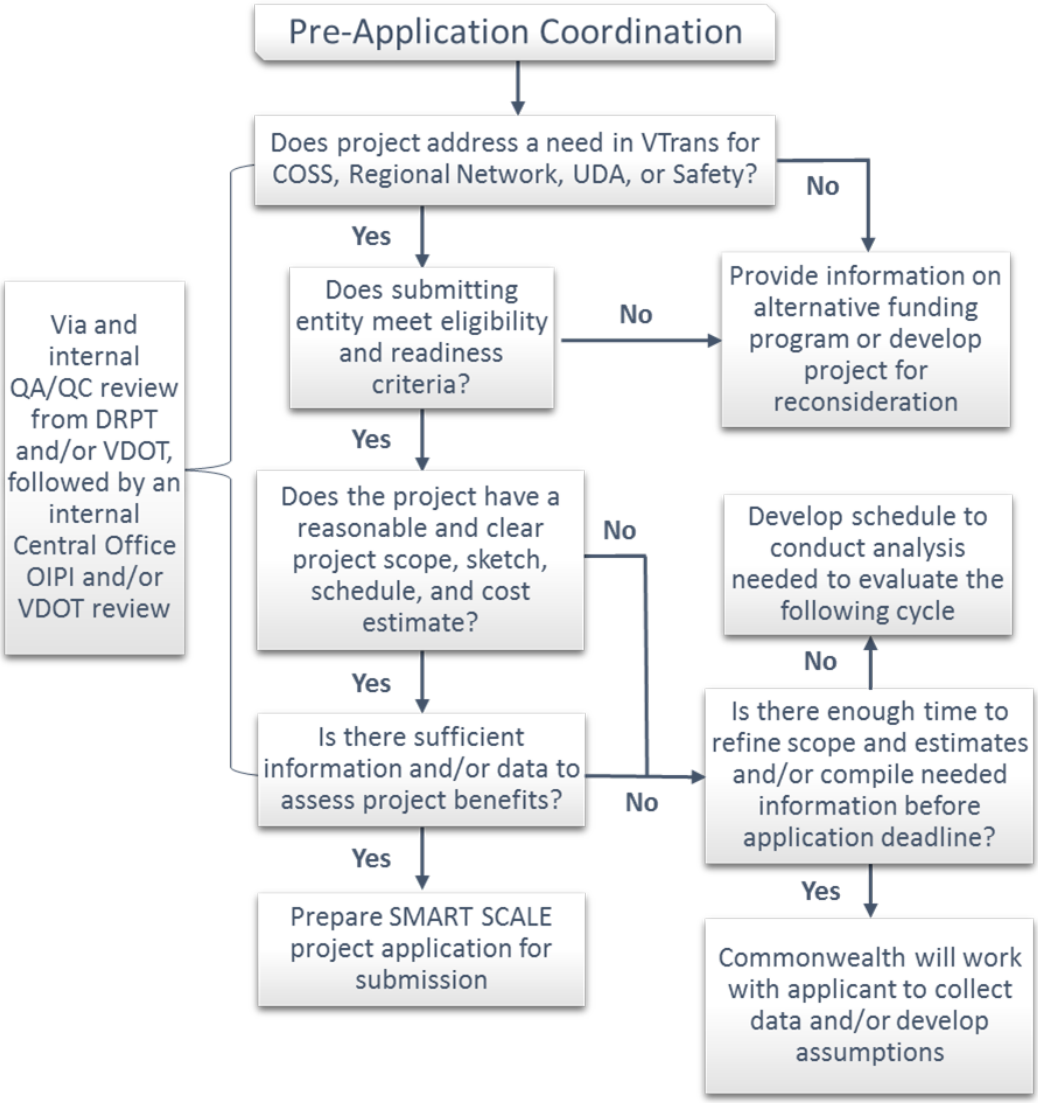
The types of projects and entities eligible for consideration are described in this section, along with a listing of funding sources not affected by SMART SCALE, and characterizations of entities eligible to submit projects. SMART SCALE projects may be submitted by a range of entities including:

- Metropolitan Planning Organizations (MPOs) and Planning District Commissions (PDCs);
- Counties;
- Cities;
- Towns that maintain their own infrastructure and qualify to receive payments pursuant to § 33.2-319; and
- Transit agencies that receive state operating assistance from the Mass Transit Trust Fund, as established in § 58.1-638(A)(4)(b)(2) of the Code of Virginia, are also eligible to submit projects.

The responsibility for transportation in those towns that do not receive maintenance payments is with the County. Counties are encouraged to coordinate with towns and prioritize candidate projects for submission similar to the Secondary Six-Year Plan process. Counties, cities, and towns that maintain their own infrastructure are eligible to submit applications regardless of the roadway system. Maintenance of the specific roadway system is not a requirement of eligibility.

An eligible entity can submit an application as long as a portion of the project is located within the boundary of the qualifying entity. An applicant cannot submit an application for a project entirely outside of the boundary of their jurisdictional authority. For an application submitted by one jurisdiction that crosses into one or more other jurisdictions, a resolution of support is needed from the other affected jurisdiction(s).

Figure 2.1 Eligibility, Readiness, and Needs Screening Process



Eligible Types of Projects

There are several types of projects that are considered for SMART SCALE funding. Highway, transit, rail, road, safety improvements, operational improvements, and transportation demand management projects will be considered. The following project types are (1) not eligible or (2) will not be considered eligible to be evaluated and rated for SMART SCALE:

- Stand-alone studies;
- Projects where a majority of the SMART SCALE funding request is related to "in-kind" repair or replacement of existing traffic control devices, asset management (bridge rehabilitation, "bridge-only" bridge replacement projects, pavement repair/replacement, guardrail repair/replacement) or other activities eligible for State of Good Repair funding;
- Projects that are fully funded through other committed funding sources such as local funding or proffers. In general, projects that are fully funded in a capital improvement program, a metropolitan planning organization's transportation improvement program, VDOT/DRPT or NVTA SYIP, or committed by a developer through local zoning approval process will be excluded from consideration in evaluating and rating for SMART SCALE. However, the Board recognizes that there are unique circumstances for large projects that require flexibility. Accordingly, a fully funded project may be considered under SMART SCALE if the total project cost is reasonably expected to exceed $1 billion and will start procurement prior to the award of the next round of SMART SCALE but was ineligible for the most recent previous round of SMART SCALE due to project readiness; and
- Projects where a project component or feature is not contiguous, proximate, or of the same improvement type (e.g., signal improvements, transit stations, etc.). For the purposes of this policy, contiguous means adjacent or together in a sequence. Transit stops or stations along a transit route or intersections or spot improvements along a corridor meet the definition of contiguous for the purposes of the project eligibility policy.
- Projects that will replace bicycle and pedestrian facilities such as sidewalks, shared-use paths, or bike lanes must be upgraded from substandard to standard unless non-SMART SCALE funds are leveraged for the bicycle and pedestrian components. Non-standard materials are not eligible for SMART SCALE funds, and use of such materials shall adhere to the IIM-LD-218.4
- Projects that duplicate exact project components in the same location as another submitted application. The exception to this is applications submitted as one complete scope with additional applications submitted with either a phased or an alternative approach.

Transit and Rail Project Eligibility

Eligible SMART SCALE transit and rail projects are capital projects that demonstrate expanded capacity and increase ridership. State of Good Repair (SGR) projects, such as asset rehab or replacement, are not eligible under this program.

Applicants should be aware that SMART SCALE project funding is generally programmed in the out years of the subsequent SYIP. For example, if an applicant was awarded SMART SCALE project funds in Year 1, funding may not become available until Year 6.

Eligible transit projects under SMART SCALE include, but are not limited to, the following:

- Rolling stock and necessary infrastructure for new or expanded transit or intercity passenger rail service.
- Transit stations, intercity passenger rail stations, transfer facilities, and other passenger facilities that increase ridership or system capacity.
- New or expanded platforms, platform access, and circulation infrastructure at rail stations to accommodate longer trains or increased train service.
- Multimodal facilities, such as those that accommodate some combination of services (i.e. intercity bus and Amtrak).
- Park and ride facilities with transit service.
- Technology improvements that provide enhanced transit services in high-priority corridors, such as ITS and signal prioritization.
- Enhanced modal connections, such as trails, sidewalks, and bike lanes leading to major transit stations, provided they have a transit connection and enhance transit ridership.

Maintenance and administrative facilities part of a larger service expansion project are also eligible. Agencies that utilize this provision must clearly describe the new transit or rail service that the facility will support.
The following projects do not provide expanded capacity or increase ridership and therefore are ineligible under this program:

- Maintenance equipment and supplies
- Support vehicles
- Administrative technologies

Applicants are encouraged to reach out to DRPT staff if they have questions about transit or rail project eligibility.

Other Considerations

- If an applicant submits an existing fully funded or committed project with independent utility for SMART SCALE funding with intention of requesting additional funds to add an additional project component such as landscaping, streetscaping, and/or bicycle and pedestrian infrastructure, then the benefits associated with the fully funded or committed project element(s) will be excluded from consideration in evaluating and rating the project for SMART SCALE.
- For a project phase or element with independent utility that is expected to be funded or accomplished through proffers, the costs and benefits associated with that project element will be excluded from consideration in evaluating and rating the project for SMART SCALE. Non-project-specific cash proffers are not subject to this policy and may be used as other committed funding in the SMART SCALE project application. If the applicant desires to submit a project with proffered conditions and seeks to obtain SMART SCALE funding for, or in lieu of the proffer, the proffer must have been legally rescinded or terminated before the applicant may submit an application for the project.
- If an applicant leverages the same funding on more than one request for funding (SMART SCALE, Revenue Sharing, TAP, etc.) and more than one project is selected for funding, then the applicant is responsible for covering the difference. A letter of commitment funding the leveraged amount is required for each project.
- All projects submitted for funding must be developed in accordance with all applicable policies and procedures (CTB, VDOT, DRPT, FHWA, FTA). For example, the CTB's policy regarding bicycle and pedestrian accommodations applies to all candidate projects.
- Signal controller/software upgrades should be considered eligible for SMART SCALE funds if they meet the following standards:
    - The proposed project is not an "in-kind" repair or replacement of existing traffic control devices, with the exception of implementing adaptive signal control.
    - Systemwide upgrades will not be considered for SMART SCALE scoring.
    - To justify the project, documentation shall be provided that includes analysis with supporting models and/or simulation outputs from a VDOT accepted software (HCS, Synchro, VISSIM, etc.). The documentation should also demonstrate operational or safety benefits from the proposed improvements.
    - All request for new traffic signals or upgrades to an existing traffic signal system shall conform to the latest VDOT Standards and Specifications (VDOT approved controller, cabinet, communication system and detection system).

- D4 software shall be used with VDOT approved controllers where the signal is maintained by VDOT. (Per TED policy).

Table 2.1 shows the general project types that are eligible to receive SMART SCALE funds.

Table 2.1 Project Types Eligible for SMART SCALE Funding

Project Types Included within SMART SCALE (Capacity, Safety and Operational Improvements only)	Project Types Excluded from SMART SCALE
• Highway Improvements (Widening, Operational Improvements, Access Management, Intelligent Transportation Systems, Technology, and SafetyImprovements)	• Studies, Asset Management (bridge rehabilitation, "bridge-only" bridge replacement projects, pavement repair/replacement, guardrail repair/replacement)*
• Transit and Rail Capacity Expansion	• Planning studies
• Bicycle and Pedestrian Improvements	• Systemwide improvements
• Transportation Demand Management (Vanpool, carpool, trip reduction programs, and park & rides - including new, expanded, or designated spaces on publicly-owned property).	• Transit maintenance facilities without capacity expansion

* Asset Management projects excluded from SMART SCALE may be eligible for funding under the State of Good Repair program as pursuant to 33.2-369 of the Code of Virginia.

In addition, projects must meet a need identified in VTrans as defined in SMART SCALE legislation;

"Candidate projects and strategies shall be screened by the Commonwealth Transportation Board to determine whether they are consistent with the assessment of capacity needs for all corridors of statewide significance, regional networks, and improvements to promote urban development areas established pursuant to § 15.2-2223.1, undertaken in the Statewide Transportation Plan in accordance with § 33.2-353."

The process for screening projects based on VTrans needs is described in more detail in **2.3 Screening Process**.

Funding Programs

Various funding sources flow into the Commonwealth Transportation Fund and are available through the DGP and HPPP to allocate according to the SMART SCALE process. There are several funding programs that have a project selection process outside of SMART SCALE, including Congestion Mitigation and Air Quality Improvement (CMAQ) Program funds, Regional Surface Transportation Block Grant Program (STBG), Transportation Alternatives (TA) Set-Aside funds, and the Revenue Sharing Program. Regional authorities such as Northern Virginia Transportation Authority (NVTA), Hampton Roads Transportation Advisory

Committee (HRTAC), and Central Virginia Transportation Authority (CVTA) also have project selection processes separate from SMART SCALE. Funds from these programs and regional authorities may be allocated to projects and used as leverage to reduce the SMART SCALE fund request.

Although both state and Federal funds are expected to be available through the SMART SCALE process, all projects selected for funding that can qualify for Federal funds shall be developed as federally eligible projects.

Entities Eligible to Submit Projects

While many stakeholders across the Commonwealth have an interest in projects that are considered for funding, only a select group of entities are eligible to submit projects for consideration. Public transit agencies and regional entities, including Metropolitan Planning Organizations (MPO), the Northern Virginia Transportation Authority, and Planning District Commissions (PDCs) are eligible to submit projects, along with counties, cities, and those towns that maintain their own infrastructure. To support local and regional planning efforts and consistency with the Constrained Long Range Plans (CLRP), a resolution of support from the MPO is needed for all projects within the MPO study area that are not included in or consistent with the adopted CLRP. If a project is included in or consistent with the CLRP, then a resolution is not required. A summary of the entities eligible to submit projects for SMART SCALE is presented below in **Table 2.2**.

Table 2.2 Eligibility to Submit Projects

Project Type	Regional Entity (MPOs, PDCs)	Locality (Counties, Cities, and Towns)	Public Transit Agencies
Corridor of Statewide Significance	Yes	Yes, with a resolution of support from relevant regional entity	Yes, with resolution of support from relevant regional entity*
Regional Network	Yes	Yes, with a resolution of support from relevant MPO*	Yes, with resolution of support from relevant regional entity*
Urban Development Area	No	Yes, with a resolution of support from relevant MPO*	No
Safety	No	Yes, with a resolution of support from relevant MPO*	No

* Projects within established MPO study areas that are not identified in or consistent with the regionally adopted Constrained Long-Range Plan (CLRP) must include a resolution of support from the respective MPO Policy Board.

Applications for funding through either the HPPP or the DGP must relate to projects within the qualifying entity's boundary. Localities and regional planning bodies may submit joint applications for projects that cross boundaries.

By majority vote, the CTB may choose to submit up to two projects for evaluation each application cycle.

2.2 PROJECT READINESS – PLANNING REQUIREMENTS

In order to reduce risk to changes in project scope or budget and to ensure that a project can advance to construction, projects must demonstrate a certain level of readiness. This section guides the required level of planning and supporting documentation needed for projects to be considered and evaluated for SMART SCALE funding. All projects must include a detailed description for each project feature that focuses on the scope of the project and not the benefits of the project.

The following guidelines will be used to assist the applicant in providing a complete and accurate application regarding specific project types. Applicants are encouraged to coordinate with VDOT and DRPT staff for assistance in determining and/or supporting the development of project readiness analysis and documentation. If the required level of planning and supporting documentation has not been completed, the project application will be excluded from consideration in evaluating and rating in SMART SCALE. Supporting documentation will be required for application submission. If such documentation is needed to be updated during the project development process, this would be considered an eligible project expense and should be included in the project's cost estimate.

Minimum Planning Requirements

Detailed Project Description Requirements

The project description must reflect all project features associated with a project. The description should focus on the scope of the project and not why the project is being pursued or the benefits of the project.

Any elements not clearly defined will not be considered for scoring, and the addition of such features could be considered as a scope addition if the project is selected for funding.

Sketch Requirements

All projects are required to have a conceptual sketch that displays and locates the project elements described in the detailed project description. The sketch should show a plan view of the project in its completed form but clearly articulate any new features that are proposed. Detailed design plans (construction documents) prepared with the land survey are not required; however, the sketch should be drawn to scale and over the latest available aerial imagery. Bicycle and pedestrian elements, including crosswalks, must be shown in the sketch to receive scores in those categories.

Detailed construction plans that have been previously prepared can be used for the project sketch; however, the construction plans must reflect the project described in the detailed project description. Any differences between the project description and the design plans should be reflected in a sketch.

Planning Study Requirements

At a minimum, a planning assessment/study, operational analysis, and/or safety assessment should be prepared prior to applying for SMART SCALE funds. The provided assessment/analysis should reflect the candidate project.

Projects that are proposed to address a safety issue not identified as a VTrans safety need (**Refer to Section 2.3**) shall include a safety analysis/study that includes a purpose and need statement, AADT traffic data, field review observations, geometric design review, alternatives considered, the preferred alternative, expected benefits and a summary of conclusions.

The size of the analysis/study will vary based on the project's complexity; however, project types with greater requirements are detailed later in this section. Refer to **Table 2.3** for the full list of readiness requirements by project type.

Cost Estimates

Project cost estimates should be developed and reviewed per applicable cost estimating guidance and application validation requirements. All cost estimates should reflect any and all items in the detailed project description and project sketch. Refer to **Section 2.4 - Project Preparation** for detailed information on cost estimation procedures.

Grade Separation Projects

Grade Separation on Limited and Non-Limited Access Facilities

Proposed new grade separated interchanges on existing limited and non-limited access facilities require a draft or final Interchange Access Report (IAR) or similar planning study that includes an alternatives analysis and supports the proposed alternative. The report or study shall address the elements described IIM-LD-200.11 and Traffic Operations and Safety Manual (TOSAM) guidelines for a new interchange. Concurrence of the appropriate District and Assistant State Location and Design Engineer is required. FHWA coordination may be required. For all interchange projects, VDOT needs to understand the specific interchange configuration or modifications proposed for funding in order to calculate the benefits.

Improvements to Grade-Separated Interchanges

Improvements to grade-separated interchanges require a draft or final Interchange Access Report (IAR), Operational and Safety Analysis Report (OSAR) or similar planning study that includes an alternatives analysis and supports the proposed alternative. The report or study shall address the appropriate elements described in IIM-LD-200.11 and Traffic Operations and Safety Manual (TOSAM) guidelines for the proposed access modifications. Concurrence of the appropriate District and Assistant State Location and Design Engineer is required. FHWA coordination may be required. SMART SCALE readiness requirements exempt

acceleration and deceleration lane extensions, but an OSAR or similar study could be required by VDOT if selected for funding.

New Traffic Signals

Proposed new traffic signals must meet VDOT spacing standards and require an approved traffic signal justification report to justify their use as the appropriate traffic control method at the proposed location, and the applicant must provide evidence that innovative intersection improvements have been considered and evaluated. The signal justification (including warrants analysis and evaluation of alternatives to signalization) must be uploaded to the SMART Portal as part of the project documentation. If a justification report has not been conducted to show that a signal is the appropriate traffic control method, then the project will be excluded from consideration in scoring and rating for SMART SCALE.

Advanced Signal Controllers

Proposed installation of advanced signal controllers must include a corridor study or operational analysis to meet readiness requirements. The planning study or operational analysis must be uploaded to the SMART Portal as supporting documentation. If a planning study or operational analysis has not been conducted then the project will be screened out for readiness and will be excluded from consideration in scoring and rating for SMART SCALE.

Roadway on New Alignment

An applicant that proposes the construction of a new roadway must provide a planning and/or safety study to support this feature documenting a preferred alternative that is consistent with the scope described in the application. The planning study must include an alternatives analysis that considers improvements, not a new alignment. In addition to completing an alternatives analysis, the applicant must provide information on NEPA approval status (see the section below on NEPA).

New Access Point(s) Adjacent to an Interchange

Minimum spacing standards for commercial entrances and intersections on crossroads near an interchange are defined in Appendix F of the VDOT Road Design Manual. The minimum distance required is 750 feet to the first crossroad entrance on the right from the end of the off-ramp. Additionally, 750 feet is required from the last crossroad entrance on the right to the start of an on-ramp terminal. The minimum distance for a four-legged intersection is 1320 feet from the end of the ramp terminal on the crossroad. There are additional standards for offset entrances and crossovers on the crossroad, and can be obtained in Appendix F. If access management standards are not met, an operational assessment following VDOT's Traffic Operations and Safety Analysis Manual is required to demonstrate that the proposed improvement does not impair interchange operations and safety.

Widening Projects that Add New Through Lane(s)

In general, a major widening is defined as the addition of two or more general-purpose through lanes. An applicant that proposes a major widening of an existing roadway must demonstrate that alternatives to optimize the existing capacity have been evaluated as part of the planning process, and that the alternatives analysis results were used in making the decision on the preferred alternative. The preferred alternative must be consistent with the scope described in the application. This proposed requirement intends not to force applicants to spend extensive time and resources conducting detailed studies. Instead, it is meant to require applicants to show that they have considered options to maximize the performance and operation of existing capacity.

Park & Ride Project Readiness

Projects that include park & ride lot(s) should include a project sketch that depicts the lot location, lot boundaries, entry and exit points, parking space layout, increase in number of parking spaces, transit circulation, and amenities where applicable. Leased park & ride lots are permitted with the above requirements and a letter of commitment from the parking lot owner.

Transit Project Readiness

Proposed transit projects must demonstrate readiness by providing a copy of any completed corridor plan, site plan, Transit Development Plan (TDP) or Transit Strategic Plan (TSP), comprehensive plan, long-range transportation plan, detailed cost estimate, or federally required planning documents such as NEPA and Section 106. A locally preferred alternative (LPA) must be identified for all fixed guideway service projects prior to application submission. A feasibility or site selection study must be provided for any passenger facility projects that seek funding for land purchases. A feasibility study identifying route and stop-level ridership projections, route alignment, proposed stops, and a draft schedule must be provided for any proposed new transit service. Ridership projections must be in present-year figures. Proposed new transit service projects must also provide a letter of support confirming the availability of operating funds and intent to operate the service. Proposed projects that include the construction of bus-only lanes must include a multimodal plan with an alternatives analysis that documents the bus-only lane as the preferred alternative.

FTA CIG (new starts, small starts, core capacity) program funding will be considered as part of the project funding package if the following conditions have been met: FTA has approved the project to enter the formal project development process, or if the applicant can demonstrate that they are in the process with FTA to enter project development. Such documentation should demonstrate that FTA is fully engaged with the applicant on the project in anticipation of formally entering the project development process. No SMART SCALE funding should be released (by agreement) for any project activities until FTA participation is formally secured by FTA approval to enter the CIG pipeline.

NEPA and Alternatives Analysis

Applicants should provide documentation that the appropriate level of planning, including alternatives analysis and environmental review (NEPA), have been or are being conducted:

- If NEPA is complete, the FHWA approval letter (CE, FONSI, ROD), and (if available) a link to the document online, shall be uploaded in the SMART Portal as part of the project documentation;
- If NEPA is not complete, then VDOT/DRPT will assess the anticipated level of NEPA document required and the current status;
- In the situation where it is determined that the project requires analysis of alternatives, then there must be an identified locally preferred alternative. The applicant must provide the draft NEPA document, if available, along with the anticipated level of NEPA class of action required. The NEPA Concurrence form approval by FHWA must be uploaded to the SMART SCALE Portal.
- The preferred alternative must be identified in the application. If more than one alternative is listed, the State will request the applicant to modify the application to identify the preferred alternative. If the applicant is unable to identify preferred alternative, then the State will deem project not ready and will screen project out from consideration.
- In the situation where it is determined that an alternatives analysis is not required, VDOT/DRPT will provide the applicant with documentation of such determination prior to application submission.

Public Support

Applicants must demonstrate that a project has the support of key stakeholders, and that the public has been afforded the opportunity to provide comments and input at the time of application submittal to SMART SCALE. A resolution of support from the relevant governing body or policy board, approved in a public forum with adequate public notice, is required at the time of application. The resolution of support must be uploaded in the SMART Portal as part of the project documentation. There are two elements of public support eligibility:

- Public Support: Every application must have a resolution of support from its governing body; In the case of an application that traverses the submitting entity's boundaries, the submitting entity must provide resolution(s) of support from the affected jurisdiction(s) or regional planning organization(s); and
- Eligibility to Submit Applications/Regional Support: For locality and transit-submitted project applications located within an MPO area, the project must have a resolution for support from the MPO. Projects within established MPO study areas that are identified in or consistent with the regionally adopted

Constrained Long Range Plan (CLRP) do not require a resolution of support from the respective MPO Policy Board.

2.3 SCREENING PROCESS

VTrans Needs Screening

Screening for transportation needs identified in Virginia's Transportation Plan (§ 33.2-353), VTrans, is a critical component of SMART SCALE as it links the planning process to the programming process to ensure that the overarching transportation goals of the Board are advanced. Transportation needs identified in VTrans are referred to as VTrans Mid-term Needs.

All project funding applications submitted for the SMART SCALE process must be consistent with one or more Mid-term Needs identified in VTrans, which identifies critical safety and capacity related needs for the following four travel markets:

- **Corridor of Statewide Significance (CoSS) –** 12 corridors that include highways, railroads, and seaport and airport facilities that move people and goods within and through Virginia, serving primarily interregional and long-distance travel;
- **Regional Networks (RN) –** 15 Regional Networks that are based on designated Metropolitan Planning Organizations (MPO) within the Commonwealth, serving primarily intraregional travel;
- **Urban Development Areas (UDA) –** this travel market includes: (1) multimodal infrastructure within over 200 designated growth areas based on local initiatives pursuant to § 15.2-2223.1; and (2) locally-identified Industrial and Economic Development Areas (IEDA) included in Virginia Economic Development Partnership's (VEDP) Virginia Business Ready Sites Program (VBRSP) (§ 2.2- 2238 C) tier 3 or higher; and,
- **Statewide Safety –** entire roadway network in the Commonwealth. Projects that are proposed to address a safety issue not identified as a VTrans safety need shall include a safety analysis/study that includes a purpose and need statement, AADT traffic data, field review observations, geometric design review, alternatives considered, the preferred alternative, expected benefits and a summary of conclusions. Additionally, the study area should have recorded at least 3+ Fatal or Injury crashes at the intersection or segment over the last five years.

In January 2020, the CTB adopted the Policy for the Identification of VTrans Mid-term Needs, which identifies criteria and thresholds for needs under each of the four travel markets listed above.

The Policy for the Identification of VTrans Mid-term Needs was operationalized to identify VTrans Mid-term Needs in 2021. The identified VTrans Mid-term Needs can be accessed using Interact VTrans, an interactive mapping application developed for viewing, downloading, and querying VTrans Mid-term Needs as well as other relevant datasets.

VTrans Mid-term Needs for UDAs and IEDAs are identified on a rolling basis as localities designated UDAs, or IEDA sites based on VEDP's Business-Ready Sites Program achieve Tier 3 or higher. The applicants should contact OIPI's Statewide Transportation Planning (STP) Section and note potential UDA or IEDA status changes in their application. May 13th, 2022, is the deadline for establishing a new UDAs or conveying an updated readiness tier for an IEDA to OIPI to be considered for the Smart Scale application intake in 2022.

Similarly, applicants can propose safety improvements to address a safety issue not identified as a 2021 VTrans Mid-term Need either based on: (1) 2019 VTrans Mid-Term Need; or (2) a safety analysis/study that includes a purpose and need statement, AADT traffic data, field review observations, geometric design review, alternatives considered, preferred alternative, expected benefits and a brief summary of conclusions.

In such instance, applicants should select the following option in SMART Portal, "if you have a safety study or a study conducted based on a 2019 VTrans Mid-Term need, check here and provide documentation in the attachments section. "The submitted safety analysis/study will be evaluated to ensure that it meets the following Need identification criteria adopted by the CTB as part of the VTrans policy: At least 3+ Fatal or Injury crashes at the intersection or segment over the last five years.

Project applicants are required to include the following components in their application and demonstrate how their proposed project meets one or more VTrans Mid-term Needs:

1. Identify one of the four relevant travel markets;
2. Identify one or more VTrans Mid-term Needs; and,
3. Describe how the project purpose meets one or more identified VTrans Mid-term Needs.

Each project funding application is reviewed by sets of reviewers: (1) VDOT District or DRPT staff; and (2) OIPI STP Section to ensure that the proposed improvement(s) meet one or more relevant VTrans Mid-term Needs. If a project does not address an identified need in VTrans, it is screened out and not considered for validation or scoring.

2.4 APPLICATION AND VALIDATION PROCESS

To support the success of the evaluation process, applicants are encouraged to coordinate with VDOT and DRPT early in the process to share information on prospective applications. This coordination phase will allow detailed project

descriptions, scopes of work, proposed schedule durations, cost estimates, and potential benefits to be developed and refined to facilitate the application and evaluation process.

Applicants are required to create a pre-application within the online application tool by April 1. Project applications created by April 1 will be reviewed for eligibility, project readiness and screened to determine if the project meets a VTrans Mid-term Need based on the CTB policy. This will provide the project sponsor with screening and eligibility determination. No new applications may be created after April 1. VDOT and DRPT will be available to assist in application preparation.

Project Preparation

Projects submitted as candidates for SMART SCALE funding will be held to a basic standard of development to assure they meet basic readiness criteria and have sufficient detail to be evaluated and scored. Additionally, all project submissions must comply with relevant federal, state, and CTB policies. VDOT and DRPT intend to support project sponsors prior to application submission to help project sponsors understand and meet expectations. Applicants are encouraged to initiate coordination with VDOT and DRPT staff prior to the application period to ensure that candidate projects are adequately developed.

SMART SCALE project applications must include the following information:

- **Scope –** At a minimum, the scope should define the limits of the project, its physical and operational footprint. All detailed project description and scope information should be supported with additional documentation, such as a detailed project sketch and/or design plans as available.
- **Schedule –** At a minimum, the schedule should clearly define the expected process for further project development, including key milestones, work activities, related activities, and approvals/approval timelines. The schedule should be realistic and reflect the complexity of the project. For any future planned phase start date for which funding is requested, the applicant should assume a start date no earlier than August 1st of the first available fiscal year of funding. This information will be used in validating project costs and schedules. Actual dates may be earlier or later depending on several project-specific factors such as federal and/or state phase authorization requirements (ex. required TIP/STIP actions, project administration agreements) and the availability of funding by fiscal year
- **Cost –** At a minimum, the cost estimate should be as realistic as possible. It should account for applicable allowances, risks, and contingencies based on the size, complexity, and level of design of the project. Projects should not be divided/segmented to the extent that they no longer have logical termini or independent utility. Cost estimates shall adhere to the procedures outlined in the VDOT Cost Estimating Manual, Version 2.0. Cost estimates shall be provided in the base year specified in the SMART Portal. The base cost

estimate for each phase should account for all expected defined costs and allowances. A Risk/contingency percentage (%) or amount should also be entered in the SMART Portal. Inflation will be applied to each phase estimate uniformly within the SMART Portal based on the proposed start date for each phase of work. Furthermore, projects must meet the relevant federal requirements for consistency with adopted Constrained Long Range Plan (CLRP) in order to make use of funding received through SMART SCALE and to advance in project development.

Design Waivers (DW) and Design Exceptions (DE) can be acceptable assumptions to include as part of SMART SCALE project submission, assuming there is proper documentation and support from the responsible approver as required by Location and Design IIM-227. This policy is to address concerns DWs and DEs are not formally approved at the time of intake for SMART SCALE, and formal approval would only occur in future PE phase as part of project design if funded. Additional guidance on DWs and DEs can be found on the SMART SCALE Apply page.

Projects with an estimated total cost greater than $100 million are required by both state and federal code to have a financial plan. If selected for funding, the initial project financial plan will be required prior to federal authorization of construction phase funding. The financial plan document provides reasonable assurance that there will be sufficient funding available to implement and complete the entire project as planned. Additional information on financial plan requirements can be found on the Financial Plans section of the VDOT Website.

The estimated cost of the project is a critical input used to determine each project's SMART SCALE score and ranking. Prior to submitting project applications, applicants should work in conjunction with VDOT and DRPT staff to develop reliable cost estimates as part of the application process. Increases in project cost and SMART SCALE funding requests, could result in reevaluation of the project and potentially a loss of funding as described in **Section 5.2**.

Phase estimates should account for the total cost of the phase to include costs of any previous work or accomplishments (i.e., life to date or expected expenditures as of the time of application submission) to date on existing phases. To the extent possible, right-of-way phase costs should attempt to exclude the value of donated land or easements or other rights-of-way phase-related in-kind contributions. If such aspects are included as a part of the phase's cost estimate, the applicant should denote that the value of such items is reflected as "Local Funds" in the Project Funding Sources described below.

All cost estimates will be reviewed and validated by VDOT and DRPT staff. If there are disagreements pertaining to proposed cost estimates between an applicant and VDOT oversight projects, the relevant VDOT District Engineer will provide final approval on any proposed project costs. For DRPT oversight

projects, the DRPT Director (or their designee) shall provide approval on any proposed project costs.

- **Leveraged funding -** Committed funds are funds committed to cover the difference in total project cost and SMART SCALE request so that the project is fully funded through construction or equivalent delivery phase. By Code, all SMART SCALE projects are required to demonstrate full funding within the six-year horizon of the Six-Year Improvement Program (SYIP); therefore all funding required to deliver the project's cost must be identified in the SYIP at the time of project selection and approval. Applicants are encouraged to identify other sources of funding (local, regional, proffers, other stated/federal funds) to reduce the amount of funding being requested via SMART SCALE. However, since committed funds are used to leverage and reduce the SMART SCALE requested amount, forming the basis of the SMART SCALE score, for any leveraged funding listed on the application that has not yet been identified in the Six-Year Improvement Program (SYIP) or officially applied for via processes outside of the SMART SCALE process at the time of application submission, such funding should be noted as "local" funding. For such funding, applicants must submit a letter of commitment that they are responsible for such committed funds even if the original source of the funds becomes or is no longer available.
    - Ex: Listing anticipated or future applications for funding outside of the SMART SCALE process will result in a commitment of local funds being required until such time funds become available.

  SMART SCALE funding is not intended to replace other committed funding sources such as local/regional funding, proffers, and/or other committed state or federal funding sources. In general, projects that are fully funded in a capital improvement program, a metropolitan planning organization's transportation improvement program, VDOT/DRPT or NVTA SYIP, or required to be paid by a developer as a result of a local zoning process will be excluded from consideration in evaluating and rating for SMART SCALE. To ensure that a proffer is accepted as other committed funds, it needs to be void of language that references a specific project (or project element with independent utility) and instead should only apply to a general area or corridor.

1. The CTB may waive this requirement for projects that:
    a. have an anticipated total cost in excess of $1 billion; and
    b. were not eligible for submission in the previous round of SMART SCALE due to readiness considerations but initiated procurement prior to award of the current round of SMART SCALE.
2. If a fully funded project is submitted with additional features that are not yet funded, the benefits associated with the fully funded or committed

project element(s) will be excluded from consideration in evaluating and rating the project benefits for SMART SCALE.

3. Other committed funds must have at least been applied for at the time of the SMART SCALE application submission.
    a. Future applications for funding provided by the CTB will not be considered leveraged or committed funds. This includes but is not limited to Revenue Sharing, State of Good Repair, Transportation Alternatives, Virginia Highway Safety Improvement Program, Interstate Operations and Enhancement, Innovation and Transportation Technology Fund, or other application-based or discretionary funding controlled by the CTB.
    b. Future applications for funding not provided by the CTB, such as MPO controlled, regional funding, or other grant funding sources outside of CTB selection purview, must be supported by a local funding commitment at the time of application as this forms the basis for programming full funding for a project in the SYIP at the time of selection and approval.

Pre-Application Coordination and Submission

VDOT and DRPT strongly encourage early coordination with VDOT and DRPT as they consider projects for application submission, as well as engaging available pre-SYIP project development tools like P4P and the Pre-Scoping Module. The online application tool (SMART Portal) will open on March 1st, allowing project sponsors to begin application development. All candidate project applications must be created by April 1st, and no new applications will be allowed after April 1st. There is a cap on the number of candidate project applications that can be submitted, and are defined in **Table 1.2**. To further facilitate VDOT and DRPT assistance in developing project applications, an applicant must submit basic information by April 1st to guarantee technical assistance from the two agencies. The pre-application will identify if projects meet a VTrans Mid-term need, are eligible and ready before submission, and provide advance knowledge of the number and type of applications. Project Sponsors will be notified prior to submission if their application meets a VTrans Mid-term Need and is eligible. OIPI, VDOT and DRPT will strive to complete VTrans screening and eligibility determinations early depending on when information is provided in the SMART Portal. Refer to **Table 1.2** for pre-application and full application cap limits.

The pre-application requires the applicant provide minimum inputs to include the following:

- General Project Information
    - POC Name
    - POC Phone Number
    - POC Email

  - Project Title
  - Principal Improvement
  - Project Description - Short Description (describing the project details, not the project history or objectives)
- Project Eligibility
  - Project Type and other basic project features needed to understand the general project scope
  - Verify not a standalone study
  - Verify contiguous improvement
  - Verify project is not fully funded
  - If in an MPO study area, ensure the project is in CLRP
- Project Readiness – refer to **Section 2.2 Project Readiness – Planning Requirements** for more detailed information. The SMART Portal warnings for different project features selected are outlined below in **Table 2.3**. At the pre-application submission, draft versions of documents are acceptable.

Table 2.3 Application Warnings for Project Features Selected

Project Feature Selected	Warning Message
Add/Construct Bike Lane, Bike/Pedestrian Other, Construct Shared-Use Path, Construct Sidewalk, Improve Bike/Pedestrian Crossing (At Grade), Improve Bike/Pedestrian Crossing (Grade Separated), Access Management, Improve Rail Crossing, Improve/Replace Existing Bridge(s), New Bridge, New Intersection, Roadway Reconstruction/Realignment, Shoulder Improvement(s), Traffic Signal Modification, Widen Existing Lane(s) (No New Lanes), Includes In-Plan Utility Betterment, Includes Utility Relocations, Right-of-Way/Easements acquisition required	None
Construct or Improve Bus Stop / Shelter, Increase Existing Route Service - Additional Vehicle(s) or Increased Frequency, Other Transit Technology Improvements, Freight Rail Improvements, Intercity Passenger Rail Service Improvements, New Intercity Passenger Rail Station or Station Improvements, New Station or Station Improvements, Rail Service Improvements, Rail Transit Other	Fill out the Transit Pearl for your project.
Construct or Convert Existing General Purpose or Parking Lane to Bus-only Lane	Provide a study that includes an operational analysis to support this feature documenting a preferred alternative that is consistent with the scope described in the application.
Construct/Expand Bus Facility	Provide details of site plan, Transit Development Plan (TDP), comprehensive plan, long-range transportation plan, detailed cost estimate, or federally required planning documents such as NEPA and Section 106. Please provide a feasibility or site selection study for facility projects seeking funding for land purchases. Additionally, fill out the Transit Pearl for your project.
New Route/Service	Fill out the Transit Pearl for your project and upload a feasibility study including ridership projections. For proposed fixed guideway projects, please identify the locally preferred alternative.

Project Feature Selected	Warning Message
Add New Through Lane(s)	Provide a Planning Study/Safety Study to support this feature documenting a preferred alternative that is consistent with the scope described in the application. If a major widening (two or more lanes), the planning study must include an alternatives analysis that considers improvements without widening.
Highway Other	This feature should only be selected when the project feature doesn't fit into another feature. Examples may include improving pavement markings and/or signage, concrete barriers, overhead signage, rumble strips, or lighting.
Improve Grade-Separated Interchange	Provide a draft or final Interchange Access Report (IAR), Operational and Safety Analysis Report (OSAR) or similar planning study that includes an alternatives analysis and supports the proposed alternative. The report or study shall address the appropriate elements described in IIM-LD-200.11 and Traffic Operations and Safety Manual (TOSAM) guidelines for the proposed access modifications. Concurrence of the appropriate District and Assistant State Location and Design Engineer is required. FHWA coordination may be required.
Innovative Intersection(s) / Roundabout(s)	Provide a traffic operational analysis (i.e., HCS, Synchro, SIDRA, etc.) to support this feature based on directions in Traffic Operations and Safety Manual (TOSAM)
Intersection Improvement(s)	This feature should only be selected when the project feature doesn't fit into another feature. Examples may include realignment or other geometric improvements.
ITS Improvement(s) / Adaptive Signal Control	Provide a study that includes an operational analysis to support this feature documenting a preferred alternative that is consistent with the scope described in the application.
Managed Lane(s) (HOV/HOT/Shoulder)	Provide a study that includes an operational analysis to support this feature documenting a preferred alternative that is consistent with the scope described in the application. If a major widening (two or more lanes), the planning study must include an alternative analysis that considers improvements without widening.
New Interchange, Limited Access Facility	Provide a draft or final Interchange Access Report (IAR) or similar planning study that includes an alternatives analysis and supports the proposed alternative. The report or study shall address the elements described in IIM-LD-200.11 and Traffic Operations and Safety Manual (TOSAM) guidelines for a new interchange. Concurrence of the appropriate District and Assistant State Location and Design Engineer is required. FHWA coordination may be required.
New Interchange, Non-Limited Access Facility	Provide a draft or final Interchange Access Report (IAR) or similar planning study that includes an alternatives analysis and supports the proposed alternative. The report or study shall address the elements described in IIM-LD-200.11 and Traffic Operations and Safety Manual (TOSAM) guidelines for a new interchange. Concurrence of the appropriate District and Assistant State Location and Design Engineer is required
New Traffic Signal	Provide an approved signal justification report for your project to support this feature.
Ramp Improvement(s)	Provide a draft or final Operational and Safety Analysis Report (OSAR) or similar planning study that includes an alternatives analysis and supports the proposed alternative. The report or study shall address the appropriate elements described in IIM-LD-200.11 and Traffic Operations and Safety Analysis Manual (TOSAM) guidelines for the minor access modifications related to ramps, ramp termini, and traffic control. Concurrence of the appropriate District and Assistant State Location and Design

Project Feature Selected	Warning Message
	Engineer is required. SMART SCALE readiness requirements exempt acceleration and deceleration lane extensions, but an OSAR or similar study could be required by VDOT if selected for funding.
Road Diet	Provide a traffic operational analysis (i.e., HCS, Synchro, etc.) to support this feature.
Roadway on New Alignment	Provide a Planning Study/Safety Study to support this feature documenting a preferred alternative that is consistent with the scope described in the application. The planning study must include an alternatives analysis that considers improvements, not a new alignment.
Turn Lane Improvement(s)	Provide turning movement counts so that this improvement can be analyzed.
Improve Park and Ride Lot, New Park and Ride Lot	Include a project sketch that depicts the lot location, boundaries, entry and exit points, parking space layout, increased number of parking spaces, transit circulation, and amenities where applicable.
New/Expanded Vanpool or On-Demand Transit Service	Fill out the Transit Pearl for your project and upload a feasibility study, including ridership projections.
TDM Other	This feature should only be selected when the project feature doesn't fit into another feature. Examples include ridesharing or teleworking features.

- Delivery and Funding
    - Identify all prior work completed for the project, including
        - Constrained Long Range Plan (MPO)
        - Preferred Alternative (NEPA or Planning Level)
        - Vision Long Range Plan (MPO)
        - Rural Long Range Plans
        - Other Regional Plan
        - Transportation Element of Local Comprehensive Plan
        - Planning/Safety Study
        - State Transportation Plan
        - Transit Development Plan (TDP)
        - NEPA Study
    - Provide cost estimate information for
        - PE (Survey, Environmental, Design)
        - RW (Right of Way and Easement Acquisition, Utility Relocation)
        - CN (Construction, Oversight, Contingencies)
- VTrans Mid-term Need(s) Selection and Location Mapping

- Supporting Documents based on features checked, but at a minimum including project sketch

Screening and Validation (Pre- and Post-Application Submittal)

Due to the implementation of pre-application cap limits, all submitted pre-applications will be screened based on the following three items: 1) project eligibility, 2) project readiness, and 3) project meeting a VTrans Mid-term Need adopted by the CTB. Depending on the completeness of available data, the VDOT and DRPT staff may request additional information or identify issues that need to be resolved. Final submitted applications are reviewed by internal technical staff and must be fully validated to move forward into the evaluation and evaluating process. Validation helps to ensure the information in the application is accurate, reasonable, and consistent with CTB policies.

If there is disagreement concerning the cost estimate or other application data that impacts the evaluation that cannot be resolved between the applicant and VDOT/DRPT SMART SCALE Point of Contact (POC), the applicant may request resolution from the VDOT District Engineer/Administrator or the DRPT Director.

Based on the review and validation by internal technical staff, a project application may be recommended to not advance to evaluation since the project type of applicant is not eligible for SMART SCALE or the project has been determined to not meet project readiness requirements or lacks sufficient detail to calculate project benefits.

Certain projects that are based on conceptual planning-level recommendations and have not been formally scoped or defined may require additional planning/pre-scoping level work before their benefits can be adequately assessed according to the SMART SCALE factors and measures. Planning and pre-scoping resources exist within VDOT, DRPT, localities, regional planning bodies, and some other entities (e.g., SPR, PL, Pre-scoping, FTA 5303, FTA 5304, etc.). However, resources are unlikely to be sufficient to fund every potential request for assistance for project development related to the SMART SCALE process. Additional information on project eligibility and project readiness is included in **Section 2.2**.

Application Submittal

The CTB's goal is to maintain an application process that remains simple and straightforward for applicants and provides enough information to estimate project benefits and minimize project development risks. Once the applicant is ready, the online application can be completed and submitted through the SMART Portal. Additionally, staff from VDOT and DRPT are available for support throughout the process. It is important for applicants to reach a consensus with VDOT and DRPT staff on the scope, schedule and estimate for project submissions. A key guiding principle was to develop a process that does not require applicants to invest significant time and resources for submission of project information or require the use of consultants to develop an eligible application. Early application

coordination and submission are encouraged to mitigate discrepancies throughout the process.

The SMART Portal allows applicants to submit applications for other VDOT programs including Revenue Sharing, Transportation Alternatives (TA) Set-Aside, Virginia Highway Safety Improvement Program, and local State of Good Repair Bridge and Pavement programs. Applications submitted through other funding programs or from a prior round that were not selected for funding may be cloned for use in SMART SCALE.

The SMART Portal is continually enhanced based on feedback and lessons learned. VDOT and DRPT staff provide regular training and are available to provide support and tools for applicants in compiling data and information needed for application development.

Table 2.4 lists the types of information needed to calculate the prioritization measures and highlights which items are calculated based on information provided by the applicant and which items are compiled or calculated by the Commonwealth. The online application tool is electronic and map-based to facilitate an automated population of key data elements. This has the potential to reduce the likelihood of data entry errors and improve consistency with VDOT's current scoping form.

Note that if an applicant submits more than one project for consideration, as part of the application process, applicants may be asked to rank their submitted projects based on priority. Applicants are encouraged to focus on their highest priority needs as each applicant is limited in the number of applications it can submit.

Table 2.4 SMART SCALE Measure Data Responsibility

	Responsibility	
	State	Applicant
All Measures		
Detailed description of improvement		X
Project location		X
Safety		
S.1 - Reduction in number of Fatal and Injury crashes	X	
S.2 - Reduction in Fatal and Injury crash Rate	X	*
Congestion Mitigation		
C.1 - Increase in Person Throughput	X	*
C.2 - Decrease in Person Hours Delay	X	*
Accessibility		
A.1 - Increase Access to Jobs	X	
A.2 - Access to jobs for disadvantaged population	X	
A.3 - Checklist of multimodal elements (transit, bike/ped, park & ride)		X
A.3 - Number of non-SOV users	X	*
Environment		
E.1 - Checklist of project elements that contribute to reduced pollutant emissions and/or energy use (transit, bike/ped, park&ride, energy-efficient facilities, etc.)		X
E.1 - Location of improvement on roadways with truck use > 8%	X	
E.1 - Improvements that benefit freight rail or intermodal facilities		X
E.2 - Acres of natural and cultural resources potentially impacted	X	
Economic Development		
ED.1 - Transportation project consistency with Local Comprehensive Plan or Local Economic Development Strategy		X
ED.1 - Transportation project consistency with Regional Economic Development Strategy		X
ED.1 - List of Development projects supported by the transportation improvement (up to 3 miles away depending on project type), including description, square footage, distance from the transportation project, and directness of access that the transportation improvement provides		X
ED.1 - Development project consistency with locality Comprehensive Plan/Zoning		X
ED.1 - Development project site plan status		X
ED.2 - Improves access to distribution, intermodal and manufacturing facilities	X	
ED.2 - Improves STAA truck route	X	
ED.2 - Enhances access or reduces congestion at ports/airports	X	
ED.2 - Tonnage (1000s) per day	X	
ED.3 - Travel time reliability	X	
Land Use and Transportation Coordination		
L.1 - Transportation efficient land use	X	
L.2 – Increase in transportation efficient land use	X	

* On non-VDOT roadway facilities, the applicant will need to provide study traffic data (existing turning movement counts). For non-roadway (transit, park & ride, bike/ped) projects, the applicant will need to provide existing year peak period usage. Bus ridership counts should also be provided for roadway improvements on segments with significant transit use.

* Applicants are encouraged to provide supplemental data and analysis but will not be required.

3.0 Evaluation Measures

This section summarizes the evaluation measures used in the SMART SCALE evaluation process and the methods by which those evaluation measures are calculated. SMART SCALE legislation requires that the measures be quantifiable and objective, that the analysis of a project's benefits is relative to its cost and that the CTB consider all modes of transportation. The law requires that the measures fall into six factor areas, listed below:

- Safety;
- Congestion Mitigation;
- Accessibility;
- Environmental Quality;
- Economic Development; and
- Land Use Coordination (for areas over 200,000 populations).

Using the framework of the six factor areas, VDOT and DRPT used an extensive process to develop the measures for SMART SCALE. The team researched best practices from other state DOTs and MPOs, established a work group focused on measures, held a peer exchange workshop, and conducted lessons learned tasks from the initial rounds of SMART SCALE. From these working groups and activities, the team gained a key understanding of some guiding principles that should be included in SMART SCALE, formalized into six guiding principles:

- Analyze what matters to people and has a meaningful impact;
- Ensure fair and accurate benefit-cost analysis;
- Be both transparent and understandable;
- Work for both urban and rural areas;
- Work for all modes of transportation; and
- Minimize overlap between measures.

3.1 SAFETY MEASURES

The SMART SCALE safety measures evaluate how each project addresses multimodal transportation safety concerns through implementation of best practice crash reduction strategies. Listed below in **Table 3.1** are brief summaries of the two measures. Additional information about the measures, methodologies and other details are available in Appendix A.

Table 3.1 Safety Measures

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
S.1	EPDO of Fatal and Injury crashes	Equivalent property damage only (EPDO) of fatal and injury crashes expected to be avoided due to project implementation	Estimate the number of fatalities and injury crashes (weighted by EPDO) at the project location and the expected effectiveness of project-specific counter-measures in reducing crash occurrence	70%*
S.2	EPDO Rate of Fatal and Injury crashes	EPDO of fatal and injury crashes per 100 million vehicle miles traveled (VMT) expected to be avoided due to project implementation	Similar to S.1, but focusing on the change in fatality and injury crashes (weighted by "EPDO" per VMT. The measure considers projects that address areas with a high rate of crashes that may be outside of high-volume roadways	30%

* Weighted at 100% for Transit and Transportation Demand Management projects.

3.2 CONGESTION MITIGATION MEASURES

The SMART SCALE congestion mitigation measures evaluate how each project addresses the ability of the transportation system to move people and reduce travel delay across the State. Listed below in **Table 3.2** are brief summaries of the measures. Additional information about the measures, methodologies and other details are available in Appendix B.

Table 3.2 Congestion Mitigation Measures

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
C.1	Person Throughput	Increase in corridor total (multimodal) person throughput attributed to the project	Assess the potential benefit of the project in increasing the number of users served within the peak period.	50%
C.2	Person Hours of Delay	Decrease in the number of person-hours of delay in the corridor	Assess the potential benefit of the project in reducing peak-period person-hours of delay.	50%

3.3 ACCESSIBILITY MEASURES

The SMART SCALE accessibility measures evaluate how each project addresses worker and overall household access to jobs and other opportunities, as well as multiple and connected modal choices. Listed below in **Table 3.3** are brief summaries of the measures, and additional information is available in Appendix C.

Table 3.3 Accessibility Measures

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
A.1	Access to Jobs (Total Population)	Change in average jobs accessibility within 45 minutes (within 60 minutes for transit projects)	Measure assesses the average change in access to employment opportunities as a result of project implementation based on the GIS accessibility tool.	60%
A.2	Access to Jobs (Disadvantaged Populations)	Change in average jobs accessibility for disadvantaged populations within 45 minutes (within 60 minutes for transit projects)	Measure assesses the average change in access to employment opportunities as a result of project implementation based on the GIS accessibility tool.	20%
A.3	Access to Multimodal Choices	Assessment of the project support for connections between modes and promotion of multiple transportation choices	Measure assigns more points for projects that enhance interconnections among modes, provide accessible and reliable transportation for all users, encourage travel demand management, and potential to support emergency mobility.	20%

3.4 ENVIRONMENTAL QUALITY MEASURES

The two SMART SCALE environmental quality measures evaluate how projects address the reduction of pollutant emissions and energy consumption and minimize the impact on natural and cultural resources. Listed below in **Table 3.4** are brief summaries of the measures, and additional information is available in Appendix D.

Table 3.4 Environmental Quality Measures

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
E.1	Air Quality and Energy Environmental Effect	Potential of the project to improve air quality and reduce greenhouse gas emissions	Measure rates a project's potential benefit to air quality by project benefits to non-SOV and freight users, applying a user-based point system and a carbon dioxide offset calculation.	100%
E.2	Impact to Natural and Cultural Resources	Potential of the project to minimize impact on natural and cultural resources located within project buffer	Measure evaluates how much sensitive land would be affected within the project buffer around the project. Points are subtracted from the final score based on total potential sensitive acreage impacted.	(*)

* Up to 5 points subtracted from final score based on the total potential sensitive acreage impacted

3.5 ECONOMIC DEVELOPMENT MEASURES

The SMART SCALE economic development measures evaluate how each project addresses regional and local economic development plans and new development activity, as well as improvements to intermodal freight movement access and efficiency and travel time reliability to support the movement of goods and people. Listed below in **Table 3.5** are brief summaries of the measures. Additional information about the measures, methodologies and other details are available in Appendix E.

Table 3.5 Economic Development Measures

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
ED.1	Project Support for Economic Development	Project consistency with regional and local economic development plans and policies and support for local development activity	This measure assesses whether the project is supporting new economic development and the progress made toward development in the project corridor at the local level. The scoring value is scaled by the square footage of sites being developed in the area of influence of the project (up to a maximum of 10 million square feet of development).	60%
ED.2	Intermodal Access and Efficiency	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	This measure assesses the following: • Level to which the project enhances access to distribution centers, intermodal facilities, manufacturing industries or other freight intensive industries; • Level to which the project supports enhanced efficiency on a primary truck freight route (or high volume/high-value truck or rail freight corridor); • Level to which the project enhances access or reduces congestion at or adjacent to VA ports/ airports The scoring value is scaled by the length of the project.	20%
ED.3	Travel Time Reliability	Improvement in travel time reliability attributed to the project	This measure determines the project's expected impact on improving reliability which supports efforts to retain businesses and increase economic activity.	20%

3.6 LAND USE COORDINATION MEASURES

The coordination between transportation and land use is an important issue within jurisdictions throughout Virginia. SMART SCALE legislation mandates the use of this factor area for metropolitan areas in the Commonwealth with a total population of 200,000 or more. Implemented in Round 5, all area types will have this measure applied. As of the publication of this technical guide, all localities will use this factor with the weightings provided in **Table 4.2** and consistent with the category type for that locality referenced in **Figure 4.2.** The goals of the SMART SCALE land use coordination measures are to improve the consistency of the connection between local comprehensive plan goals for transportation-efficient land use and transportation infrastructure design, multimodal accommodation, and system operations. Listed in **Table 3.6** is a brief summary of the land use measures, and additional information is available in Appendix F.

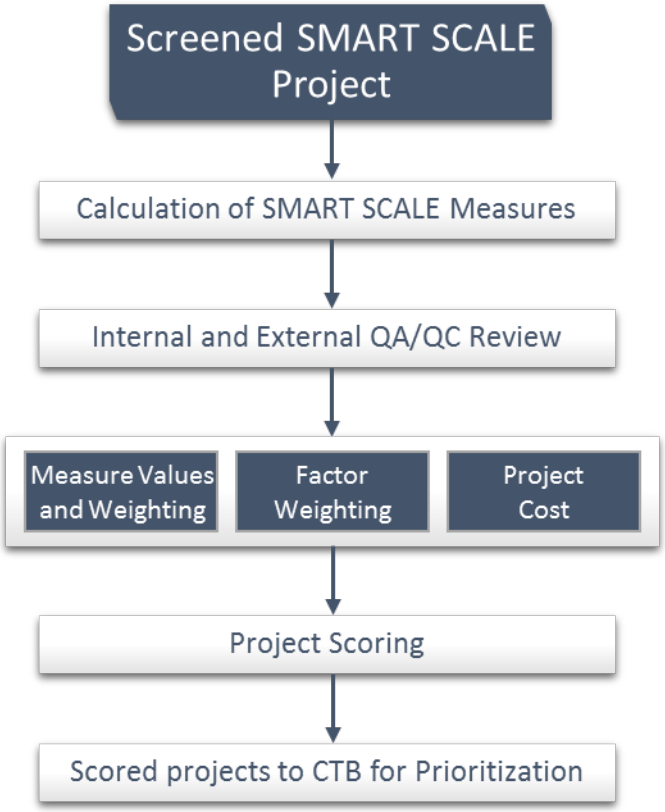
Table 3.6 Transportation Efficient Land Use Measure

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
L.1	Transportation Efficient Land Use	Amount of population and employment located in areas with high non-work accessibility	This measure determines the degree to which the project supports population and employment that on average has a reduced impact on the transportation network	50%
L2	Increase in Transportation Efficient Land Use	Increase in amount of population and employment located in areas with high non-work accessibility between present-day and the horizon year of 2030	This measure determines the degree to which the project supports population and employment that on average has a reduced impact on the transportation network	50%

4.0 Project Evaluation and Rating

This section summarizes how projects are evaluated once submitted and screened in for consideration in the SMART SCALE process. The CTB's goal is to ensure a transparent process that allows the public and stakeholders to understand how the project benefit for each project is determined and hold decision makers accountable. The flowchart in **Figure 4.1** below illustrates the general process of SMART SCALE project evaluation and rating, and will be explored in more detail within this section.

Figure 4.1 SMART SCALE Project Evaluation Process



4.1 Calculation of SMART SCALE Measures

The technical evaluation team collects and calculates measures listed in **Section 3.0 Evaluation Measures**, spanning the six factor areas. This is an open process that involves state agency collaboration and review from an external team of stakeholders to ensure transparency and improve consistency. Methodologies and specific evaluating methods are listed in Appendix A-F for each of the factor areas.

4.2 INTERNAL/EXTERNAL REVIEW

A key step in the rating process is to perform a quality assurance/quality control (QA/QC) review of the calculated measures for each project. This review will be conducted by internal and external technical groups. Measures generated through a GIS-based analysis (i.e., environmental factor) or based on responses from the applicant are not subject to the QA/QC review.

The internal technical evaluation team, led by OIPI in cooperation and coordination with VDOT and DRPT staff, is responsible for calculating and evaluating submitted projects in the SMART SCALE process. Duties of this group include:

- Validating and screening projects;
- Calculating measure values for submitted projects according to the methodologies set out in the Appendices; and
- Identifying any inconsistencies.

Once the initial analysis is done, a blind secondary analysis is performed on a minimum of 10 percent of the applications. Projects are randomly chosen for a blind secondary evaluation. A member of the technical evaluation team not involved in the initial analysis conducts the blind independent evaluation to ensure consistency in the development of assumptions and application of analytical methods and to identify process improvements.

4.3 FACTOR WEIGHTING

The SMART SCALE legislation recognized the diversity of transportation needs in different areas of the Commonwealth. It states:

"The Commonwealth Transportation Board shall weight the factors used in subdivision 1 for each of the state's highway construction districts (9). The Commonwealth Transportation Board may assign different weights to the factors, within each highway construction district, based on the unique needs and qualities of each highway construction district."

"The Commonwealth Transportation Board shall solicit input from localities, metropolitan planning organizations, transit authorities, transportation authorities, and other stakeholders in its development of the prioritization process pursuant to this section. Further, the Board shall explicitly consider input provided by an applicable metropolitan planning organization or the Northern Virginia Transportation Authority when developing the weighting of factors pursuant to subdivision 3 for a metropolitan planning area with a population over 200,000 individuals."

"The Commonwealth Transportation Board, pursuant to subdivision B.3 of § 33.2-214.1 as created by this act, shall ensure that congestion mitigation, consistent with

§ 33.2-257 of the Code of Virginia, is weighted highest among the factors in the prioritization process."

Based on a robust public involvement process, it was determined that needs within each construction district are often diverse as well. The CTB created four weighting frameworks and assigned frameworks by planning district commission (PDC) and metropolitan planning organization (MPO) boundaries. **Table 4.1** and **Figure 4.2** present the final factor weighting categories assigned to each MPO and PDC area.

Figure 4.2 PDC and MPO Factor Weighting Typology Map

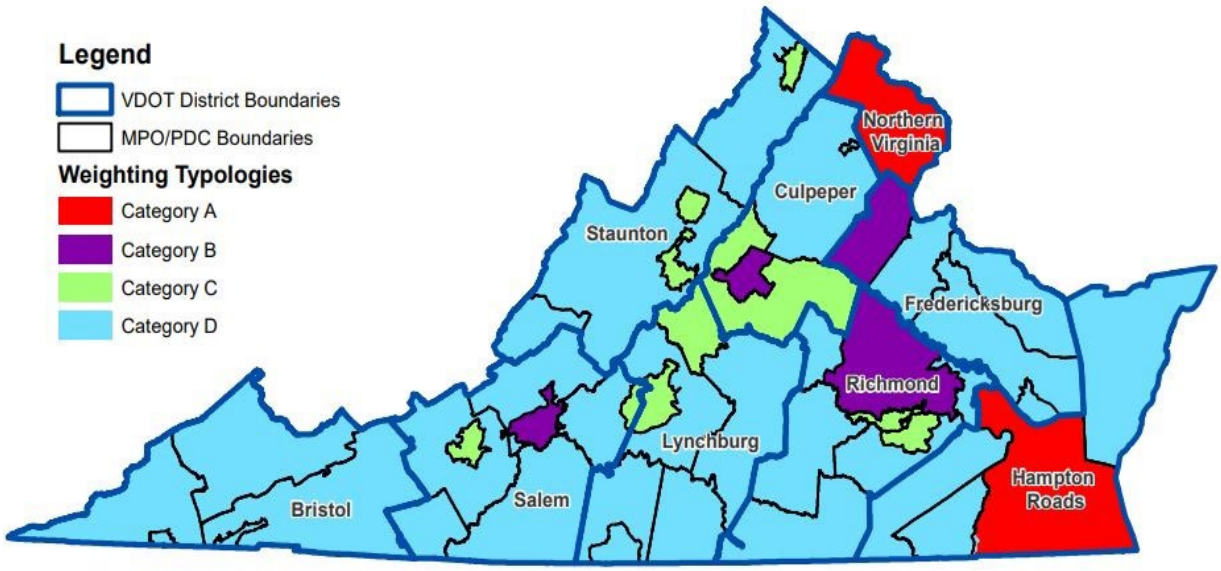


Table 4.1 PDC-MPO Factor Weighting Typology

Name	Typology
Accomack-Northampton PDC	Category D
Bristol MPO	Category D
Central Shenandoah PDC*	Category D
Central Virginia MPO	Category C
Charlottesville-Albemarle MPO	Category B
Commonwealth RC	Category D
Crater PDC*	Category D
Cumberland Plateau PDC	Category D
Danville MPO	Category D
Fredericksburg Area MPO (FAMPO)	Category B
George Washington RC*	Category D
Hampton Roads PDC[i]	Category D
Hampton Roads TPO (HRTPO)[i,ii]	Category A
Harrisonburg-Rockingham MPO	Category C
Kingsport MPO	Category D
Lenowisco PDC	Category D
Middle Peninsula PDC[ii]	Category D
Mount Rogers PDC*	Category D
New River Valley MPO	Category C
New River Valley PDC*	Category D
Northern Neck PDC	Category D
Northern Shenandoah Valley RC*	Category D
Northern Virginia RC (NVRC)	Category A
Northern Virginia Transportation Authority (NVTA)/ Transportation Planning Board (TPB)[iii]	Category A
Rappahannock-Rapidan RC[iii]	Category D
Region 2000 LGC*	Category D
Richmond Regional PDC*	Category D
Richmond Regional TPO (RRTPO)	Category B
Roanoke Valley TPO (RVTPO)	Category B
Roanoke Valley-Alleghany PDC*	Category D
Southside PDC	Category D
Staunton-Augusta-Waynesboro MPO	Category C
Thomas Jefferson PDC*	Category C
Tri-Cities MPO	Category C
West Piedmont PDC*	Category D
WinFred MPO	Category C

*Note: PDC is defined as the remainder of the region outside the MPO boundary. In many cases, these regions include partial counties (e.g., Goochland County is partially within RRTPO and the Richmond Regional PDC). If a project is within the MPO boundary in a partial county, the project shall use the weighting associated with the MPO with the following exceptions:

i. The portion of Southampton County and the City of Franklin within the Hampton Roads TPO boundary shall use the weighting associated with the Hampton Roads PDC.

ii. Gloucester County portion of HRTPO included within Middle Peninsula PDC typology.

iii. Fauquier County portion of TPB included within Rappahannock-Rapidan RC typology.

For projects that cross multiple typology boundaries, the project shall use the weighting associated with the typology for which the majority of the project is located.

The final weighting scheme by category is presented in **Table 4.2**. Where MPO boundaries cover a partial county, the assumption is that any project partially or wholly within the MPO boundary will use the assigned MPO weighting approach unless noted otherwise in **Table 4.1**. For projects that cross multiple typologies, the weighting framework from the typology for which the majority of the footprint of the project is located will be utilized.

Table 4.2 Factor Weights by Category

Factor	Congestion Mitigation	Economic Development	Accessibility	Safety	Environmental Quality	Land Use
Category A	45%[b]	5%	15%	5%	10%	20%[a]
Category B	15%	20%	20%	20%	10%	15%[a]
Category C	15%	25%	15%	25%	10%	10%
Category D	10%	30%	10%	30%	10%	10%

[a] For metropolitan planning areas with a population over 200,000, the prioritization process shall also include a factor based on the quantifiable and achievable goals in VTrans. TPB, HRTPO, RRTPO, FAMPO and RVTPO all meet this definition.

[b] For Northern Virginia and Hampton Roads construction districts, congestion mitigation is weighted highest among the factors in the prioritization process.

4.4 PROJECT COST

SMART SCALE (§ 33.2-214.1) mandates that the prioritization process be based on the benefit of a project relative to the cost of the project. In accordance with the CTB policy, the SMART SCALE score is based on the benefit of the project relative with the requested SMART SCALE funds.

For purposes of determining the SMART SCALE score, only the funds requested from SMART SCALE programs – the High Priority Projects Program and the District Grant Program – are considered. Information on a project's benefits relative to total cost will be provided to the CTB for comparison purposes.

Using only the funds requested from SMART SCALE programs directly accounts for the benefit of private, local, or other leveraged funding and helps augment limited state and federal funding sources.

This policy encourages applicants to bring resources to the table.

4.5 PROJECT SCORING

SMART SCALE requires an analysis of the project benefits, considering each applicable factor relative to the project's cost. Each project's benefit is determined by calculating values for each of the evaluation measures, converting those values into a normalized value for each factor (0 to 100 scale), and then by weighting the factor values according to one of several potential weighting frameworks approved by the CTB. Ultimately, a Project Benefit is divided by the amount of funds requested from the SMART SCALE programs to obtain the final SMART SCALE score used to rank projects and develop the staff-recommended funding scenario. In addition, the Project Benefit is divided by the total cost of the project, and this figure is provided to the CTB for information purposes.

Key Terms

Measure Value – Data calculated for the project that describes the characteristics of the project. Wherever possible, the SMART SCALE measure values should be calculated, so they are proportional to the size or impact of the project, even for qualitative measures.

Normalized Measure Value – Numerical value given to each measure based on the Measure Value as a percentage of the maximum or best Measure Value in the state (in other words, scoring based on proportion of the highest Measure Value).

Weighted Normalized Measure Value – Normalized Measure Values within a factor area multiplied by their measure weights.

Factor Value – Sum of the Weighted Relative Measure Values within a factor area.

Weighted Factor Value – Factor Value multiplied by the factor weight of the appropriate weighting framework based on the project location.

Project Benefit – Sum of the Weighted Factor Values for each factor area. This represents the total benefits of the project relative to other projects' benefits.

SMART SCALE Score (Project Benefit / SMART SCALE Cost) – Project Benefit divided by the SMART SCALE-funded cost of the project. This index allows projects to be compared to each other in terms of their benefit per SMART SCALE dollar invested. Project costs are applied in units of tens of millions of dollars ($10 million).

Methodology

Step 1 – Within each factor, for each measure, the highest Measure Value is determined after calculating the measures for each project. The highest Measure Value is given a value of 100. Other Measure Values are compared to the highest Measure Value. The Normalized Measure Value is then established by taking the project Measure Value as a percentage of the highest value. An example of normalization is shown in **Table 4.3** below.

Table 4.3 Normalization of Measure Weights

	Project 1	Project 2	Project 3	Project 4
Measure Value	11.62 hours	166.45 hours	1332.85 hours	21131.65 hours
Measure Value	0.05	0.79	6.31	100.00

Step 2 - Once each Normalized Measure Value has been assigned for a factor, the measure weighting is applied. Each measure within the five or six factors has a measure weight which determines the proportion of the Factor Value carried by each measure. Once the measure weighting has been applied, the sum of the Weighted Normalized Measure Values produces the Factor Value. **Table 4.4** presents an example for the Congestion Mitigation factor area.

Table 4.4 Applying Measure Weights

	C.1: Person Throughput		C.2: Reduction in Person Hours of Delay		Raw Factor Value: Congestion
Measure Weight	50%		50%		
	Value	Value	Value	Value	
Project 1	5	0.01	11	0.05	(50% * .01) + (50% * .05) = .03
Project 2	747	1.40	166	0.80	(50% * 1.4) + (50% * .80) = 1.1
Project 3	182	0.34	1,332	6.30	(50% * .34) + (50% * 6.31) = 3.32
Project 4	53,200	100.00	21,131	100	(50% * 100) + (50%*1000)= 100

Step 3 - The Factor Value is then multiplied by the weighting percentage assigned to that factor by the predetermined weighting typology. **Table 4.5** demonstrates this factor weighting using example project 2 and the Category A weights. This process is repeated for all applicable factors – their sum producing the Project Benefit.

Table 4.5 Applying Factor Weights

Project 2 (Category A Weights)	Congestion Mitigation	Economic Development	Accessibility	Safety	Environmental Quality	Land Use	Final Project Benefit
Weight	45%	5%	15%	5%	10%	20%	
Factor Value	1.1	2.6	0.2	4.1	0.3	4.5	
Weighted Value	0.50	0.13	0.03	0.2	0.03	0.89	1.78

Step 4 **-** The Project Benefit is then divided by the SMART SCALE-funded cost of the project (in $10 millions) to determine the value of the benefit for every dollar invested. For example, assume that Project 2 is requesting $12.4 million in SMART SCALE funds out of a total cost of $20 million. The Project Benefit is 1.78, and the SMART SCALE Score would be 1.43 (i.e., 1.78/1.24 = 1.43).

The Project Benefit is also divided by the total project cost to provide supplemental information on the cost-effectiveness of each project. If the total project costs were used, instead of SMART SCALE funds only, the cost-effectiveness of Project 2 would be 0.89 (i.e., 1.78/2 = 0.89).

Everything is Relative

Under this process, the maximum measure values may change on a year-to-year basis depending on the characteristics of the submitted projects. This method aims to score each project on a scale proportional to its benefits and relative to its cohort of projects rather than an arbitrary scale that defines whether a project does well or not.

In the first round of SMART SCALE, the Transform66: Outside the Beltway project received the highest measure value in the congestion factor with a 100. In that same round, the I-64 High Rise Bridge and Widening project received a 24.3. In the second round of SMART SCALE without the Transform66: Outside the Beltway project, the I-64 High Rise Bridge and Widening project received a 94.5 measure value for the congestion factor – the highest value. The benefits of the I-64 High Rise Bridge and Widening project did not quadruple, rather as the evaluation is done on a relative basis, the benefit increased because it did the most to reduce congestion of the projects submitted in the second round of SMART SCALE.

Table 4.6 summarizes the calculation of the SMART SCALE Score for the Project 2 example described above. This shows how the measure values and weights, combined with the factor weights, can be used to calculate the Project Benefit. The SMART SCALE Score is the Project Benefit divided by the SMART SCALE cost. Once all projects have been evaluated, they are sorted (ranked) based on the highest scored to lowest scored projects.

Project Segmentation – Fixed Guideway Projects (Transit and Rail Only)

Some projects are submitted for SMART SCALE that is a segment of a larger project plan. The individual project may not deliver certain benefits, but the larger project will have significant benefits if each of the individual components is built. For example, if a project is submitted to extend a platform at a rail station to allow longer trains to be utilized, the benefits for just the extended platform will be very limited. To account for future benefits of projects that are segmented, a percentage of the benefits derived from all segments of a larger plan will be used in the evaluating of a specific segment. In our example, assuming the rail platform cost $10 million, and the future purchase of railcars cost $90 million for a total cost of $100 million, benefits would be measured for the total project, and the segmented component would receive a pro-rata percentage of the benefits relative to the component's cost to the total project's cost. In this instance, 10% ($10 million/$100

million) of the benefits would be used for evaluating the platform project as this component represents 10% of the overall cost of the total project. [1]

Table 4.6 Calculate SMART SCALE Score

SMART SCALE Area Type A															
Factor	Congestion Mitigation		Safety		Accessibility			Economic Development			Environment		Land Use	
Measure	Increase in Peak Period Person Throughput	Reduction in Peak Period Delay	Reduction in Fatal and Injury Crashes	Reduction in Fatal and Injury Crash Rate	Increase in Access to Jobs	Increase in Access to Jobs for Disadvantaged Populations	Increase in Access to Multimodal Travel Choices	Square Feet of Commercial/Industrial Development Supported	Tons of Goods Impacted	Improvement to Travel Time Reliability	Potential to Improve Air Quality	Potential Sensitive Acreage Impacted	Support of Transportation-Efficient Land Use	Increase Transportation- Efficient Land Use
Measure Value	2,928.0 persons	643.9 person hrs.	33.5 EPDO	86.8 EPDO / 100M VMT	1,653.7 jobs per resident	2,552.3 jobs per resident	14,165.9 adjusted users	7,414,543.8 thousand adj sq. ft.	79,931.5 thousand adj daily tons	141,935,293.9 adj. buffer time index	14,165.9 adjusted points	20.2 scaled points	651,654.1 access * pop/emp density.h	149,664.9 access * pop/emp density change.
Normalized Measure Value (0-100)	10.4	10.0	9.6	0.2	29.1	44.1	50.6	37.7	1.7	3.3	100.0	61.1	49.2	42.4
Measure Weight (% of Factor)	0.5	0.5	0.7	0.3	0.6	0.2	0.2	0.6	0.2	0.2	1	Up to -5 points*	0.5	0.5
Factor Value	10.2		6.78		36.4			23.6			100		45.8	
Factor Weight (% of Project Score)	45%		5%		15%			5%			10%		20%	
Weighted Factor Value	4.6		0.3		5.5			1.2			8.1		9.2	
Project Benefit	**27.6** *[30.7 – 3.1(E.2*)]*													
SMART SCALE Cost	$57,200,000													
SMART SCALE Score (Project Benefit per $10M SMART SCALE Cost)	**4.8**													

[1] This has very limited applicability and does not apply to roadway widenings

5.0 CTB Prioritization and Programming

This final section summarizes CTB prioritization and programming methods that are used in the SMART SCALE process, specifically how SMART SCALE scored projects are reviewed and ultimately incorporated into the SYIP. The flowchart in **Figure 5.1** below illustrates the basic process of the final stages of the SMART SCALE Biennial Process, in which the CTB begins with the results from the SMART SCALE evaluation and rating process, and the staff recommended funding scenario to inform funding decisions for the draft SYIP.

Figure 5.1 Prioritization and Programming Process (Odd Years)

First, the SMART SCALE technical review team presents the screening and scoring results to both the CTB and the public. Pursuant to Section 33.2-214.2 of the Code of Virginia, project values will be made publicly available no later than 150 days prior to the CTB's vote to adopt the Six-Year Improvement Plan. Under current

practices, this requires that the results be released at the January CTB meeting. The CTB gives guidance on program development and begins to narrow down their funding decisions for projects that will be funded in the draft SYIP. Their decisions are represented in the draft SYIP. After the draft SYIP is presented, the CTB holds a public comment period that allows eligible entities to comment on the process, screening decisions, and evaluating individual projects. The CTB takes into account public comments based on the draft SYIP, ultimately approving the final SYIP in June.

5.1 FUNDING DECISIONS FOR DRAFT SYIP

Pursuant to Section 33.2-214 of the Code of Virginia, each year, the CTB must approve a capital improvement program that outlines planned spending for transportation projects for proposed construction development or study for the next six years. The SYIP covers all surface transportation projects, including highway, transit, rail, roadway, technology operational improvements, and transportation demand management strategies. Project funding is programmed in accordance with project schedules and cash flow requirements. The CTB updates the SYIP each year as revenue estimates are updated, priorities are revised, project schedules and costs change, and study results are known.

Information from the fall transportation meetings and results of the evaluation process are utilized by the CTB to direct the development of a draft SYIP. The draft SYIP is presented to the CTB each spring. At that time, the draft SYIP is made available for public comment. A final SYIP is presented to the CTB in June each year for approval. To meet its statutory obligation, the CTB will adopt a SYIP in June of each year effective July 1st, though SMART SCALE will only happen every other year (see **Section 1.4, Biennial SMART SCALE Cycle**).

Once the scoring is complete, OIPI develops a staff-recommended funding scenario based on guidance from the CTB.

The CTB may modify the staff-recommended funding scenario. Additional considerations that may be used by the CTB include:

- Public feedback from Fall Transportation Meetings and Spring public meetings;
- SMART SCALE scores;
- Project segmentation – starting the next phase of a multi-segment roadway improvement, e.g., to complete a major multi-segment project; and
- Other information on project status.

The prioritization process does not require that the CTB fund projects in order of their scores. Further, the CTB is not required to select the highest scoring project. The process is a means to assist the CTB in evaluating and comparing proposed improvements. The CTB continues to retain final decision-making authority on improvements to be included in the SYIP.

5.2 PUBLIC COMMENT PERIOD

The CTB provides numerous opportunities for the public to provide input on transportation projects and priorities as part of the continuing transportation planning process. The CTB holds annual Fall Transportation Meetings in the construction districts[2], providing public and elected officials with an opportunity to identify transportation priorities and to review and comment on the current SYIP. VDOT and DRPT also hold an annual planning and programming meeting inviting representatives from all MPOs and PDCs to attend and provide their transportation priorities prior to the annual development of the SYIP.

Stakeholders have the opportunity to provide input as to what projects the jurisdictions/MPOs/PDCs/transit agencies should consider moving forward in the process through the development of an application for SMART SCALE funds as well as by providing feedback to the CTB during the annual Fall Transportation Meetings. Stakeholders may work with the state to ensure that projects are defined in sufficient detail for SMART SCALE evaluation. All of the applications and supporting analysis will be posted on the SMART SCALE website and made available for public review prior to scoring. Public input at this stage is critical to ensuring that no pertinent issues or options are overlooked in the development of a project application. By January of each SMART SCALE cycle, the evaluation of projects selected for SMART SCALE prioritization evaluation will be complete, and results will be made public. Stakeholders have the opportunity to review assumptions and calculations and see each project's score.

Each spring, the draft SYIP is made available for public comment and CTB hosts a public hearing in each construction district[2]. Attendance at the Fall Transportation Meetings and spring public meetings generally includes elected state officials, city and town officials, County Boards of Supervisors, representatives of advocacy groups, representatives from MPOs and PDCs, and the general public. Comments are accepted both verbally and in writing at the meeting or via regular mail or email after the meeting.

5.3 PROCESS ISSUES

The CTB adopted an updated SYIP policy on December 7, 2016, with changes to the programming process intended to 1. Improve transparency in the programming process, 2. Increase certainty for local project sponsors, citizens, and businesses, and 3. Accelerate delivery of selected projects. This policy document outlines key provisions in the following areas:

- Frequency of updates to programs in the SYIP and to HPPP and DGP;

[2] The meetings may be conducted using electronic communications in accordance with Item 4-0.01.g. of Chapter 1289 (2020 Acts of Assembly), as the COVID-19 emergency makes it impracticable or unsafe to assemble in a single location.

- Changes relating to modification of the amounts of funds previously committed and programmed to projects under certain programs;
- All SMART SCALE projects selected for funding under the HPPP and the DGP (enacted as Code of Virginia § 33.2-370 and § 33.2-371,) must be fully funded and demonstrate the Board's commitment to advance the project through construction;
    - Fully funding a project means all funding for the project must be identified to fully fund the total cost of the project at the time of inclusion in the SYIP and within the six-year window of the SYIP.
- The Board will be presented with a base scenario based on project scores to guide the allocation of funds in the draft SYIP and consider modifications to the base scenario to form the consensus scenario to guide the allocation of funds in the final SYIP;

Some of the specific process issues pertaining to SMART SCALE are outlined below.

Project Changes Post Selection and SYIP Approval

In general, once a project has been screened, evaluated, and selected for funding, it will remain in the SYIP as a funding priority. However, certain circumstances may warrant a review of the project's SMART SCALE score or funding decision. More specifically, changes to a project's scope or budget may require engagement in the SMART SCALE project change process.

The project change process was developed to ensure the integrity of the SMART SCALE scoring process, the original intent/benefits of evaluated projects, and the CTB's allocation decisions. Changes to basic project elements, such as scope or cost could result in funding projects that are not as cost effective as others.

The project change process was designed to be flexible, allowing for most project modifications to be addressed through business rules without requiring CTB action, thereby avoiding potential project delays. More information about SMART SCALE project changes can be found in the SMART SCALE Project Change Guide.

A project that has been selected for funding must be reviewed through the project change process if there are significant changes to either the scope or cost of the project:

1. If proposed project scope changes will change the nature of the project as presented in the project's SMART SCALE application, then a preliminary review of the proposed changes will be conducted to determine if there is an impact to project benefits. If the project benefits may be impacted, then a quantitative assessment will be conducted to determine the level of impact. If warranted, the project will be re-scored utilizing the same methodology and maximum measure values for the round of SMART SCALE in which the project was selected for funding. In this case, if the revised score is less than the lowest-ranked funded project in the district

for that round of SMART SCALE and would not have been funded, CTB action is required to approve the change in scope.

The CTB may opt to approve the project change, deny the project change or cancel the project. In such cases of cancellation, the remaining SMART SCALE funds will be reserved to address budget adjustments on existing SMART SCALE projects or reserved for allocation in the next solicitation cycle for SMART SCALE. Results of SMART SCALE project scope changes reviewed by the CTB will be made publicly available.

If the proposed scope change is an increase in scope, the applicant is responsible for the additional cost attributable to the increase in scope regardless of budget impact.

2. If an estimate increases prior to project advertisement or contract award and exceeds the following thresholds shown in **Table 5.1**, and the applicant is not funding the increased cost with other funds, CTB action is required to approve the budget increase:

Table 5.1 Project Budget Change Thresholds for CTB Action

Total Project Budget	Change from original SMART SCALE requested amount
Less than $5,000,000	20% or greater increase in funding requested
From $5,000,000 to $10,000,000	$1,000,000 or greater increase in funding requested
Greater than $10,000,000	10% or greater increase in funding requested; $5,000,000 maximum increase in funding

3. To address cost estimate increases both within the threshold and beyond the threshold, funds will be reprogrammed from projects with surplus allocations due to estimate decreases, contract award savings, schedule changes, etc., or from future SMART SCALE funds from the applicable grant program (DGP or HPPP). Regular reviews will be conducted to ensure that the scope and benefit of selected projects have not changed significantly. Project estimates will also be monitored to determine if the thresholds need to be adjusted. See **Post Selection SYIP Allocations** section below for additional information about surplus funding.

Changes in Leveraged Funding

The applicant is responsible for a leveraged commitment, even if the identified sources of leveraged funding are reduced or become unavailable.
. As discussed in the Project Eligibility and Application Process section of this guide, An applicant may only identify State of Good Repair, Transportation Alternatives Set-Aside, Virginia Highway Safety Improvement Program and Revenue Sharing funds as committed funds, if the funding has already been approved by the CTB. Applicants must have an approved or pending application for other sources of committed funds, such as local/regional or other federal funds, at the time of the SMART SCALE application submission.

Re-Submittal of Projects

If a submitted project is not selected for funding during a cycle, the CTB will allow eligible entities to re-submit the project the next cycle.

Other considerations regarding resubmittal of projects include the following:

- A project that has been selected for funding cannot be resubmitted to address cost increases or the loss of other sources of funding.
- Once a project is selected for funding, an entity must wait for two rounds of SMART SCALE following the end date of construction before submitting a new project application for the same location that meets the same need as the project that was selected for funding.
- Once a project is selected for funding, an entity may not resubmit the project with a revised scope in a subsequent round unless the previously selected project has been canceled.

Post Selection SYIP Allocations

A project that has been selected for funding must be initiated, and at least a portion of the programmed funds expended within one year of the budgeted year of allocation (first fiscal year in the SYIP that includes DGP or HPP allocations) or funding may be subject to reprogramming to other projects selected through the prioritization process. In the event the Project is not advanced to the next phase of construction when requested by the CTB, the locality or metropolitan planning organization may be required, pursuant to § 33.2-214 of the Code of Virginia, to reimburse the Department for all state and federal funds expended on the project.

The Board may adjust the timing of funds programmed to projects selected in previous SMART SCALE cycles to meet the cash flow needs of the individual projects, but will not (1) reduce the total amount of state and federal funding committed to an individual project unless it is no longer needed for the delivery of the project or the project sponsor is unable to secure permits and environmental clearances for the project or (2) increase the total amount of state and federal funding committed to an individual project beyond the thresholds requiring CTB action identified in the SMART SCALE policy.

Surplus Funding

In cases where programmed funds are no longer needed for delivery of a project due to estimate decreases, contract award savings, schedule changes, etc., the unexpended surplus funds are reallocated within the SMART SCALE program unless superseded by the terms of a signed project agreement, as follows:

- Surplus DGP funds no longer needed for delivery of a project will remain with the district and may not be used in other districts;
- Surplus HPPP funds will be transferred to a statewide balance entry account and may be used on a statewide basis on other High Priority projects; or

- Such funds will be reserved to address budget adjustments on existing SMART SCALE projects or reserved for allocation in the next solicitation cycle for SMART SCALE.

In the event that revenue reductions decrease the amount of actual funding available for a particular SMART SCALE cohort, two approaches are envisioned:

- Delaying timing of projects to out years where future funding may be available; or
- Utilizing SMART SCALE funds from future years to fund the project

5.4 IMPROVEMENTS TO PROCESS AND MEASURES

SMART SCALE represented a new step forward for the Commonwealth of Virginia, and the CTB broke new ground in moving towards a prioritized transportation funding structure. As the process moves into future cycles, SMART SCALE will continue to evolve and improve. Advances in technology, data collection, and reporting tools will upgrade and modernize SMART SCALE for a growing Virginia, and the CTB looks forward to using these tools to provide a more balanced and equitable distribution of the Commonwealth's transportation funds.

5.5 LEGISLATIVE REQUIREMENTS

Periodically the Virginia legislature addresses improvements to SMART SCALE policy through enacting new laws.

In 2020, H.B. 561 was passed to amend and reenact § 33.2-214.2 of the Code of Virginia, relating to project evaluation on primary evacuation routes. As a result, the scorecards will indicate whether such projects are located on a primary evacuation route. The notation does not have an impact on the SMART SCALE score.

In 2021, H.B. 2071 was passed to amend and reenact § 33.2-214.2 of the Code of Virginia, relating to whether a project has been designed to be resilient when evaluating projects for the Six-Year Improvement Program and consider resiliency when establishing the Statewide Transportation Plan. As a result, the scorecards will indicate whether a project is addressing a VTrans Mid-Term need associated with three hazards: (1) sea-level rise, (2) storm surge, and (3) inland/riverine flooding. Additionally, it will be reported on the scorecard if a project has been designed to be or the project sponsor has committed that the design will be resilient. The notation does not have an impact on the SMART SCALE score.

6.0 Appendix A: Safety Measures

Table 6.1 Safety Factor – Measures Summary

ID	Measure Name	Weight	Measure Description	Measure Objective
S.1	EPDO of Fatal and Injury crashes	70%[a]	Equivalent property damage only (EPDO) of fatal and injury crashes expected to be avoided due to project implementation	Estimate the number of fatalities and injury crashes (weighted by "equivalent property damage only" crash value reported by FHWA) at the project location and the expected effectiveness of project-specific counter-measures in reducing crash occurrence
S.2	EPDO Rate of Fatal and Injury crashes	30%	Equivalent property damage only (EPDO) of fatal and injury crashes per 100 million vehicle miles traveled (VMT) expected to be avoided due to project implementation	Similar to S.1, but by focusing on the change in fatality and injury crashes (weighted by "equivalent property damage only" crash value reported by FHWA) per 100 million vehicle miles traveled (VMT), the measure considers projects that address areas with a high rate of crashes that may be outside of high-volume roadways

[a] 100% for Transit and Transportation Demand Management projects

6.1 S.1 EQUIVALENT PROPERTY DAMAGE ONLY (EPDO) OF FATAL AND INJURY CRASHES

Definition

EPDO-weighted fatal and injury crashes expected to be reduced due to project implementation.

Data Source(s)

- Most recent five years of crashes from VDOT Roadway Network System (RNS) geospatial (GIS) data prepared by the Traffic Engineering Division.
- FHWA report on crash cost estimates by the severity of the injuries sustained adjusted to the mid-year of the analysis period as modified by VDOT[3].

[3] Council, F., Zaloshnja, E., Miller, T., and Persaud, B., Crash Cost Estimates by Maximum Police-Reported Injury within Selected Crash Geometries, U.S. Department of Transportation, Federal Highway Administration (FHWA), October 2005, Washington, DC.

- SYIP to determine if and when improvements have been implemented in proximity to the project in the last five years.
- SMART SCALE project expected crash reduction percentage developed using FHWA's Crash Modification Factors (CMF) Clearinghouse website and Virginia crash summaries and models published on the Apply page.[4]
- For park and ride projects, data from the U.S. Census Bureau's OnTheMap tool will be used to indicate the most common primary direction(s) and average distances of commute(s) for those living within the catchment area of the proposed improvement. Additionally, when available, lot user surveys or other applicable information (conducted within the past five years) of existing park and rides within reasonable proximity of the proposed improvement can supplement OnTheMap data. Common directions of travel and average distances from OnTheMap, as well as any available origin-destination information from lot users surveys, are used to apply logical routing. The number of new park & ride users is determined using existing park & ride utilization in the area and/or projected demand based upon an established methodology that factors in demographic data and travel patterns.[5]

Methodology

Roadway

Step 1: VDOT will compile the latest five years of fatal (F) and injury (I by severity) crashes for the roadway segments within the project limits. The project limits are defined by the begin and end milepost for roadway, pedestrian, bicycle, in-roadway transit service (e.g., bus rapid transit), in-roadway freight service corridor improvements; the ends of the turn bays on all approaches for intersection improvements; the nearest intersection(s) on the cross street for a new interchange as well as adjacent ramps on the freeway within 1,600 feet of any proposed interchange ramp; and the begin and end milepost on key parallel roadway(s) (facilities where vehicles may shift from) for transit and freight improvement projects. The SYIP will be reviewed, and local VDOT staff will determine if and when improvements have been implemented within the project limits during the five year analysis period. When identified the analysis period will be shortened to the post improvement years as necessary.

Step 2: Weight the number of crashes by severity using the "equivalent property damage only" (EPDO) crash value scale reported by FHWA and adjusted to the mid-year of the analysis period. Research has shown that many factors unrelated to the design or condition of a roadway play a role in whether a crash results in fatality or severe injury, such as age of the individual and age of the vehicle, VDOT has developed an average weighted EPDO value for crashes that involve either a

[4] *http://www.cmfclearinghouse.org/ and https://www.smartscale.org/apply/*

[5] *http:onthemap.ces.census.gov/*

fatality or a severe injury. The EPDO values used in the SMART SCALE process are shown in **Table 6.2** below.

Table 6.2 EPDO Crash Value Conversion

Accident Type	Rounded Value	Weight
Fatal (F) + Severe Injury (A)	$2,200,000	160
Moderate Injury	$260,000	20
Minor Injury	$140,000	10

Step 3: Select the most appropriate expected crash reduction (PECR) percentage based on published CMFs (PECR=1-CMF) for each of the project segment improvement types based on targeted (crash specific) or all crash CMFs applicable to SMART SCALE project types.

Step 4: Multiply the average annual EPDO weighted fatal and injury crash frequency by the PECR to estimate the number of EPDO crashes expected to be reduced.

- For roadway widening (capacity) projects, the previously described steps are applied using crashes on the highway segment from the beginning and end mile points of the project plus influence areas of intersections and interchanges at the terminals.
- For intersection-related improvement projects, crashes in the influence area of the minor roadway approaches to the major roadway, which is defined as the highest volume facility, will be included for those minor roadways recorded in VDOT's RNS roadway inventory. The minor roadway approach improvement influence area is considered to be 250 feet or the length of existing turn lanes, whichever is greater.
- For projects on roadways on new location, crashes on the most reasonable alternative route(s) would be compiled. The statewide 5-year average fatal and injury crash rate for the new roadway, using the facility type and the number of lanes of the new roadway, is used to determine the build condition expected new crashes per year. New intersections or interchanges at the ends of the new roadway will add annual crashes based on Safety Performance Functions (SPFs) for the intersection/interchange type. Based on travel demand model estimates of VMT for the build versus no-build scenarios, percent changes in VMT on each alternate route segment equates to the CMF applied the surrounding roadway network. The net total of the expected EPDO crashes on the alternative route(s) and the expected EPDO crashes on the build corridor equals the overall project crash reduction. The alternate routes with expected changes in traffic volumes may be identified by the applicant.
- New interchanges and interchange ramp modifications on the freeway will consider freeway and crossing route crashes depending on the specific ramp

improvements in proposed projects.

Transit/Freight Rail/TDM

The methodology described for roadway projects is not used for transit infrastructure projects. Rather the safety benefits for transit projects will be estimated based on reduced vehicle miles traveled from the expected shift from auto to transit with the assumption that dedicated transit vehicles have minimal crash frequencies. The same approach as described for transit projects would be applied to freight rail projects, except the focus will be on the 5-year average of truck-related fatal and injury crashes in the parallel corridor. For TDM projects like park and ride lots, the same approach as described for transit projects would be applied taking into account the traffic reductions on adjacent highways.

Step 1: Highway segments predicted to experience primary travel shifts by the proposed improvement(s) will be provided by the transit project applicant (transit) or determined with U.S. Census data to determine the most common directions of travel and average distance traveled in each direction. Park and ride lot user origin-destination surveys may be provided by the applicant when available. In addition, for each highway and fixed-guideway transit segment with new service, the applicant sponsor shall provide the daily and hourly ridership and/or the increase in parking spaces for projects increasing park and ride capacity. The highway segments impacted by a mode shift will be assessed to determine the percent VMT change on the network; that is, the expected percent modal shift from the highway (VMT) to transit/ride-sharing due to the project. The after-project VMT will be one minus the percent model shift (VMT After = 1 – %VMT Reduced).

Step 2: Compile all fatal and injury crashes by severity from highway segments predicted to experience primary travel shifts.

Step 3: Weight the number of crashes by severity using the "equivalent property damage only" (EPDO) crash value scale reported by FHWA and adjusted to the end-year of the analysis period.

Step 4: Compute the 5-year annual average Fatal + Injury EPDO crash frequencies for the on-road segments and impacted parallel roadways.

Step 5: Calculate the expected reduction of annual Fatal + Injury EPDO crash frequencies for highway segments predicted to experience primary travel shifts by multiplying the existing crash frequency by the after-project percent VMT reduction.

Bicycle/Pedestrian

The methodology described for roadway projects will be used for bicycle and/or pedestrian projects based on the proposed segment and/or intersection improvement CMFs. CMFs from FHWA and other sources were developed based

on the associated roadway element improvement CMF targeting bicycle and pedestrian crashes. For some improvement types CMFs for all motor vehicle crashes are available. Other alternative sources of information may be developed to assess the safety benefit of these project types based on bicycle facility classification or facility separation from travel lanes.

Scoring Value

Total change in EPDO of fatal and injury (F+I) crash frequency.

6.2 S.2 EQUIVALENT PROPERTY DAMAGE ONLY (EPDO) RATE OF FATAL AND INJURY CRASHES REDUCED

Definition

Number of Equivalent Property Damage Only (EPDO) weighted fatal and injury crashes per 100 million vehicle miles traveled (VMT) expected to be reduced due to the project.

Data Source(s)

- Most recent five years of crashes from VDOT RNS geospatial GIS data maintained by the Traffic Engineering Division. Driving while under the influence of alcohol crashes will be removed from the data set used for safety scoring.
- FHWA report on crash cost estimates by the severity of the injuries sustained adjusted to the end-year of the analysis period[6].
- SYIP to determine if and when improvements have been implemented in the last five years.
- Existing AADT by roadway segment from VDOT RNS, available studies, Congestion Measure analysis or the applicant/jurisdiction, and segment(s) length to calculate annual VMT.
- SMART SCALE project expected crash reduction percentage developed using FHWA's CMF Clearinghouse website and Virginia crash summaries and models published on the Resource page.[7]

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[6] Harmon, T., Bahar, G., Gross, F. Crash Cost for Highway Safety Analysis, U.S. Department of Transportation, Federal Highway Administration (FHWA), January 2018, Washington, DC. (https://safety.fhwa.dot.gov/hsip/docs/fhwasa17071.pdf)

[7] http://www.cmfclearinghouse.org/ and https://www.smartscale.org/apply/default.asp

Methodology

Roadway and Bicycle/Pedestrian

Step 1: Collect and use the most recent years AADT to calculate the annual VMT for the same segment(s) used for crash data collection for the S.1 measure.

Step 2: Match the project location segment VMT with the expected Fatal + Injury EPDO of Fatal + Injury crashes reduced by the project from the S.1 measure.

Step 3: Compute the existing Fatal + Injury EPDO crash rate based on EPDO per 100 million VMT.

Step 4: Compute the expected Fatal + Injury EPDO crash rate reduction due to the project improvements - the S.1 reduced annual average F+I EPDO crashes divided by the segment 100 million VMT. For longer projects covering several segments with different AADT values, the average annual crash rate reduction is the sum of the segment reduced crashes over the sum of the segment VMTs.

The methodology varies by project type, as described above for S.1 crash frequency reduction assessments.

Transit/Freight Rail/TDM

The methodology described for roadway projects cannot be used for transit projects. For on-road and off-road (dedicated guideway) transit projects, only the S.1 measure of the total Fatal + Injury EPDO crash frequency reduction will be used so the transit safety score will be based on the S.1 result. The same approach as described for transit would be applied for Freight Rail types of the project, except the focus will be on the 5-year average of truck-related fatal and injury crashes in the parallel corridor.

Scoring Value

Expected reduction in fatal and injury (Fatal + Injury) EPDO crash rate.

7.0 Appendix B: Congestion Mitigation Measures

Table 7.1 Congestion Mitigation Factor – Measures Summary

ID	Measure Name	Weight	Measure Description	Measure Objective
C.1	Person Throughput	50%	Increase in corridor total (multimodal) person throughput attributed to the project	Assess the potential benefit of the project in increasing the number of users served within the peak period.
C.2	Person Hours of Delay	50%	Decrease in the number of person-hours of delay in the corridor	Assess the potential benefit of the project in reducing peak period person-hours of delay.

7.1 C.1 Person Throughput

Definition

Change in corridor total (multimodal) person throughput attributed to the project.

Data Source(s)/Analytical Tools

- Latest available 24-hour traffic count data summarized by hour, direction, and roadway segment, including vehicle classification, where applicable, from VDOT TMS, or jurisdiction.
- Latest available regional travel demand model encompassing the influence area only for projects consisting of new transportation facilities. The project is tested with the regional travel demand model using the SYIP highway network.
- Existing AADT by roadway segment from VDOT TMS or jurisdiction.
- Lane capacity is set by the current functional classification of the roadway. In the case of a new location roadway, the planned functional classification is used. Lane capacities were established based on an average of the capacities vs by area type outlined in the *ENTRADA User's Guide*, August 2020 and the *Virginia Travel Demand Modeling Policies and Procedures Manual Version 3.0*.
- Obtain lane capacities for different facility types (i.e., freeway, collector, etc.) and area types from the *ENTRADA User's Guide*, August 2020. The urban threshold for capacity will be used statewide and is generally based on LOS D/E.
- For park and ride projects, data from the U.S. Census Bureau's OnTheMap tool will be used to indicate the most common primary direction(s) and average distances of commute(s) for those living within the catchment area of the

proposed improvement. Additionally, when available, lot user surveys or other applicable information (conducted within the past five years) of existing park and rides within reasonable proximity of the proposed improvement can supplement OnTheMap data. Common directions of travel and average distances from OnTheMap, as well as any available origin-destination information from lot users surveys, are used to apply logical routing. The number of new park & ride users is determined using existing park & ride utilization in the area and/or projected demand based upon established methodology that factors in demographic data and travel patterns.

- For transit projects, the Department of Rail and Public Transportation (DRPT) will provide estimated daily ridership and hourly ridership for the proposed service.
- For new managed lane projects, assumed occupancy rates will be provided by VDOT.
- For roadway projects, SPS will be used to determine the number of lanes, lane widths, speed limit, terrain (e.g., level, rolling, mountainous), lateral clearance, number of driveways on arterials, interchange density on freeways, and median type on arterials.
- Latest available aerial imagery to determine merge, diverge, and weaving lengths on freeways and verify other data from SPS.
- FHWA Cap-X: evaluation tool that uses critical lane volumes (CLV) to evaluate the efficiency of intersections and interchanges.
- Potential traffic growth rate sources include SPS, and the travel demand model.

Methodology

The methodology is a quantitative, corridor-based analysis that requires an estimate of future no-build (without the project) and build (with the project) person throughput. It is anticipated that the project corridor will consist of an intersection or segment within the corridor, depending on the project type. The segment within the corridor with calculated person throughput increase above zero is used for analysis purposes.

The methodologies to determine person throughput for roadway, bicycle/pedestrian, transit, TDM (including park and ride lots), and freight projects are described below.

For all project types described in this section, person throughput is only credited/ scored if the facility is over capacity in the no-build project condition (has a volume to capacity ratio greater than 1.0)

Roadway

There are four types of analyses used to quantify the change in person throughput as a result of a proposed roadway project:

- Basic roadway segment (freeway, rural multilane, rural two-lane), urban arterial (segments between signals are combined with delay calculations from Cap-X to establish no-build versus build average travel speeds)
- Freeway facility (diverge, merge, weave)
- Intersection or interchange, and
- New/Complex facilities - Limited-access roadway capacity expansion projects greater than two miles in length are defined as complex.

The methodology to compute the change in person throughput will be described for each of the four facility types listed above. The methodology for the analysis of the first two facility types is the same.

Basic Roadway Segment / Freeway Facility

Basic segments represent uninterrupted-flow conditions and have no fixed causes of delay or interruption external to the traffic stream. This category includes two-lane highways, multilane highways, and basic freeway segments as defined in the *Highway Capacity Manual 6*. Freeway facilities also represent uninterrupted-flow facilities consisting of continuously connected segments that include: basic freeway, weaving, merge, and diverge segments. In order to calculate average travel speeds along signalized arterial routes, basic roadway segments are coded along the project length and are combined with the Cap-X analysis to compute the no-build and build average travel speeds.

A modified BPR equation is used for the analysis of these types of facilities. Nationally, the BPR equation is the mostly widely used volume-delay function for road segments. The equation addresses the relationship between volume and capacity on the segment, with the result being the delay associated with traffic volumes. Capacity in the BPR equation is based on the area type and facility type.

Step 1: Compile existing peak period traffic volumes within the project corridor using the aforementioned data sources, including existing peak period traffic count data from VDOT TMS.

Step 2: Determine the peak period flow rate on the roadway segment without the project and with the project. Using the capacity values by functional classification, compute the vehicle throughput without the project and with the project.

Step 3: Compute the change in peak period vehicle throughput by subtracting the no-build vehicle throughput from the build vehicle throughput.

Step 4: Compute the peak period person throughput for no-build and build conditions by multiplying the average vehicle occupancy rate by the vehicle throughput.

Intersection / Interchange

Intersections and interchanges represent interrupted flow conditions with features that create delay such as traffic signals.

Step 1: Compile existing peak period traffic volumes within the project corridor using the aforementioned data sources, including existing peak period traffic count data from VDOT TMS.

Step 2: Use FHWA CAP-X analysis tool to determine the intersection/ interchange critical lane volumes and to estimate the vehicle throughput for the no-build and build conditions.

Step 3: Compute the change in peak period vehicle throughput by subtracting the no-build vehicle throughput from the build project vehicle throughput.

Step 4: Compute the peak period person throughput for without and with conditions by multiplying an average vehicle occupancy rate by the vehicle throughput.

New/Complex Roadway Facilities

Estimating vehicle throughput for new roadway facilities requires the use of a regional travel demand model. The project is added to the regional travel demand model, using the SYIP highway network, and model outputs are then used to summarize with project vehicle throughput.

Step 1: Code the new facility into the regional travel demand model with assumed posted speed limit, facility type, and number of lanes.

Step 2: Identify links in the regional network operating below the speed limit in future no-build scenario with greater than 10% reduction of traffic for the different alternative improvements compared to the no build scenario. Calculate total difference in VHT for these links between the no-build model and the build model.

Step 3: Multiplying the difference between the no-build VHT from the build VHT by 30% to convert to peak period delay reduction (expressed in vehicle hours).

Step 4: Compute the average system project throughput by multiplying the difference between the no-build VHT from the build VHT by 60 to convert to vehicles minutes traveled, and dividing this difference by the average trip length (expressed in minutes).

Transit / Bicycle/Pedestrian / Freight Rail / TDM

New service for alternative modes supports change in throughput both on the other mode and on highway network. For trips on other modes, estimate total person throughput for existing and new users in the peak period. The person throughput reduction for new users is associated with any throughput savings associated with a shift from auto to the other mode. For the highway network, total demand is reduced, which may lead to a reduction in vehicle demand on parallel facilities. For transit projects, compute the number of equivalent vehicles on roadway(s) within the impacted area using a forecasted ridership per hour and an assumed transit occupancy. Once the number of vehicles on impacted roadway(s) is computed, determine the peak period person throughput for no-build and build conditions by multiplying an average vehicle occupancy rate by the vehicle throughput.

Scoring Value

Total change in person throughput due to the project.

7.2 C.2 PERSON HOURS OF DELAY

Definition

Decrease in the number of peak period person hours of delay in the project corridor.

Data Sources/Analytical Tools

- Latest available 24-hour traffic count data summarized by hour, direction, and roadway segment, including vehicle classification, where applicable, from VDOT TMS, or jurisdiction.
- Latest available regional travel demand model encompassing the influence area only for projects consisting of new location transportation facilities.
- Existing AADT by roadway segment from VDOT TMS or jurisdiction.
- Lane capacity is set by the current functional classification of the roadway. In the case of a new location roadway, the planned functional classification is used. Lane capacities were established based on an average of the capacities outlined in the *ENTRADA User's Guide*, August 2020 and the Virginia Travel Demand Modeling Policies and Procedures Manual Version 3.0.
- For park and ride projects, data from the U.S. Census Bureau's OnTheMap tool will be used to indicate the most common primary direction(s) and average distances of commute(s) for those living within the catchment area of the proposed improvement. Additionally, when available, lot user surveys or other applicable information (conducted within the past five years) of existing park and rides within reasonable proximity of the proposed improvement can

supplement OnTheMap data. Common directions of travel and average distances from OnTheMap, as well as any available origin-destination information from lot user's surveys, are used to apply logical routing. The number of new park & ride users is determined using existing park & ride utilization in the area and/or projected demand based upon established methodology that factors in demographic data and travel patterns.

- For transit projects, Department of Rail and Public Transportation (DRPT) will provide estimated daily ridership and hourly ridership for the proposed service.
- For new managed lane projects, assumed occupancy rates will be provided by VDOT.
- For roadway projects, SPS will be used to determine number of lanes, lane widths, speed limit, terrain (e.g., level, rolling, mountainous), lateral clearance, number of driveways on arterials, interchange density on freeways, and median type on arterials.
- Latest available aerial imagery used to determine merge, diverge, and weaving lengths on freeways and verify other data from SPS.
- FHWA Cap-X: evaluation tool that uses critical lane volumes (CLV) to evaluate the efficiency of intersections and interchanges.
- Potential traffic growth rate sources include SPS, and travel demand model.

Methodology

The methodology is a quantitative, corridor-based analysis that requires an estimate of future no-build (without project) and build (with the project) person throughput and congested travel speeds.

The methodologies to determine person-hours of delay for roadway, bicycle/pedestrian, transit, and freight projects are described below. It is anticipated that project corridor length definition will vary by mode and project type. For example, the project length for a park and ride lot project is equal to the average commuting distance determined from the census data website identified in the data sources. On the other hand, the project length for a roadway corridor improvement project is established by extending the corridor to the next adjacent signalized intersection or interchange on both ends of the corridor. If there are no adjacent signalized intersections or interchanges within one mile of either end of the corridor, then one mile is added to both ends of the corridor.

Roadway

There are four types of analyses used to quantify the change in person-hours of delay as a result of a proposed roadway project:

- Basic roadway segment (freeway, rural multilane, rural two-lane, urban arterial)

- Freeway facility (diverge, merge, weave),
- Intersection or interchange, and
- New facility.

Basic Roadway Segment/ Freeway Facility

Basic segments represent uninterrupted-flow conditions and have no fixed causes of delay or interruption external to the traffic stream. This category includes two-lane highways, multilane highways, and basic freeway segments as defined in the *Highway Capacity Manual 6*. Freeway facilities also represent uninterrupted-flow facilities consisting of continuously connected segments that include: basic freeway, weaving, merge, and diverge segments. In order to calculate average travel speeds along signalized arterial routes, basic roadway segment sheets are coded along the project length and are combined with the Cap-X analysis to compute the no-build and build average travel speeds.

A modified BPR equation is used for the analysis of these types of facilities. Nationally, the BPR equation is the mostly widely used volume-delay function for road segments. The equation addresses the relationship between volume and capacity on the segment, with the result being the delay associated with traffic volumes. Capacity in the BPR equation is based on functional classification.

Step 1: Compile existing peak period traffic volumes within the project corridor using the aforementioned data sources, including existing peak period traffic count data from VDOT TMS.

Step 2: Collect and document all roadway geometric features using data from SPS and supplemented by field visits and/or aerial imagery.

Step 3: Convert the peak period traffic volumes to flow rates using methods from the *Highway Capacity Manual 6*.

Step 4: Compute no-build and build travel speeds and delays using a modified BPR equation. Delay is calculated by calculating the difference between the predicted travel speed and the posted speed limit.

Step 5: Compute the change in vehicle hours of delay by subtracting the build (with project) delay from the non-build (without project) delay.

Step 6: Compute the peak period person hours of delay for no-build and build conditions by multiplying an average vehicle occupancy rate by the vehicle delay.

Step 7: Compute the change in person hours of delay by subtracting the build (with project) delay from the non-build (without project) delay.

Intersection / Interchange

Intersections and interchanges represent interrupted flow conditions with features that create delay such as traffic signals. Corridor travel speed and delay will be calculated based on intersection/interchange delay and segment speed and delay.

Apply a capacity check for intersection/interchange and roadway segment. Use the least improved bottleneck to calculate throughput change between the no-build (without project) and the build (with project) conditions.

Step 1: Compute existing peak period traffic volumes within the project corridor using the aforementioned data sources, including existing peak period traffic count data from VDOT TMS.

Step 2: Determine the critical lane volume for each approach to the intersection, which is defined as the movements with the maximum traffic volume per lane.

Step 3: Use FHWA CAP-X analysis tool to estimate the vehicle delay for the no-build and build conditions.

Step 4: Compute the peak period person delay for no-build and build conditions by multiplying the average vehicle delay by an average vehicle occupancy rate by the vehicle delay.

Step 5: Compute the change in peak period delay by subtracting the build (with project) delay from the non-build (without project) delay.

New Roadway Facilities

Estimating vehicle delay for new facilities requires the use of a regional travel demand model. The project is added to the regional travel demand model and model outputs are then used to summarize project build vehicle delay. The total vehicle delay reduction is the cumulative effect at a system level (total trips).

Step 1: Code the new facility into the regional travel demand model with assumed posted speed limit, facility type, and number of lanes.

Step 2: Identify links in the regional network operating below the speed limit in future no-build scenario with greater than 10% reduction of traffic for the different alternative improvements compared to the no build scenario. Calculate total difference in VHT for these links between the no-build model and the build model.

Step 3: Multiplying the difference between the no-build VHT from the build VHT by 30% to convert to peak period delay reduction (expressed in vehicle hours)

Step 4: Compute the person peak period delay by multiplying the average vehicle delay by an average vehicle occupancy rate.

Transit / Freight Rail / TDM

New service from alternative modes supports change in delay both on the other mode and on the highway network. For trips from other modes, estimate total person travel time savings for existing and new users in the peak hour. The person travel time savings for existing users is associated with any improvement in frequency or travel time associated with the project. The person travel time savings for new users is associated with any travel time savings associated with a shift from auto to the other mode. For the highway network, total demand is reduced, which may lead to a reduction in delay on parallel facilities.

Bicycle/Pedestrian

No reduction in person-hours of delay is assumed for a stand-alone bicycle and/or pedestrian project.

Scoring Value

Total peak-period person delay reduction.

8.0 Appendix C: Accessibility Measures

Table 8.1 Accessibility Factor – Measures Summary

ID	Measure Name	Weight	Measure Description	Measure Objective
A.1	Access to Jobs	60%	Change in average job accessibility per person within 45 minutes by driving (within 60 minutes for transit, bicycle, and pedestrian projects)	Measure assesses the average change in access to employment opportunities in the region as a result of project implementation based on the GIS accessibility tool.
A.2	Access to Jobs for Disadvantaged Populations	20%	Change in average jobs accessibility per person for disadvantaged populations within 45 minutes by driving (within 60 minutes for transit, bicycle, and pedestrian projects)	Measure assesses the average change in access to employment opportunities in the region as a result of project implementation based on the GIS accessibility tool.
A.3	Access to Multimodal Choices	20%	Assessment of the project support for connections between modes and promotion of multiple transportation choices	Measure assigns more points for projects that enhance interconnections among modes, provide accessible and reliable transportation for all users, encourage travel demand management, and potential to support incident management.

8.1 A.1 ACCESS TO JOBS

Definition

The GIS accessibility tool analyzes the existing average accessibility to jobs within 45 minutes per person at the individual U.S. Census block group level statewide. For transit, bicycle, and pedestrian projects, accessibility will be calculated to jobs within 60 minutes. The tool calculates the average accessibility to jobs by mode (auto, walk, bicycle, and transit). The jobs are weighted based on a travel time decay function, where jobs within a shorter travel time are weighted more than jobs farther away. The decay function was developed based on travel survey data. The average accessibility represents the total number of jobs reachable in a 45 minute travel time from each block group to every other block group by driving and in a 60 minute travel time from blocks to blocks by other modes.

The tool calculates the improvement in the number of jobs reachable within that travel shed resulting from a proposed transportation improvement. Therefore, the average number of jobs reachable represents the total jobs accessible from each block group/block to every other block group/block, weighted by the population

in each analytic zone. The actual metric relevant for SMART SCALE prioritization purposes is the increase in average job accessibility resulting from a proposed project. Travel times are based on congested roadway travel times, real transit operating schedules, and an assessment of pedestrian and bicycle network connectivity.

As part of the estimation of change in project corridor person-hours of delay (Measure C.2), an estimate of the project build congested speed is developed. The project build congested speed is entered into the underlying congested network within the accessibility tool, and the difference between the build and no-build congested speeds is used to calculate the change in cumulative accessibility by block group for auto.

Data Source(s)

- Accessibility tool.
- Change in project corridor congested speed, transit operations, and pedestrian system connectivity (as it relates to last-mile connections to transit service).

Methodology

The accessibility tool reports average accessibility to jobs by mode for each Census block group (for auto or Census block for walk, bicycle, and transit) in the region. The analysis of project benefits considers how an improvement in travel time expands accessibility to jobs at the block group or block-level (without consideration of regional or State boundaries). By default, 2030 land use forecasts will be used. Applicants may also provide modified land use density assumptions from a locally or regionally approved market study to be used for Build versus No-Build analysis.

Step 1: Update congested roadway speeds, transit network, or pedestrian system connectivity. Based on the analysis conducted in the congestion factor for measure C.2, post-project implementation congested speeds are generated and applied to the roadway network underlying the accessibility tool. For transit projects, the project corridor and basic operational information (peak period frequency and travel times) are coded into the transit network (based on General Transit Feed Specification (GTFS) data, which is a common format for public transportation schedules and associated geographic information) underlying the accessibility tool. For the non-motorized mode, the tool reflects improvements in connectivity provided by the new sidewalk, bicycle lanes or path connections or meaningful pedestrian elements that substantially improve the quality of service for pedestrians, bike users or on routes providing access to transit service.

Step 2: Use the accessibility tool to calculate the current (no build) accessibility by mode for a project. The accessibility is the average access to jobs from each block group/block to every other block group/block within the project's area of influence.

Step 3: Use the accessibility tool to calculate the build accessibility (using post-project implementation congested speeds and/or changes in quality of service of walking/bicycle network and transit operations) by mode for a project.

Step 4: Calculate the change in accessibility scores between the build and no-build conditions. For each project, an average accessibility improvement is reported (depending on mode, e.g., for roadway projects the auto mode improvement is reported, for transit projects the transit mode improvement is reported).

Scoring Value

Total change in average jobs accessibility.

8.2 A.2 ACCESS TO JOBS FOR DISADVANTAGED POPULATIONS

Definition

The accessibility tool analyzes the existing average accessibility to jobs within 45 minutes at the individual U.S. Census block group level statewide. For walk, bicycle and transit projects, accessibility will be calculated to jobs within 60 minutes. The tool calculates the average accessibility to jobs by mode (auto, walk, bicycle, and transit). The jobs are weighted based on a travel time decay function, where jobs within a shorter travel time are weighted more than jobs farther away. The decay function was developed based on travel survey data. The average accessibility represents the total number of jobs reachable in a 45 minute travel time from each block group to every other block group by driving and in a 60 minute travel time from blocks to blocks by other modes[8]. For this measure, the change in average job accessibility is calculated and averaged based on the disadvantaged population in each Census block or block group.

Data Source(s)

- Accessibility tool.
- 2014 U.S. Census American Community Survey 5-year estimates.

Methodology

For the purposes of this analysis, the "disadvantaged population" is calculated as low-income, minority, or limited-English proficiency (LEP) population.

[8] The area of influence of a project is defined as a 45 mile radius circle around the project for auto and transit modes (reflecting 45 minutes of travel at 60 miles per hour)) and a 3-mile and 10-mile buffers for walk and bicycle modes respectively. Beyond this area of influence, the tool does not calculate job accessibility as it is a distance that is not relevant to the vast majority of trips.

All Census blocks and block groups in Virginia were analyzed to determine the populations of low-income, minority, or limited English speaking persons (LEP) in each.

The accessibility tool calculates job accessibility averaged by population in each Census block or block group. The calculation of accessibility for the disadvantaged population was calculated in exactly the same way as described in A.1 above for general accessibility, except that instead of averaging for population as a whole, the accessibility was averaged for the disadvantaged population in each Census block or block group.

Scoring Value

Total change in average jobs accessibility for disadvantaged populations.

8.3 A.3 ACCESS TO MULTIMODAL CHOICES

Definition

This measure considers the degree to which the project can increase access to non-single occupant vehicle travel options. The objective is to recognize projects that enhance connections between modes or create new connections.

Data Source(s)

- GIS data of transit routes or transit service areas, all rail transit stations (from GTFS data as described for accessibility tool).
- DRPT/VDOT GIS data of park-and-ride lots.
- VDOT GIS data of on and off-road bicycle facilities (incomplete dataset at this time).
- Anticipated peak period non-SOV users of travel options with increased access or service.

Methodology

Step 1: The project sponsor provides project-level detail on the extent of connections and accommodation of multiple modes as part of the project definition and self-assign points consistent with descriptions in **Table 8.2**.

Step 2: The project corridor is entered into a GIS database and overlaid with a layer including all multimodal transportation options. The GIS analysis is recommended to inform the validation of sponsor scoring in **Table 8.2**.

For roadway or multimodal projects, this includes type of bicycle facility, type of pedestrian facilities, connection to park-and-ride locations or inclusion of managed lanes, inclusion of technology supporting traveler information, or wayfinding signage to other modes, and accommodation of on-road transit vehicles.

For transit projects, depending on transit mode, this includes associated bike and pedestrian facilities, bicycle parking, accommodation of bike on transit vehicles, park-and-ride facilities, traveler information, affiliation or presence of local TDM programs, and transfers with other transit modes.

For bike and pedestrian projects, this includes class of bicycle facility, type of pedestrian improvements, connections to other on- or off-road bicycle facilities, connections to transit facilities, and affiliation or presence of local TDM programs. A bicycle facility project can include elements in one or more of the following categories:

- On-Street Facilities: Shared use paths, separated bicycle lanes (cycle tracks), buffered bicycle lanes, conventional bicycle lanes, bicycle boulevards (signed routes), and shared roadways.
- Off-Street Facilities: Off-street bicycle facilities are separate from motor-vehicle roadways and include shared-use paths or trails. Trails may be adjacent to the roadway or located on an abandoned railroad right of way.
- Equipment: Bicycle facility equipment includes signs, traffic signals, barriers, and bicycle parking. Note: standalone equipment improvements, including bicycle racks as part of an application are not eligible as a bicycle facility.

Freight-related accessibility is considered in the economic development factor.

Table 8.2 Access to Multimodal Choices – Scoring Approach

Project Type (Mode) and Characteristics	Points (If Yes)
Project includes transit system improvements or reduces delay on a roadway with scheduled peak service of 1 transit vehicle per hour.	5
Project includes improvements to an existing or proposed park-and-ride lot. Ex. New lot, more spaces, entrance/exit, technology (payment, traveler information).	4
Project includes improvements to existing or new HOV/HOT lanes or ramps to HOV/HOT	2
Project includes construction, enhancement, or replacement of bike facilities. For bicycle projects, off-road or on-road buffered or clearly delineated facilities are required.	1.5
Project includes construction, enhancement, or replacement of pedestrian facilities. For pedestrian projects, sidewalks, pedestrian signals, marked crosswalks, refuge islands, and other treatments are required (as appropriate).	1.5
Project provides real-time traveler information or wayfinding specifically for intermodal connections (access to transit station or park&ride lot).	1
Provides traveler information or is directly linked to an existing TMC network/ITS architecture.	1
Total Points Possible	**5 points maximum**
Measure Scaling: Points are multiplied by the number of new peak period non-SOV users	

Step 3: SMART SCALE review staff evaluate project scoring and work with project sponsor to adjust scoring as necessary.

Step 4: Total project points are then multiplied (scaled) by the number of peak period non-SOV users.

Scoring Value

Total points reflecting multimodal choices scaled by the number of peak period non-SOV users of the project.

9.0 Appendix D: Environmental Quality Measures

Table 9.1 Environmental Quality Factor – Measures Summary

ID	Measure Name	Weight	Measure Description	Measure Objective
E.1	Air Quality and Energy Environmental Effect	100%	Potential of project to improve air quality and reduce greenhouse gas emissions	Measure rates a project's potential benefit to air quality by project benefits to non-SOV and freight users, applying a user based point system and a carbon dioxide offset calculation.
E.2	Impact to Natural and Cultural Resources	(*)	Potential of project to minimize impact on natural and cultural resources located within project buffer	Measure evaluates how much sensitive land could be affected within project buffer around the project. Points are subtracted from final score based on total potential sensitive acreage impacted.

* Up to 5 points subtracted from final score based on the total potential sensitive acreage impacted

9.1 E.1 Air Quality and Energy Environmental Effect

Definition

The Air Quality and Energy Environmental Effect measure estimates the level of benefit that a project is projected to have on air quality and greenhouse gas emissions (or alternative energy use). The objective of this measure is to recognize projects that are expected to contribute to improvements in air quality and reductions in greenhouse gas emissions.

Data Source(s)

- Project sponsor answers defined qualifiers as described below based on project definition.
- Increase in non-SOV users as determined in the congestion factor.
- Decrease in the number of peak period person-hours of delay as determined in the congestion factor.
- Percent trucks determined using Existing AADT by roadway segment from VDOT TMS or jurisdiction.

- Trip length as determined in the congestion factor.
- Fuel use factor and emissions factor

Methodology

Air quality and energy effect are determined by reviewing a project sponsor responses (collected through the project nomination) to the qualifications identified in **Table 9.2**. The methodology applies to all project types.

Step 1: The project sponsor self-assesses the project based on **Table 9.2**. The nomination form includes space for the sponsor to provide clarifications/justifications for the points awarded.

Step 2: SMART SCALE review staff receive each project nomination and review the information provided. As appropriate, staff contact project sponsors to address any questions or unexplained assignments.

Table 9.2 Air Quality and Energy Environmental Effect – Scoring Approach

Project Type (Mode) and Characteristics	Points (If Yes)
Non-SOV Project Characteristics	
Project includes improvements to rail transit or passenger rail facilities.*	3
Project includes construction or replacement of bike facilities. For bicycle projects, off-road or on-road buffered or clearly delineated facilities are required.*	2
Project includes construction or replacement of pedestrian facilities. For pedestrian projects, sidewalks, pedestrian signals, marked crosswalks, refuge islands, and other treatments are required (as appropriate).*	2
Project includes improvements to an existing or proposed park-and-ride lot. Ex. New lot, more spaces, entrance/exit, technology (payment, traveler information).*	2
Project includes bus facility improvements or reduces delay on a roadway with scheduled peak service of 1 transit vehicle per hour.*	1
Project includes energy-efficient fleets, including hybrid or electric buses*	0.5
Measure Scaling: *Points are multiplied by the number of peak period non-SOV users for that category	
Freight Transportation Project Characteristics	**Points (If Yes)**
Project reduces traffic delay at a congested intersection, interchange, or other bottleneck with a high percentage of truck traffic (greater than 8 percent of AADT). ** • 0 < Person Hours of Delay Reduced < 2 = 0.5 point • 2 <= Person Hours of Delay Reduced < 100 = 1 point • Person Hours of Delay Reduced >= 100 = 2 points	0.5 - 2
Project includes improvements to freight rail network or intermodal (truck to rail) facilities/ports/terminals.**	0.5
Measure Scaling: **Points are multiplied by peak period truck volumes	

Step 3: Apply User-Based Point System - Weighted 50%

After SMART SCALE staff review and confirm points assigned in Table 9.2, the non-SOV project component points are scaled by the respective increased users then all component values are summed. The scaled non-SOV users are normalized (0 to 50 scale). The freight project component points are scaled by the peak period truck volume then all component values are summed. The scaled freight users are normalized (0 to 50 scale).

The normalized non-SOV component is summed with the normalized freight component.

Step 4: Carbon Dioxide (CO_2) Offset - Weighted 50%

The increased non-SOV vehicle miles traveled (VMT) users are calculated by multiplying the increase in non-SOV users by the trip length. The non-SOV CO_2 offset is calculated by dividing the increase in non-SOV VMT by the average fuel economy and then multiplying by the CO_2 emissions factor. For example,

$$100 \text{ Non-SOV VMT} \times \frac{1 \text{ gallon gas}}{24 \text{ miles}} \times \frac{8.9 \text{ kg } CO_2}{1 \text{ gallon gas}} = 37.1 \text{ kg } CO_2 \text{ reduced}$$

Calculate the reduced heavy vehicle hours of delay (HVHD) by dividing the total person-hours of delay reduced (C.2 measure) by 1.2 persons/vehicle, and multiply by the weighted average truck percent. The freight CO_2 offset is calculated by multiplying the reduced HVHD by the diesel fuel idling and CO_2 emissions factors. For example,

$$10 \text{ HVHD reduced} \times \frac{0.44 \text{ gallon gas}}{1 \text{ hour}} \times \frac{8.9 \text{ kg } CO_2}{1 \text{ gallon gas}} = 39.2 \text{ kg } CO_2 \text{ reduced}$$

The total CO_2 offset is calculated by adding the non-SOV CO_2 offset and the freight CO_2 offset.

Step 5: Add Step 3 and Step 4 together for total E.1 measure score.

Scoring Value

Sum of the normalized non-SOV component and normalized freight component (Step 3) with the CO_2 offset (Step 4).

9.2 E.2 IMPACT TO NATURAL AND CULTURAL RESOURCES

Definition

This measure considers the potential of a project to minimize the impact on natural and cultural resources located within the project impact buffer.

Data Source(s)

GIS layers for each of four categories. For cultural resources, associated non-spatial data ("NRE Eligibility Status") will be used to determine eligibility for listing in the National Register of Historic Places. For threatened and endangered species, species status will be referenced to filter the spatial data appropriately and is limited to state endangered, state threatened, federal endangered, federal threatened.

Methodology

The potential of the project to minimize the impact on natural and cultural resources is conducted by considering the existing acres of sensitive areas and resources located within a project impact buffer, as shown in **Table 9.3** below, as well as the type of environmental document (EIS, EA, CE, PCE) expected to be required for the project. The final E.2 (Natural and Cultural Resource Impact) score for the project will be based on the total acres affected within the project buffer (initial score) and the weighted points derived from other factor areas. The resulting value is then renormalized to calculate the final score and weighting is applied. Measure E.2 is unique among evaluation measures because the score is subtractive.

Step 1: Using the project impact buffer around each project, total the acreage of land in four categories – 1) Conservation Land, 2) Species/Habitat, 3) Cultural Resources, and 4) Wetlands. The specific GIS layers used in each category are as follows:

Conservation Lands

- Appalachian Trail Conference Appalachian Trail
- Virginia Outdoor Foundation Protected Easements
- Virginia Department of Conservation and Recreation Conservation Land
- Virginia Department of Conservation and Recreation 6F properties
- Virginia Department of Conservation and Recreation Natural Heritage Screening Sites

- Virginia Department of Forestry Agricultural/Forest Districts

Species/Habitat

- Virginia Department of Wildlife Resources Threatened and Endangered Species
- Virginia Department of Wildlife Resources – Bats and Roost Trees

Cultural Resources

- National Park Service, American Battlefield Protection Program Potential National Register (POTNR) Areas
- Virginia Department of Historic Resources Architecture layer: properties listed in or determined eligible for listing in the National Register of Historic Places ("NRE Eligibility Status")
- Virginia Department of Historic Resources Archeology layer: sites listed in or determined eligible for listing in the National Register of Historic Places ("NRE Eligibility Status")
- Virginia Department of Conservation and Recreation Conservation Lands (Managing Agency= Virginia Department of Historic Resources)

Wetlands

- U.S. Fish and Wildlife Service National Wetlands Inventory

Step 2: Determine the level of environmental documentation required for the federal action. This information will be used to assess and scale the potential natural resource impacts. If not already determined by the appropriate federal agency with the action, VDOT/DRPT environmental staff will determine the anticipated level of environmental documentation required for the project using the best available information. Concurrence by the federal agency is required prior to the initiation of environmental documentation. The amount of potentially impacted acreage that will be counted towards the score is different based on the type of environmental document required:

- *Environmental Impact Statement (EIS)* – 50% of acreage used for scoring
- *Environmental Assessment (EA)* –30% of acreage used for scoring
- *Categorical Exclusion (CE)* – 10% of acreage used for scoring
- *Programmatic Categorical Exclusion (PCE)* – 0% of acreage used for scoring

This process of scaling acres based on the type of environmental document is illustrated in **Table 9.4** below.

If the sum of potentially impacted acres across all categories exceeds the total number of impact buffer acres (i.e., there are areas with multiple overlapping categories), the final measure is capped at the total size of the impact buffer in acres.

Table 9.3 Impact Buffer Area by Transportation Project Tier

Impact Buffer by Feature Type Selected	Impact Buffer
Tier 1 Access Management, Add/Construct Bike Lane, Bike/Pedestrian Other, Construct or Convert Existing General Purpose or Parking Lane to Bus-only Lane, Construct or Improve Bus Stop / Shelter, Construct Shared-Use Path, Construct Sidewalk, Improve Bike/Pedestrian Crossing (At Grade), Improve Bike/Pedestrian Crossing (Grade Separated), Improve Grade-Separated Interchange, Improve Rail Crossing, Increase Existing Route Service – Additional Vehicles or Increased Frequency, Innovative Intersection(s) / Roundabout(s), Intercity Passenger Rail Service Improvements, Intersection Improvement(s), ITS Improvement(s) / Adaptive Signal Control, New Intersection, New Route/Service, New Traffic Signal, New/Expanded Vanpool or On-Demand Transit Service, Other Transit Technology Improvements, Rail Service Improvements, Ramp Improvement(s), Road Diet, Roadway Reconstruction/Realignment, Shoulder Improvement(s), TDM Other, Traffic Signal Modification, Turn Lane Improvement(s), Widen Existing Lane(s) (No New Lanes)	30-foot buffer
Tier 2 Construct/Expand Bus Facility, Freight Rail improvements, Improve Park and Ride Lot, New Intercity Passenger Rail Station or Station Improvements, New Park and Ride Lot, New Station or Station Improvements, Right-of-Way/Easements acquisition required	1/8th mile buffer
Tier 3 Add New Through Lanes(s), Improve/replace existing bridge(s), Managed Lane(s) (HOV/HOT/Shoulder), New Bridge, New Interchange-Limited Access Facility, New Interchange-Non-Limited Access Facility, Roadway on New Alignment, Highway Other*, Rail Transit Other*	1/4th mile buffer

***Requires manual review to determine tier placement**

Table 9.4 Example - Impacted Acres by Type of Environmental Document

Project	Conservation	Species/ Habitat	Cultural Resources	Wetlands	Total Acres	Environmental Document Scale	Total Acres Scaled by Environmental Document	Impact Buffer Acres	Final Total Acres
A	100	25	25	150	300	EA (30%)	90	500	90
B	100	25	25	150	300	EIS (50%)	150	500	150
C	20	0	0	5	25	CE (10%)	2.5	500	2.5
D	200	400	200	400	1200	EIS (50%)	600	500	500

Scoring Value

Impacted acres scaled by document type and transportation project tier.

Whereas all the other measures are added together based upon typology weighting, the E.2 measure is applied to that sum as a subtractive measure.

Across typologies, all factor weights sum to 100% for a theoretical maximum benefit score of 100. For a project with no impacts on natural and cultural resources, zero points are subtracted; thus, a theoretical maximum score of 100 is maintained. Non-zero E.2 measures are normalized by dividing by the highest E.2 measure (i.e. the greatest impact on natural and cultural resources) then scaled by 5 points. These derived points, ranging from 0 to 5, are then subtracted from the sum of all other measures' weighted scores. This measure can cause a project with a non-zero score to earn a total adjusted score of zero. No project will receive a negative total benefit score. This process of converting scaled impacted acres to a negative score is illustrated in **Table 9.5** below.

Table 9.5 Example - Natural and Cultural Resources Impacted Acres on Benefit Score

Sum of All Other Weighted Measures	Impact to Natural and Cultural Resources	Normalized E.2 Measure	E.2 Points (Subtractive)	Total Benefit Score
60	Highest	100	-5.0	55.0
25	Moderate	40	-2.0	23.0
4	High	70	-3.5	0.5
3	Low	10	-0.5	2.5

10.0 Appendix E: Economic Development Measures

Table 10.1 Economic Development Factor – Measures Summary

ID	Measure Name	Weight	Measure Description	Measure Objective
ED.1	Project Support for Economic Development	60%	Project consistency with regional and local economic development plans and policies and support for local development activity	The intent of this measure is to assess if the project is supporting future economic development and the progress made toward development in the project corridor at the local level. Progress will be assessed through the use of a checklist of desired actions.
ED.2	Intermodal Access and Efficiency	20%	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.	The intent of this measure is to assess the: Level to which the project enhances access to distribution centers, intermodal facilities, manufacturing industries, or other freight intensive industries; Level to which the project supports enhanced efficiency on a primary truck freight route (or high volume/high-value truck or rail freight corridor); Level to which the project enhances access or reduces congestion at or adjacent to VA ports/ airports.
ED.3	Travel Time Reliability	20%	Improvement in travel time reliability attributed to the project	The intent of this measure is to determine the project's expected impact on improving reliability which supports efforts to retain businesses and increase economic activity.

10.1 ED.1 Project Support for Economic Development

Definition

Assessment of project based on input provided by the applicant regarding the project's potential to directly support economic development and the readiness of the economic development sites affected. Progress will be assessed through the use of a checklist of desired actions that examine the impact of the project on

economic development sites and the progress that has been made to advance the economic development sites.

Data Sources

Economic Development site description and supporting information provided by the project sponsor.

Methodology

The focus of this measure is on the support of real, planned non-residential development/redevelopment (residential-only developments are not eligible) within the project corridor (what is included in the project corridor is clarified in steps below). Residential development as part of a mixed-use development that includes a non-residential component is eligible. To qualify as mixed-use development, a site or parcel must be designated in the locality's current zoning map or future land use map as mixed-use zoning or future land use, which allows for a range of land uses (residential, commercial, cultural, institutional, and/or industrial) in a single development project. To qualify as redevelopment, a site or parcel must be in a measurable state of decline, disinvestment, abandonment, or a site cleared of the previous building(s). Redevelopment sites must rebuild or restore to non-residential or mixed-use and must include either a conceptual site plan, detailed site plan, or a building permit.

Project assessment is based on points received based on characteristics of both the transportation project and development sites located within a project buffer, as shown in **Table 10.2** below. Validation (based on documents provided by the applicant) of the existence of the project and site status in the checklist is included as part of the project nomination. The transportation project is awarded scaling points for each development site within a project buffer. The total scaling points are multiplied by the proposed or projected square footage of each development site to reflect the magnitude of the development supported by the transportation project. The maximum amount of development that can be considered for the purpose of scaling the ED.1 measure is set at 10 million square feet. An applicant may submit additional sites (square footage) above this cap; however, additional documentation consisting of tenant agreements, major economic development announcements from the state (Governor or Economic Development Partnership), and/or mega-site certification by a third party will be required for all sites that are zoned only or have conceptual site plans related to the project.

Figure 10.1 below illustrates the overall process to calculate ED.1 measure value.

Figure 10.1 Flow Chart for Project Support for Economic Development Measure Value

Step 1: Determine ED Site Eligibility - Distance from Transportation Project (Refer to Table 10.2)

- Tier 1 Transportation Project Type: 0.5-mile buffer
- Tier 2 Transportation Project Type: 1-mile buffer
- Tier 3 Transportation Project Type: 3-mile buffer

Step 2: Calculate Site Scaling Points (Refer to Table 10.3)

Select one – Site Plan Type (maximum of 3 scaling points):

- Detailed Site Plan Approved: 3 points
- Detailed Site Plan Submitted: 1 point
- Conceptual Site Plan Approved: 0.5 points
- Conceptual Site Plan Submitted: 0.25 points
- Zoned Only: 0 points

Select one – Site Characteristics (maximum of 1 scaling point)

- Redevelopment of existing site: 1 point
- VEDP Tier 5 Site: 1 point
- VEDP Tier 4 Site: 0.5 points
- VEDP Tier 3 Site: 0.25 points

(Maximum 4 total scaling points can be applied in Step 2)

Step 3: Calculate Transportation Project Scaling Points (Refer to Table 10.4)

- Proposed Transportation Project Included in Local Plans: 0.5 point
- Degree of economic distress: up to 0.5 point

(Maximum 1 scaling point can be applied in Step 3)

Step 4: Calculate Total Site Scaling Points

- Add ED Site Points (Step 2) and Transportation Project Points (Step 3)
  (Total Maximum of 5 scaling points per ED site)

Step 5: Calculate Site Adjusted Building Square Footage (Refer to Table 10.5)

- Identify ED Site Building Square Footage (up to a maximum of 10 million square feet)
- Adjust for Access Provision: 100%(multiply by 1) or 50% (multiply by 0.5)
- Adjust for Distance: Divide by distance to transportation project if greater than 1 mile

Step 6: Calculate Adjusted Site Score and Final Measure Value

- ED Site Scaling Points X Adjusted Square Footage = Adjusted Site Value
- Sum of each Adjusted Site Square Footage = ED.1 Measure Value

Site Eligibility by Transportation Project Type

To determine if a site is eligible for consideration in the ED.1 measure value, the proposed development has to be within a buffer distance from the transportation project. The project type has an assigned tier value, which defines the buffer area for eligibility. The site eligibility determination is defined in **Table 10.2**.

Table 10.2 Site Eligibility by Transportation Project Tier

Transportation Project Tier by Feature Type Selected	Distance from Transportation Project to be an Eligible ED Site
Tier 1 Add/Construct Bike Lane, Bike/Pedestrian Other, Construct or Convert Existing General Purpose or Parking Lane to Bus-only Lane, Construct or Improve Bus Stop / Shelter, Construct Shared-Use Path, Construct Sidewalk, Highway Other, Improve Bike/Pedestrian Crossing (At Grade), Improve Bike/Pedestrian Crossing (Grade Separated), Improve Park and Ride Lot, Improve Rail Crossing, Improve/replace existing bridge(s), Increase Existing Route Service – Additional Vehicles or Increased Frequency, ITS Improvement(s) / Adaptive Signal Control, New Intersection, New Park and Ride Lot, New Route/Service, New Traffic Signal, New/Expanded Vanpool or On-Demand Transit Service, Other Transit Technology Improvements, Rail Transit Other, Ramp Improvement(s), Right-of-Way/Easements acquisition required, Road Diet, Roadway Reconstruction/Realignment, Shoulder Improvement(s), TDM Other, Traffic Signal Modification, Turn Lane Improvement(s), Widen Existing Lane(s) (No New Lanes)	Up to 0.5 mile buffer
Tier 2 Access Management, Constuct/Expand Bus Facility, Innovative Intersection(s) / Roundabout(s), Intercity Passenger Rail Service Improvements, Intersection Improvement(s), Managed Lane(s) (HOV/HOT/Shoulder), New Interchange-Non-Limited Access Facility, Rail Service Improvements	Up to 1.0 mile buffer
Tier 3 Add New Through Lanes(s), Freight Rail improvements, Improve Grade-Separated Interchange, New Bridge, New Interchange-Limited Access Facility, New Intercity Passenger Rail Station or Station Improvements, New Station or Station Improvements, Roadway on New Alignment	Up to 3.0 mile buffer

Economic Development Site Scaling Points Criteria

Development site plan status scaling points are assigned in **Table 10.3**. Use the definitions below to determine the type and status of the site plan.

- Detailed Site Plan: Construction documents, engineering/architectural drawings and specifications that include construction requirements for a site. These plans are detailed enough for construction and include details regarding building pad locations, grading, drainage, utilities, parking, and entrances. Note that an applicant can only take credit for a site as long as the Certificate of Occupancy has not been issued prior to the final SMART SCALE submission deadline.
- Conceptual Site Plan: A conceptual sketch, or preliminary plan, as part of a rezoning application that must include the following details: (1) The location, area and density or floor area ratio (FAR) of each type of proposed

land use within the development. (2) A delineation of developable land to exclude wetlands and terrain that will not be developed. (3) The location of any proposed roadway facility on-site within the development's boundaries and the connectivity of the network addition as proposed. (4) The location of stub-outs on adjoining property and the existing land use of such adjacent property, if applicable, and the location of any proposed stub-outs within the network addition, if applicable.

- Approved: Site plans that have been reviewed and given documentation of support from the local jurisdiction and/or VDOT, if applicable. Official approval documentation from the approving authority must be uploaded with the application.
- Submitted: Site plans that are currently under review by a locality and/or VDOT, if applicable, for construction, rezoning, or special use permits. Documentation of submitted site plans to the approving authority must be uploaded with the application.
- Zoned-Only: Development project lacks an approved or submitted conceptual or detailed site plan but is consistent with local comprehensive plan's future land use or zoning map, and/or zoning code/ordinance. Zoned-only sites must have primary access to the project or be directly adjacent to the proposed transportation project to be eligible. For the purposes of SMART SCALE, zoned only sites will be capped at an assumed Floor Area Ratio (FAR) of 0.3 unless the applicant can provide documentation as part of the project application that the average FAR for sites around the proposed project exceeds 0.3 or that local ordinances or zoning has established a minimum FAR greater than 0.3.

Site characteristic scaling points are defined below in **Table 10.3**. Use the definitions below to determine the type and status of the site plan.
Redevelopment of Existing Site: Existing buildings on the site with a total building footprint of at least 10% of the site area that will be demolished or rehabilitated for non-residential or mixed-use development. Note that to gain points for redevelopment status a site must have Conceptual or Detailed site plan approved.

- Redevelopment sites must rebuild or restore to non-residential or mixed-use and must include either a conceptual site plan, detailed site plan, or a building permit. As the intention of this category is to encourage rehabilitation of derelict properties, parcels that are currently in use but upzoned to include mixed-use development do not qualify, nor do upgrades or replacements on continuously operational educational campuses, nor locations that are merely being transferred from one business to another. The existence of a minor remaining business on an otherwise abandoned parcel does not foreclose the possibility of redevelopment.
- VEDP Location: The site is listed by the Virginia Economic Development Partnership's (VEDP) Business Ready Sites Program (VBRSP) as a Tier 5

"shovel ready," Tier 4 "infrastructure ready" site, or Tier 3 "Zoned industrial/commercial, due diligence complete." Note that the VEDP site location is independent of plan approvals, so VEDP site location status is allocated points in addition to the level of plan approvals.

Table 10.3 Site Scaling Points

Scaling Point Description	Points Value
Development Site Plan Status (Max of 3 scaling points)	Detailed site plan approved: 3
	Detailed site plan submitted: 1
	Conceptual site plan approved: 0.5
	Conceptual site plan submitted: 0.25
	Zoned Only: 0
Site Characteristics (Max of 1 scaling point)	Redevelopment of existing site: 1
	VEDP Tier 5 Site: 1
	VEDP Tier 4 Site: 0.5
	VEDP Tier 3 Site: 0.25
	Subtotal of Economic Development Site Scaling Points (max 4 points that can be applied)
Development building square footage up to a maximum of 10 million square feet (does not include residential-only property) within a specified buffer distance from the project and adjusted by factors will be multiplied by the above points to calculate the final project measure value. Zoned-only sites must have primary access to the project or be directly adjacent to the proposed transportation project in order to be eligible.	

Transportation Project Scaling Points Criteria

Transportation project scaling points are applied based on the proposed transportation project, and then points are distributed to each eligible economic development site in the application.

Referenced in Local Plans: To determine whether a project is consistent with local plans, first identify the local Comprehensive Plan, local Economic Development Strategy or Regional Economic Development Strategy for the geographic area in which the transportation project is proposed. Second, review the goals, objectives, and strategies noted in the document(s) to determine if the proposed transportation project is specifically cited in the document(s) as a key project desired to support local/regional economic development. If the proposed transportation project is specifically mentioned as a key project in at least one of the local Comprehensive Plan, local Economic Development Strategy or Regional Economic Development Strategy documents, the project is considered "referenced in" and is awarded 0.5 points.

Economic Distress: To determine the relative economic distress of a project location, consult the Economic Innovation Group's latest Distressed Communities Index by ZIP Code (ZIP Codes refer to US Census Bureau ZIP Code Tabulation Areas). Find the ZIP Code or Codes in which the transportation project is located.

Use the highest distress score (maximum value of 100) and divide by 200. If the transportation project is located in a ZIP Code that does not have a distress score (Zip Codes with populations under 500 do not have a value calculated), then use the highest value adjacent ZIP Code and divide by 200.

Table 10.4 Transportation Project Scaling Points

Scaling Point Description	Points Value
Transportation project referenced in local Comprehensive Plan, local Economic Development Strategy or Regional Economic Development Strategy	Referenced in: 0.5 points
Transportation project area economic distress score	Up to: 0.5 points
Subtotal of Transportation Project Points (max 1 point that can be applied – these points are applied to each eligible economic development site included in the project application)	
NOTE: Zoned-only sites must have primary access to the project or be directly adjacent to the proposed transportation project in order to be eligible.	

Scaling points are multiplied by the proposed or potential development building square footage (does not include residential-only property) near the project, based on the project buffer and access/distance adjustments, which are defined below in **Table 10.5**.

Table 10.5 Adjustments for Access and Distance

Access Provision Adjustment	
Transportation Project provides new direct access to the site or improves existing access to the site (site must be physically adjacent to the project). In case of capacity enhancement to limited access facility, new or improved interchange, transit rail capacity improvement, or new transit rail station, zoned properties* within 0.5 miles of the adjacent interchange(s) or rail station(s) qualify as receiving improved direct access.	100% of building sq. footage
Transportation 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% of building sq. footage
Distance Adjustment**	
Economic development site is within 1 mile of the proposed transportation project.	100% of building sq. footage
Economic development site is greater than 1 mile from proposed transportation project.	Divide building sq. footage by distance in miles

* Zoned only sites must have primary access to the project or be directly adjacent to the proposed transportation project in order to be eligible.

** distance is measured via the travel distance on the transportation network

The following hypothetical case study for a proposed interchange improvement project shows the sequence for scoring a transportation project's ED.1 measure value.

Step 1: Determine Site Eligibility by Transportation Project Type - Interchanges are classified as Tier 3 Projects, allowing economic development sites within 3 miles of the project to be considered for scoring.

Step 2: Calculate Site Scaling Points - There are three economic development sites within the 3-mile buffer of the proposed interchange Site A, Site B, and Site C.

- Site A has a detailed site plan approved (+3 points), is a VEDP Tier 4 site (+0.5 points). *Site A receives 3.5 total Economic Development Site scaling Points.*
- Site B has a conceptual site plan approved (+0.5 points) and has qualifying redevelopment (+1 points). *Site B receives 1.5 total Economic Development Site Scaling Points.*
- Site C is a zoned-only site (+0 points) and is a VEDP Tier 3 Site (+0.25 points). *Site C receives 0.25 total Economic Development Site Scaling Points.*

Step 3: Calculate Transportation Project Scaling Points - A proposed interchange project is referenced as a key economic development project in the local Comprehensive Plan (+0.5 point). The ZIP code containing the proposed

interchange project has an identified Economic Distress Score of 50 (+0.25 points). *Total Transportation Project Scaling Points are 0.75. – there are 3 ED sites; therefore 0.75 scaling points will be applied individually to Site A, Site B, and Site C.*

Step 4: Calculate Total Site Scaling Points

- Site A total scaling points = 3.5 (economic development site scaling points) +0.75 (transportation project scaling points) = 4.25
- Site B total scaling points = 1.5 (economic development site scaling points) + 0.75 (transportation project scaling points) = 2.25
- Site C total scaling points = 0.25 (economic development site scaling points) + 0.75 (transportation project scaling points) = 1.0

Step 5: Apply Adjustments for Access and Distance - Adjust the building square footage for each site multiplying by 1 if directly accessed by the proposed transportation project or by 0.5 if indirectly accessed.

Then, adjust again by dividing by the distance in miles between the transportation project and development site for any distance greater than one mile. Example shown below in **Table 10.6.**

Table 10.6 Example Calculating Building Square Footage

Site	Building Sq. Ft.	Project provides direct access (Yes = 1, No = 0.5)	Adjusted Sq. Ft.	Distance to transportation project (divide by miles if greater than 1 mile)	Final Adjusted Sq. Ft.
A	250,000	1	250,000	0.2 miles	250,000
B	250,000	0.5	125,000	2.5 miles	50,000
C	150,000	1	150,000	1.5 miles	100,000

Step 6: Multiply the final adjusted square footage for each site by the Total Project Site Scaling Points. Total the scores for each site to determine the final ED.1 measure value. Example shown below in **Table 10.7**

Table 10.7 Support for Economic Development Final Measure Value

Site	Final Adjusted Square Footage	Total Site Scaling Points	Adjusted Site Value
A	250,000	4.25	1,062,500
B	50,000	2.25	112,500
C	100,000	1.0	100,000
			1,275,000

The proposed example project has an ED.1 measure value of 1,275,000.

10.2 ED.2 INTERMODAL ACCESS AND EFFICIENCY

Definition

Measure rates each project based on the extent to which the project is deemed to enhance access to critical intermodal locations and/or freight intensive industries and supports increased efficiency for freight movement in congested corridors.

Data Sources

- Project description and supporting information provided by the project sponsor
- Project description, if applicable, in the Virginia Multimodal Freight Study (2014)
- STAA Truck Routes and Restrictions[9]
- SMART SCALE Congestion Scoring outputs

Methodology

Project descriptions will be reviewed and assessed based on the extent to which the project is deemed to enhance access to critical intermodal locations and/or freight intensive industries and supports increased efficiency for freight movement in congested corridors.

Points are assigned through a qualitative assessment of the project description and supplementary information submitted by the project sponsor. Flexibility is provided in the project nomination for sponsors to describe the manner in which the project is expected to enhance access to critical intermodal locations, interregional freight movement, and/or freight intensive industries and supports increased efficiency for freight movement in congested corridors. The project rating is based on the extent to which the project is deemed to enhance access to critical intermodal locations, freight networks, and/or freight intensive industries and supports increased efficiency for freight movement in congested corridors. The Congestion Scoring process will identify roadway improvements that are likely to provide an operational benefit to freight movement.

This comparison supports a determination of the level of economic enhancement on a 0 to 6 scale as summarized in **Table 10.8**.

[9] http://gis.vdot.virginia.gov/vatruckweb/VaTruckRestrictions.aspx

Table 10.8 Intermodal Access and Efficiency – Scoring Approach

Rating Description	Value
1. Level to which the project enhances access to existing or planned distribution centers, intermodal transfer facilities (excluding ports and airports), manufacturing industries or other freight intensive industries	
Project provides direct access (within 1 mile) to existing or planned locations	2
Project provides indirect access (greater than 1 mile, less than 3 miles) to existing or planned locations	1
No direct or indirect access	0
2. Level which the project supports enhanced efficiency on a primary truck freight route	
Project is on the designated STAA National and Virginia Network or a STAA Virginia Access Route[10]	2
Project directly connects to designated STAA National and Virginia Network or a STAA Virginia Access Routes	1
Project is not on and does not connect to the designated STAA National and Virginia Network	0
3. Level to which the project enhances access or reduces congestion at or adjacent to Virginia ports or airports	
Project provides direct access to (within 1 mile) existing or planned ports or airports (measured from designated entry gates to port or air cargo facilities)	2
Project provides indirect access to (greater than 1 mile, less than 3 miles) existing or planned ports or airports (measured from designated entry gates to port or air cargo facilities)	1
No direct or indirect access	0
Total (sum of score)	**0 – 6**

Scoring Value

Total points received based on the assessment in **Table 10.8** are multiplied (scaled) by total freight tonnage within the project corridor and by the total length of the proposed roadway project contributing to the operational benefit to freight movement. Depending on the project type, the definition of total freight tonnage within the project corridor will vary. For example, for an interchange project or extension of acceleration/deceleration lanes at an interchange, estimates of freight tonnage on the ramps (instead of the mainline) will be used to scale the points received as described in **Table 10.8**.

[10] http://gis.vdot.virginia.gov/vatruckweb/VaTruckRestrictions.aspx.

10.3 ED.3 TRAVEL TIME RELIABILITY

Definition

Change in travel time reliability attributed to the project.

Data Source(s)

- Latest five complete years of crashes from VDOT Roadway Network System (RNS) GIS data maintained by Traffic Engineering Division.
- Buffer index (BI) from University of Maryland Regional Integrated Transportation Information System (RITIS).
- Weather information from VDOT VA Traffic database.
- AASHTO *Highway Safety Manual* (HSM), 2010.

Methodology

The methodology to compute travel time reliability for a project is a quantitative, corridor-based analysis with two components: impact and frequency. The impact is defined as the ability of a project to reduce the impact of the four contributors for unreliable travel time:

- Highway incidents
- Weather events
- Work zones
- Capacity bottlenecks

Since other SMART SCALE measures account for the impacts of work zones and capacity bottlenecks, only the impacts of highway incidents and weather events will be accounted for in the computation of travel time reliability.

Frequency is defined as the likelihood of unanticipated delays due to highway incidents and weather events. Estimates of frequency are based on segment data for incidents and weather.

For each project, VDOT will compile information to compute five factors to be used in evaluating the reliability of the proposed project:

- BI
- Incident impact
- Incident frequency
- Weather impact
- Weather frequency

The BI is defined as the extra time travelers should add to average travel times to ensure on-time arrival. This index is expressed as a percentage of the average time.

A BI of 0.20 means that traveler needs to increase their time cushion by an extra 20% from the average travel time. This index value is computed by dividing the difference between the 95th percentile travel time and mean travel time by the mean travel time for a segment. For long corridors, the index is averaged using a weighted factor based on VMT.

The BI, which comes from the RITIS data, does not provide statewide coverage. In the first round of SMART SCALE scoring, in cases where data does not exist, the method utilized buffer indices from other nearby facilities. This approach leads to questionable results on low-volume roadways. Moving forward, if BI data does not exist within the project corridor, the approach is to assume there is no reliability issue and BI = 0 - therefore, the score will be 0.

The methodology to compute travel time reliability for roadway projects is defined in the following steps:

Step 1: Determine the impact of incidents on the network. The effectiveness of the project to reduce the impact of incidents within the project study area will be based on the type of project. **Table 10.9** present the impact values of both roadway and transit projects. Project types that are most effective at reducing the impacts of incidents will receive the highest scores as identified in the following scoring criteria:

2: Projects directly improving incident frequency and duration (e.g., interchange improvements, truck run-away ramps, queue warning)

1: Projects improving incident management response (e.g., traveler information systems, location signs, reversible lanes)

0: No impact

While most projects provide one benefit in incident reduction per the project type listed in **Table 10.9**, there are complex projects that provide more than one benefit. For those projects, the total score of the impact of incidents is found by adding the maximum value of one benefit (i.e., 1 or 2) to 10% of the value of the remaining benefits. For example, if a project adds a travel lane and a truck runaway ramp, its score is 2 (travel lane) + 10%x 2 (truck runaway ramp) = 2.2

Step 2: Determine the frequency of crashes using historical crash data. VDOT will compile the latest five years of crashes within the project limits. An annual average Equivalent Property Damage Only (EPDO) value is obtained through data from the VDOT Roadway Network System, and the ratio of cost for crashes by severity published by FHWA and AASHTO since the EPDO value is used as a measure to quantify the incident duration and the impact to travel time reliability, the weight for Fatal crashes is adjusted from 540 to 120 to better reflect the incident duration as opposed to the societal cost as applied in the EPDO calculation for the safety measures. EPDO will be used as a surrogate measure to determine the frequency and duration of incidents since more severe crashes will typically cause longer traffic disruption. The EPDO equates injury and fatal crashes to property damage only crashes, thus reflecting the severity. Project types that are most effective at

reducing the frequency and severity of incidents will receive the highest scores as identified in the following scoring criteria:

5: EPDO greater than 300

4: EPDO between 200 and 300

3: EPDO between 125 and 200

2: EPDO between 75 and 125

1: EPDO between 25 and 75

0: EPDO less than 25

Step 3: Determine the impact of weather events. The effectiveness of the project to reduce the impact of weather within the project study area will be based on the type of project. Project types that are most effective at reducing the impacts of weather will receive the highest scores as identified in the following scoring criteria:

2: Projects directly mitigate weather impacts by geometric improvements or end-to-end detection or warning systems

1: Projects that contain a component of an end-to-end detection or warning system or mitigate the event (e.g., improved detour routes, expanded transit operations)

0: No impact

While most projects provide one benefit in mitigating weather events per the project type listed in **Table 10.9**, there are complex projects that provide more than one benefit. For those projects, the total score of the impact of weather events is found by adding the maximum value of one benefit (i.e., 1 or 2) to 10% of the value of the remaining benefits. For example, if a project adds a bridge heating system and a reversible lane, its score is 2 (bridge heating system) + 10%x 1 (reversible lane) = 2.1

Step 4: Determine the frequency of weather events using historical weather data. VDOT will compile three years of historical weather data within the project limits. The magnitude of weather events will be determined from historical data and scores will be assigned according to the following criteria:

2: More than 40 hours of combined moderate/severe snow events and flood events per year

1: Between 20 and 40 hours of combined moderate/severe snow events and flood events per year

0: Less than 20 hours of combined moderate/severe snow events and flood events per year

Step 5: Compute the BI of the roadway. The Regional Integrated Travel Information System (RITIS), offered through VDOT's participation with the I-95 Corridor Coalition provides a tool to calculate the BI. The RITIS system can

provide the BI for all interstates and most primary routes. Where BI data is not available, it can be assumed that the BI is zero if no congestion or reliability issues are observed.

Step 6: Compute the travel time reliability measure. To compute travel time reliability, add the product of the incident impact (from Step 1) and the incident frequency (from Step 2) to the product of the weather impact (from Step 3) and the weather frequency (from Step 4), then multiply this result by the BI (from Step 5).

The methodology to determine travel time reliability for transit and TDM (including park and ride lots) projects uses this defined process as they are included as project impacts in **Table 10.9**. Bicycle/pedestrian projects are not applicable.

Scoring Value

The travel time reliability measure estimated in Step 6 above is multiplied by corridor VMT to scale the scoring results.

Table 10.9 Incident, Weather and Work Zone Impact Scoring

Major Project Type	Sub Project Type	Incidents Impact	Weather Impact
Median Design	Emergency crossovers, Controlled/Gated turnaround	2	1
	Moveable traffic barriers	0	1
	Movable cable median barrier	1	1
	High median barriers	1	0
	Traversable medians	1	0
	Accessible/widen shoulder to 10 feet	2	1
Shoulder Design	Drivable shoulder to 11-12 feet	2	1
	Hard shoulder running/Dynamic shoulders	2	1
	Emergency pull-offs/Turnouts, Crash investigation sites	2	0
	Bus turnouts	0	0
Ramps Design and Use	Ramp widening (All lanes)	2	1
	Ramp closure (time of day)	1	1
	Off-ramp terminal traffic control	2	0
	Ramp turn restrictions (time of day)	0	0
Truck Incident Design	Runaway truck ramps	2	0
Travel Lanes Design	Add travel lanes	2	1
	Interchange modifications – ramps	2	1
	Intersection modifications – turning lanes	2	1
Animal-Vehicle Collision	Wildlife fencing over/underpass	1	0
Lane Types and Use	Contra-flow lanes (no-notice evacuation will be scored w/ weather)	0	2

Major Project Type	Sub Project Type	Incidents Impact	Weather Impact
	Adding HOV lanes / HOT lanes	2	1
	Dual facilities (bypass lanes)	2	1
	Reversible lanes	1	1
	Lane reconfigurations to improve capacity or improve safety (static change, i.e., lane stripes)	1	0
Traffic Signals	Emergency vehicle traffic signal improvements	2	0
	Signal timing systems	1	0
Active Traffic Mgmt	Dynamic ramp metering / flow signals	1	1
	Variable speed limit / reduction	2	2
	Connected Vehicle System integration	2	2
	Over-height vehicle detection system	2	0
	Truck roll over warning	2	0
	Queue warning	2	0
	Integrated Corridor Management (alt routes/modes)	1	1
	Dynamic lane merging	1	0
Tolling	Converting to all electronic tolling	1	0
Weather	Fog detection warning system	0	2
	RWIS	0	2
	Flood warning systems / Wind warning systems	0	2
	Bridge heating systems / Anti-icing	0	2
	Drainage improvements	0	2
Incident Management	Incident clearance – pre-staged incident response, incentive-based towing, emergency relocation programs	2	0
	Safety Service Patrol	2	1
	Improvements to detour routes	2	1
	Reference location signs	1	0
	Incident detection / CAD integration	2	0
TDM	Park and Ride Lots	0	0
	Traveler Information/ Travel Time Information: DDMS	1	1
Transit	Additional trains on existing rail lines	0	1
	New rail lines	0	1
	New rail station / intermodal connection	0	1
	Transit AVL – Traveler Information	0	0
	Shorter headway	0	0
	New bus route	0	1
	Larger bus capacity	0	0
	Additional bus stops	0	0

11.0 Appendix F: Land Use Coordination Measure

Table 11.1 Land Use Factor – Measure Summary

ID	Measure Name	Weight	Measure Description	Measure Objective
L.1	Future transportation efficient land use	50%	Evaluates the amount of population and employment located in areas with high non-work accessibility	To determine the degree to which the project supports population and employment that on averages has a reduced impact on the transportation network
L.2	Increase in Transportation Efficient Land Use	50%	Evaluates the increase in amount of population and employment located in areas with high non-work accessibility between present-day and the horizon year of 2030	To determine the degree to which the project supports population and employment that on averages has a reduced impact on the transportation network

11.1 L.1 Future Transportation Efficient Land Use

Definition

The measure reports a project's support for transportation efficiency based on the amount and pattern of future development. The measure is based on (1) the amount of population and employment in 2030 and (2) the non-work accessibility, or the number of key non-work destinations that are accessible within a reasonable walking distance. Research and analysis have demonstrated that areas with a high level of non-work accessibility result in fewer vehicle miles traveled per household than in areas with less non-work accessibility with reductions of as much as 66% per household.

Data Sources

- Accessibility tool
- Change in local pedestrian network and network conditions
- Horizon year, 2030, population and employment

Methodology

The accessibility tool reports access to non-work destinations by walking as a composite value at the individual U.S. Census block level. The analysis considers how well local land uses around the project support access to a variety of destinations within a reasonable walking distance. Current non-work destinations considering the impact of the project will be used. Proposed changes to transportation networks are included in the analysis; those that improve walking access to destinations will improve scores, while any that impede walking access will reduce scores.

A composite value of local access to non-work destinations was established by analyzing existing patterns throughout Virginia. This value, described in **Table 11.2**, assigns points for different types of non-work destinations accessible by walking, based on the maximum expected number of occurrences for each destination type statewide. Similar to the access to jobs analysis, destinations are evaluated using a decay curve where destinations within a shorter travel time are weighted more than destinations farther away. The decay function was developed based on travel survey data. Every location in Virginia earns a value between 0 and 100.

Table 11.2 Local Non-Work Access Value

Destination Type	Definition (specific destinations included)	Points per destination
Bank	Bank, ATM	0.74 (up to 15 occurrences)
Education	School	5.6 (up to 2 occurrences)
Entertainment	Cinema, Performing Arts, Museum, Nightlife, Sports Complex, Convention/Exhibition Center, Sports Center, Animal Park	5.6 (up to 2 occurrences)
Food & Drink	Restaurants, Coffee Shop, Winery, Bar or Pub	0.25 (up to 45 occurrences)
Grocery	Grocery	3.7 (up to 3 occurrences)
Healthcare	Hospital, Medical Service, Pharmacy	3.7 (up to 3 occurrences)
Public Services	Library, Post Office, Community Center, City Hall, Court House, Police Station	3.7 (up to 3 occurrences)
Recreation	Golf Course, Ice Skating Rink, Campground, Park/Recreation Area	3.7 (up to 3 occurrences)
Shopping	Shopping, Convenience Store, Clothing Store, Department Store, Specialty Store, Home Improvement & Hardware Store, Office Supply & Service Store, Bookstore, Home Specialty Store, Sporting Goods Store, Consumer Electronic Store	0.34 (up to 33 occurrences)
Total points		**100**

Step 1: Update transportation networks in the accessibility tool to reflect new or changed links that the proposed project will provide. The tool imposes impedances on certain walking conditions automatically. Measure development involves scanning the project area carefully using aerial imagery for links that are legally walkable but that average people would avoid, such as crossings of unsignalized freeway ramps or narrow bridges with narrow shoulders and no

pedestrian accommodations; any of these links within a 1-mile buffer of the project are removed.

Step 2: Use the accessibility tool with a destination-decay rate for the walking mode to calculate post-project non-work accessibility to the weighted destinations in **Table 11.2** for each Census block in a 1-mile buffer of the project.

Step 3: Obtain horizon-year population and employment for all Census blocks in the 1-mile study area. For each block, calculate the sum to obtain the future job population.

Scoring Value

L.1 – Non-Work Accessibility x Future Density

The post-project non-work accessibility value for each block is multiplied by the future job-population density of each block, and these values are averaged

L.1 Measure = Average for all blocks of [Future Job-Population Density x Post-Project Non-Work Accessibility Value]

11.2 L.2 INCREASE IN TRANSPORTATION EFFICIENT LAND USE

Definition

This measure uses the same inputs as the L.1 measure, but it evaluates the increase in the amount of population and employment located in areas with high non-work accessibility. The measure is based on (1) the change in the amount of population and employment between today and the horizon year of 2030 and (2) the non-work accessibility, or the number of key non-work destinations that are accessible within a reasonable walking distance.

Data Sources

- Accessibility tool
- Change in local pedestrian network and network conditions
- Current year and horizon year, 2030, population and employment

Methodology

The accessibility tool reports access to non-work destinations by walking as a composite value at the individual U.S. Census block level. The analysis considers how well local land uses around the project support access to a variety of destinations within a reasonable walking distance. Current non-work destinations considering the impact of the project will be used. Proposed changes to transportation networks are included in the analysis; those that improve walking

access to destinations will improve scores, while any that impede walking access will reduce scores.

A composite value of local access to non-work destinations was established by analyzing existing patterns throughout Virginia. This value, described in the previous section in **Table 11.2**, assigns points for different types of non-work destinations accessible by walking, based on the maximum expected number of occurrences for each destination type statewide.

Step 1: Update transportation networks in the accessibility tool to reflect new or changed links that the proposed project will provide. The tool imposes impedances on certain walking conditions automatically. Measure development involves scanning the project area carefully using aerial imagery for links that are legally walkable but that average people would avoid, such as crossings of unsignalized freeway ramps or narrow bridges with narrow shoulders and no pedestrian accommodations; any of these links within a 1-mile buffer of the project are removed.

Step 2: Use the accessibility tool with a destination-decay rate for the walking mode to calculate post-project non-work accessibility to the weighted destinations in **Table 11.2** for each Census block in a 1-mile buffer of the project.

Step 3: Calculate the difference between the existing and horizon-year job-population (the sum of population and employment for all Census blocks in the 1-mile study area. For each block, calculate the sum to obtain the future job population.

Scoring Value

L.2 - Non-Work Accessibility – Change in Density

The post-project non-work accessibility value is multiplied by the expected change in job-population density of each block, and these values are averaged

L.2 Measure = Average of all blocks of [(Future Job-Population Density – Existing Job-Population Density) x Post-Project Accessibility Value]

12.0 Appendix G: List of Acronyms

AADT	Annual average daily traffic
BOS	Board of Supervisors
BI	Buffer Index used in calculation of reliability measure
BPR	Bureau of Public Roads
CAP-X	FHWA Capacity Analysis for Planning of Junctions analysis tool
CE	Categorical Exclusion (NEPA)
CN	Construction phase for schedule and cost estimates
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CoSS	Corridors of Statewide Significance
CTB	Commonwealth Transportation Board
DRPT	Virginia Department of Rail and Public Transportation
DGP	District Grant Program
EPDO	Equivalent Property Damage Only, crash value defined by FHWA
FAMPO	Fredericksburg Area MPO
FAST	Fixing America's Surface Transportation Act, federal transportation bill
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact (NEPA)
FTA	Federal Transit Administration
GIS	Geographic Information Systems
HCS	Highway Capacity Software
HPPP	High-Priority Projects Program
HRTPO	Hampton Roads TPO
HSIP	Highway Safety Improvement Program
HSM	AASHTO Highway Safety Manual
IJR	Interchange Justification Request
IMR	Interchange Modification Report
MAP-21	"Moving Ahead for Progress in the 21st Century" Act, federal transportation bill
MPO	Metropolitan Planning Organization

NEPA	National Environmental Policy Act process
NTD	National Transit Database
NVTA	Northern Virginia Transportation Authority
OIPI	Office of Intermodal Planning and Investment
PDC	Planning District Commission
PE	Preliminary Engineering phase for schedule and cost estimates
QA/QC	Quality Assurance/Quality Control
RITIS	University of Maryland Regional Integrated Transportation Information System
RN	Regional Networks
RNS	VDOT Roadway Network System
ROD	Record of Decision (NEPA)
RRTPO	Richmond Regional TPO
RVTPO	Roanoke Valley TPO
RW	Right-of-Way phase for schedule and cost estimates
SGR	State of Good Repair Program
SPR	State Planning and Research funding
STBG	Surface Transportation Block Grant Program
STIP	State Transportation Improvement Program
SYIP	Six-Year Improvement Program
TA	Transportation Alternatives Set-Aside funds
TIP	Transportation Improvement Program
TMS	VDOT Traffic Monitoring System
TPB	National Capital Region Transportation Planning Board
UDA	Urban Development Areas
VACO	Virginia Association of Counties
VDOT	Virginia Department of Transportation
VHT	Vehicle Hours of Travel
VML	Virginia Municipal League
VMTP	Virginia Multimodal Transportation Plan
VTA	Virginia Transit Association