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Agency of Transportation

MEMORANDUM

TO: House and Senate Transportation Committees
FROM: Sue Minter, Secretary of Transportation *SMM*
DATE: March 13, 2015
SUBJECT: Vermont State Standards for the Design of Transportation Construction,
Reconstruction and Rehabilitation of Freeways, Roads and Streets (Vermont
State Standards)

As required in Section 26 of Act 167 (2014), I am pleased to submit the attached report, "Revising the Vermont State Standards; M2D2: Multimodal Development and Delivery". The report includes a work program that identifies specific modifications to the Vermont State Standards, recommends changes to other related design guidelines and policies, and presents an implementation plan and schedule.

The work program in the report was developed through an extensive stakeholder process that brought together the Agency's design and planning professionals with our external partners and customers including businesses, municipalities, regional planning commissions, trucking, transit and active transportation advocates, and our sister State Agencies. The process was facilitated and the report prepared by Smart Growth America with the generous support of the Rockefeller Foundation. The report would not have been possible without assistance from Smart Growth America and the time commitment and expertise offered by the stakeholder group.

Over the last twenty years, the Vermont State Standards have played a vital role toward achieving our vision for a safe, efficient and multimodal transportation system that promotes Vermont's quality of life and economic wellbeing. The recommendations in the work program build off this success and will help guide our design decisions as we face new challenges in the next twenty years and move forward toward the vision.

Revising the Vermont State Standards (VSS)

M2D2: Multimodal Development and Delivery

Work Plan

March 2015



A Partnership of the
Vermont Agency of Transportation
(VTrans) and Smart Growth America



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Making Neighborhoods Great Together

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Any errors and all interpretations are the responsibility of Smart Growth America. Please direct questions about this report to Roger Millar, PE, AICP, Vice President; Institute: rmillar@smartgrowthamerica.org, 406.544.1963.

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Revising the Vermont State Standards (VSS)

M2D2: Multimodal Development and Delivery

Work Plan

Executive Summary

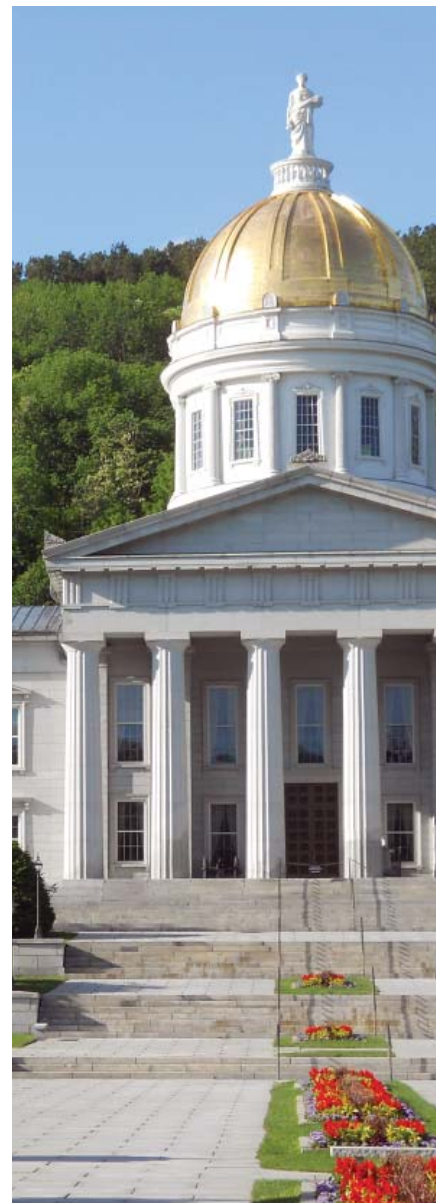
The Vermont Agency of Transportation (VTrans) recognizes that to carry out its mission in the context of 21st Century economic and demographic realities, many of the Agency's standards and approaches for planning, designing, constructing, maintaining and operating highway facilities need to be updated to meet and balance a variety of needs and goals for the state transportation network. This includes balancing the impacts and interactions of all potential modes of travel from a safety, capital investment, physical construction, operational, and maintenance perspective.

The Vermont State Standards (VSS), which provide VTrans staff and other partners with direction in designing roadway transportation projects, is a key document used by the Agency. Developed in 1996, the VSS set a high standard for the national state of the practice in flexible design at that time, but they have not been substantially updated in the years since. The VSS need updating to both keep pace with the state of practice in highway

engineering and ensure that Vermont transportation facilities are designed to meet current state and community needs and accommodate a variety of users of the transportation network.

To address this compelling need, VTrans has partnered with Smart Growth America (SGA) to initiate a process of updating the VSS with input from a Project Stakeholder Group (PSG), a broad group of stakeholders representing both internal VTrans divisions and external partner agencies and organizations. This initiative incorporates an approach and process SGA initially developed with the Michigan Department of Transportation known as Multimodal Development and Delivery (M2D2), designed to help transportation agencies around the country explore the needs and expectations for different transportation modes and ways to balance those needs in planning and design.

VTrans and SGA initiated the VSS revision process in the fall of 2014



... designing transportation facilities within a variety of contexts...

by engaging the PSG to conduct an initial “gap analysis,” with the goal of identifying gaps and barriers within the current VSS through discussion between VTrans staff and other partners impacted by the agency’s design practices. VTrans and SGA then provided a series of workshops led by national experts to the PSG to help stakeholders learn about the national state of the practice in providing for different transportation modes and identify modifications to the VSS and other VTrans practices to make them consistent with the state of the practice. Workshop topics included:

- Land use and transportation
- Public transportation
- Freight logistics
- Intelligent Transportation
- Systems (ITS)
- Transportation Demand Management (TDM)
- Active transportation
- Multimodal integration

During the M2D2 workshop series, the PSG identified a variety of issues, opportunities and considerations for the VSS update, as well as other issues to address within broader VTrans practices and processes. Following the workshop series, the SGA project team compiled and analyzed the suggested revisions

and developed a framework for updating the content and structure of the VSS and other related documents and practices, communicating about the revisions to internal and external stakeholders, and conducting training on using the new VSS.

Table E-1 provides a summary of the recommended revisions to the VSS outlined in this work plan. These recommended revisions are intended to serve as a starting point, and may evolve as VTrans initiatives the revision process in partnership with internal and external stakeholders. This work plan recommends the addition of several new sections to the VSS based on gaps and themes identified by the PSG, including guidance on designing intersections, balancing the needs of different design vehicles, and designing within a variety of land use contexts including transitions between different types of development.

This work plan also recommends that VTrans:

- Develop a user-friendly online interface for the VSS in order to make the VSS more accessible to VTrans staff and external users, create clearer linkages

WORK PLAN

The purpose of this work plan is to provide VTrans with a detailed process for revising the VSS and other related documents and practices. The work plan includes:

1. Recommended revisions to the VSS
2. Recommended revisions to other documents, standards, guidance and procedures
3. A proposed revision process
4. Discussion of a process for future updates to the VSS
5. A recommended approach for managing internal and external communication and collaboration
6. A proposed framework for conducting internal and external training

with other relevant VTrans documents, and improve VTrans' ability to make updates over time.	point of entry for accessing design resources.	external stakeholders and partners. The updated VSS will enable VTrans to better weigh tradeoffs in designing transportation facilities within a variety of contexts and meet and balance diverse needs and priorities for the state transportation network.
<ul style="list-style-type: none"> Integrate or more clearly reference other national and VTrans design guidance within the VSS to create a centralized 	VTrans will submit this work plan to the Vermont State Legislature in March of 2015, and will then begin work on implementing the recommendations with participation from internal and	

Table ES-1. Summary of recommended revisions to the VSS

Primary Need(s)

Recommended Revisions

1. Introduction (Chapter 1.0 of the Current VSS)			
Revision/ Augmentation	Include revised and augmented introduction section that addresses: <ul style="list-style-type: none">Purpose of the VSSPolicy statement about VTrans’ framework for making design decisions,	including the importance of considering context <ul style="list-style-type: none">Intended users and applications of the VSSRelationship between the VSS and other	guidance, documents, and standards <ul style="list-style-type: none">Description of how updates, revisions, and clarifications to VTrans design standards will be made and where these updates can be found
2. Project Design Decision-Making Framework (New)			
New Chapter	Add new chapter that outlines the general process and key issues to consider during transportation facility design, including: <ul style="list-style-type: none">Guidance on how the VSS relates to the VTrans Project Development Process Manual and when design engineers become a part of the project development teamA framework for assessing context and identifying the appropriate design	vehicle(s) that includes consideration of adopted plans and identified priority corridors for freight, transit and active transportation <ul style="list-style-type: none">A framework for weighing tradeoffs in balancing different needsGuidance on incorporating Intelligent Transportation Systems (ITS) and Transportation Demand Management (TDM) into project development	<ul style="list-style-type: none">Guidance on the appropriate internal and external outreach processes during project development decision-makingGuidance on the level of flexibility designers can exercise, and a process for addressing design exceptionsA description of how interim updates are made to the VSS
3. Functional Classification Sections (Chapters 2.0–6.0 of the Current VSS)			
Revision/ Augmentation	For these sections, the project team recommends the following revisions and augmentations where appropriate: Roadway classifications – <ul style="list-style-type: none">Incorporate a context-based roadway classification approach to compliment the existing functional classification systemAdd section on designing safe transitions Expand standards and guidance on designing to meet the needs of a variety	of users of the transportation network, including: <ul style="list-style-type: none">Maintenance vehicles (add)Transit vehicles and facilities (add)Trucks (add)Bicycles (update/expand existing)Pedestrians (update/expand existing)Other vehicles Design values/tables – <ul style="list-style-type: none">Include a range of appropriate design values within tablesRevise specific values in tables as necessary to be consistent with other	VTrans documents and current national standards <ul style="list-style-type: none">Include visual illustrations of design concepts Other considerations – <ul style="list-style-type: none">Modify/revisit LOS requirementsRevise and expand Special Design Considerations as needed, including the addition of considerations such as: surrounding land uses, existing community land use plans and corridor plans, stormwater management, and resilient design/green design
4. Intersection Design (New)			
New Chapter	Include new chapter that provides guidance on designing safe intersections for diverse users within a variety of contexts.		
5. Level of Improvement (Chapter 7.0 of the Current VSS)			
Create Separate LOI Policy Document	Revisit the role of this chapter in the VTrans design process and consider moving the content to a standalone policy document for use during the project definition process.		
6. Definitions and Key Concepts (New)			
New Chapter	Add new section with definitions for key terms and design concepts within the VSS, including illustrations where appropriate.		

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Revising the Vermont State Standards (VSS)

M2D2: Multimodal Development and Delivery

Work Plan

Introduction

VTrans recognizes that to carry out its mission in the context of 21st Century economic and demographic realities, many of the Agency's standards and approaches for planning, designing, constructing, maintaining and operating highway facilities need to be updated to meet and balance the variety of needs and goals for the state transportation network. This includes balancing the impacts and interactions of all potential modes of travel from a safety, capital investment, physical construction, operational, and maintenance perspective.

The VSS, which provide VTrans staff and other partners with direction in designing roadway transportation projects, is a key document used by the Agency. Developed in 1996, the VSS set a high standard for the national state of the practice in flexible design at that time, but they have not been substantially updated in the years since. The VSS need updating to both keep pace with the state of practice in highway engineering and ensure

that Vermont transportation facilities are designed to meet current state and community needs and accommodate a variety of users of the transportation network.

Project purpose

To address this compelling need, VTrans has partnered with SGA to initiate a process of updating the VSS with input from the PSG, a broad group of stakeholders representing both internal VTrans divisions and external partner agencies and organizations. The revised VSS will guide VTrans staff and other partners as they weigh tradeoffs in designing transportation facilities within a variety of contexts.

This initiative incorporates an approach and process SGA initially developed with the Michigan Department of Transportation known as Multimodal Development and Delivery (M2D2), designed to help transportation agencies around the country explore the needs and expectations for different transportation modes and ways to



. . . strengthen the state's economy and support the Agency's vision . . .



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balance those needs in planning and design. As a part of the M2D2 process, SGA provided a series of six workshops led by national experts in the fall of 2014 to help VTrans staff and other partners and stakeholders identify modifications to the VSS and other VTrans practices that would help meet and balance multimodal transportation needs.

This work plan sets in place a process for VTrans to modify and augment the VSS based on the outcomes of the M2D2 workshop series, including revisions to support greater inclusion of all transportation modes within the design process as well as revisions to address broader issues and considerations identified by VTrans staff and partners during the workshop series. This work plan also outlines a framework for providing training to VTrans staff and other stakeholders who use or have an interest in the VSS, and communicating about the revisions to VTrans customers in state agencies, regional and local government, the business community, advocacy groups, and the traveling public.

While the primary focus of this initiative is on modifying the VSS, VTrans recognizes that other documents and practices will also likely need revision to meet the Agency's mission and provide for the needs of all users. Therefore, this work plan also includes an approach for modifying other documents, guidance and practices that VTrans and other stakeholders have identified as priorities for revision or integration with the updated VSS.

Background

Strengthening Vermont's Economy by Integrating Transportation and Smart Growth Policy

In 2013 VTrans and SGA partnered to demonstrate that policies and programs at VTrans that connect smart growth and transportation strengthen the state's economy and support the Agency's vision for a safe, efficient, and multimodal transportation system. A Project Stakeholder Group (PSG) consisting of a broad spectrum of

... build on Vermont's strong track record in smart growth...

representatives from the public and private sectors served as the steering committee for the project. Together, VTrans, SGA and the PSG identified improvements that build on Vermont's strong track record in smart growth and address the important question – working with its partners, how can VTrans best support state designated community centers and regional and local plans within the constraints of its overall budget? The effort resulted in a final report with a series of recommendations, titled *Strengthening Vermont's Economy by Integrating Transportation and Smart Growth Policy*.¹

The initiative focused on better ways to coordinate, measure, and incentivize public and private actions consistent with statewide goals, policies, and programs. The project resulted in six recommended strategies:

1. Strengthen and expand the VTrans corridor management planning program.
2. Revise VTrans guidance and procedures for identifying, defining, and prioritizing transportation projects to incorporate and measure consistency with state land use, economic development, environmental, energy, and community development goals.
3. Consolidate and update VTrans design standards to support multimodal objectives.
4. Improve VTrans review and participation under Act 250 and the state highway access permitting process (Section 1111) to encourage development in state designated community centers and improve consistency with regional and local plans and state land use planning law.
5. Identify new policies and programs to support private sector development in state designated community centers and consistent with regional and local plans.

¹ *Strengthening Vermont's Economy by Integrating Transportation and Smart Growth Policy*, Smart Growth America, 2013 http://smartgrowthamerica.org/documents/vtrans-final-report_9-2013.pdf



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... identify barriers, gaps, and opportunities that exist ...



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6. Document the smart growth benefits and costs of VTrans policies, programs, and investments.

2014 Legislation

VTrans began working to implement the recommendations above in early 2014 by seeking direction from the State Legislature to update the VSS. The legislation directed VTrans to “establish a multi-disciplinary Stakeholders Group consisting of representatives of public and private sector entities from the various modes of transportation affected by the Vermont State Standards to provide the Agency with critical input in revising the Standards.”

The legislation tasked the Stakeholder Group with fulfilling the following objectives:

1. Review the current VSS and identify areas that require modification to be current with state-of-practice transportation facility design, and modifications to be consistent with supplemental design guidance and policies prepared by the Agency since 1997. In

fulfilling this primary duty, the Group shall also identify other related Agency standards and guidance that would need to be addressed to align with the revised VSS.

2. Identify barriers, gaps, and opportunities that exist in current Agency design practices, standards, and guidance to address the needs of all transportation modes in a variety of contexts.
3. Document the opportunities that exist to modify the existing VSS to meet current state-of-the-industry practices.
4. Prepare an implementation plan and associated schedule for addressing the various components of the VSS that require modification.

The legislation also required that VTrans report back to the state legislature in March of 2015 with initial findings and a recommended approach for moving forward with the update to the VSS.¹

¹ Act No. 167 (2013-2014 Session). <http://legislature.vermont.gov/assets/Documents/2014/Docs/ACTS/ACT167/ACT167%20As%20Enacted.pdf>.

. . . provide a diverse state of the practice understanding of the capabilities . . .

Multimodal Development and Delivery (M2D2) workshop series

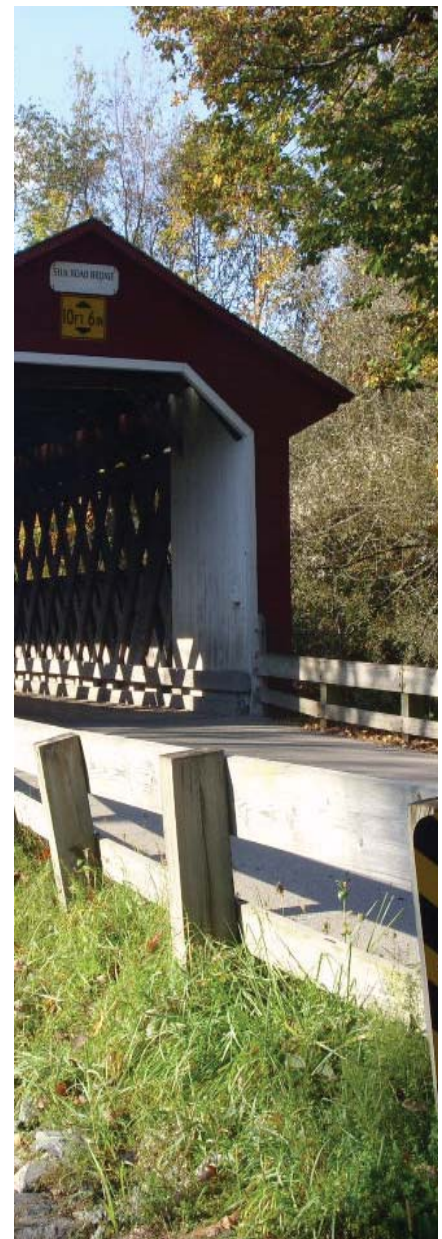
VTrans entered a second phase of its partnership with SGA in spring of 2014 to begin the task of updating the VSS as set forth by the legislature. VTrans and SGA convened a new PSG consisting of stakeholders from the previous 2013 initiative as well as additional VTrans staff and representatives of other state agencies, federal, regional and local government, the business community, advocacy groups, trade associations, and professional organizations such as the Vermont Planners Association, the American Council of Engineering Companies, the American Society of Landscape Architects, and the Associated General Contractors of America. These stakeholders were chosen for their ability to provide a diverse state of the practice understanding of the capabilities and requirements of each transportation mode and the opportunities and tradeoffs that exist in a multimodal environment.

VTrans and SGA engaged the PSG to conduct an initial gap analysis in the fall of 2014 to initiate the VSS revision process. The goal of this

analysis was to start a discussion between VTrans staff and other partners about gaps and barriers within the current VSS to meeting and balancing the needs of a variety of users of the state transportation network and accomplishing other state and community goals. VTrans and SGA then provided a series of workshops led by national experts on multimodal development and delivery to the PSG. The outcomes of this workshop series informed the development of a framework and process for revising the VSS and related documents and practices, as outlined in this work plan.

M2D2 Workshops

To begin the process of updating the VSS, VTrans and SGA invited members of the PSG to participate in a series of five one-day workshops between September and December 2014, as well as a final two-day “multimodal integration” workshop to discuss integrating the concepts and discussion outcomes of previous workshops. The workshop schedule and topic areas covered are listed in **Table I**.

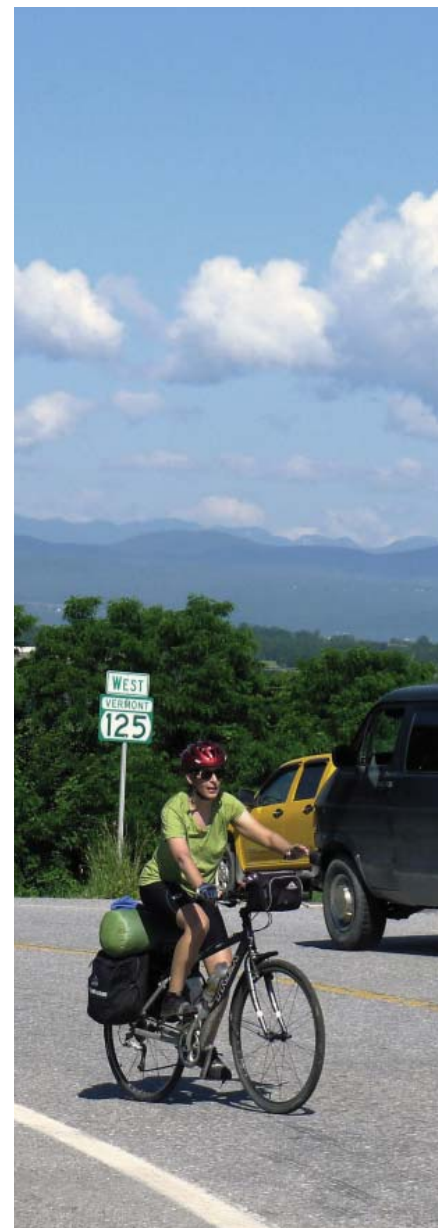


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... a series of ... workshops to discuss integrating the concepts ...

Table I. M2D2 workshop Schedule

1. September 30, 2014: Land Use and Transportation workshop	
<ul style="list-style-type: none"> • Introduction to planning • Overview of zoning and subdivisions • Land use planning in the Vermont context 	<ul style="list-style-type: none"> • Planning for economic and fiscal health • Integrating land use and transportation
2. October 21, 2014: Public Transportation workshop	
<ul style="list-style-type: none"> • Interactions between public transportation, land use and other travel modes • Integrating public transportation into VTrans' planning and design practices 	<ul style="list-style-type: none"> • Public transportation fundamentals • Understanding and overcoming planning and design challenges
3. October 28, 2014: Freight Logistics workshop	
<ul style="list-style-type: none"> • Overview of supply chain management • How firms make supply chain decisions • Role of transportation in supply chain decision-making 	<ul style="list-style-type: none"> • Integrating supply chain management considerations into VTrans' planning and design practices
4.a November 18, 2014: Intelligent Transportation Systems (ITS) workshop	
<ul style="list-style-type: none"> • Overview of ITS • ITS strategies and applications for all modes 	<ul style="list-style-type: none"> • State of the ITS practice in Vermont and surrounding states
4.b November 18, 2014: Transportation Demand Management (TDM) workshop	
<ul style="list-style-type: none"> • What is TDM and why do it? • Existing TDM in Vermont • Typical and atypical TDM tools • The state role in TDM 	<ul style="list-style-type: none"> • Measuring performance • Incorporating TDM into VTrans' and other partners' practices
5. December 4, 2014: Active Transportation workshop	
<ul style="list-style-type: none"> • Active transportation at VTrans • The state role in active transportation • Balancing the needs of different users 	<ul style="list-style-type: none"> • Integrating walking and biking into VTrans' planning and design practices
6. December 16-17, 2014: Multimodal Integration workshop	
<ul style="list-style-type: none"> • Summary of findings from past workshops • Overview of design flexibility available in AASHTO's Green Book • Discussion of VTrans internal and external decision-making practices that could be revised to better-address the needs of all modes 	<ul style="list-style-type: none"> • Discussion of specific revisions to the VSS and other documents and guidance. • Discussion of a process for revising the VSS and other documents and communicating the results to stakeholders



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... facilitate discussion about barriers, gaps and opportunities ...

These workshops were designed to educate project stakeholders on the national state of the practice in supporting different travel modes, provide a common vocabulary,

and facilitate discussion about barriers, gaps and opportunities in the current VSS and other VTrans standards and practices – as well as the practices of VTrans'

external partners – to supporting and balancing the needs of all travel modes and meeting a variety of other goals for the state transportation network.

Issues Identified During the M2D2 Workshops

PSG members identified a variety of issues, opportunities and considerations for the VSS update during discussions at the six modal workshops in the fall of 2014. In addition to specific considerations for the VSS, stakeholders also identified a number of issues to address within broader VTrans practices and processes to better meet the needs of a variety of users of the transportation system. Some themes from these discussions included challenges associated with balancing and weighing tradeoffs between the needs of different design vehicles; issues related to coordination between VTrans and the agency's partners during project development; challenges associated with meeting mobility needs in Vermont's rural and low-density context; challenges associated with the cost of maintaining transportation facilities and the question of who should

be responsible for maintenance; the question of how to ensure that transportation project decisions align with existing local, regional, and corridor plans; and the question of how to design transportation facilities that are responsive to future needs such as changing demographics. Detailed issues are captured below.

General Issues and Challenges

PSG members raised the following issues:

- It is challenging to balance the needs of different users within limited right-of-way
- VTrans has minimal opportunities to influence local and regional land use decisions, particularly for non-Act 250 development projects as well as more incremental development

that occurs within the State right-of-way, which requires a Section 1111 permit

- The VTrans Highway Level of Service (LOS) policy can be improved to further support compact development.
- Current practices for measuring success (including LOS) do not capture the variety of needs and benefits of multimodal transportation.
- The VSS has a lack of guidance on designing within diverse land use contexts, especially transitions between rural areas and town and village centers
- It is challenging to take advantage of growing national demand for living in compact, walkable communities in places with stagnant populations/economies. This should be taken in context with Vermont's large population of Baby-

... PSG members identified a variety of issues, opportunities and considerations . . .



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- Boomers, the majority of the State's rural development patterns, and the ability of such population subsets to be able to age in place, access services, etc.
- It is challenging to make transit a viable travel option in low density/rural contexts
- Coordination with transit agencies often happens too late in VTrans' project development process, and transit is rarely considered in scoping and design when there is no current service on the corridor
- Need to continue to improve upon current coordination with maintenance and operations early in the project development process to accurately consider project life-cycle costs
- There can be a mismatch between timeframe for business decisions vs. transportation decisions
- It can be challenging to balance freight infrastructure needs with the needs of other transportation system users and other considerations (ex. village character) – lack of freight input/involvement
- VTrans needs a greater understanding of how the agency can play a role in supply chain management with its policy and investment decisions
- There is a lack of integration of ITS technologies into projects, potentially partially a result of the costs to introduce and maintain ITS technologies
- The lack of a "stick" for encouraging Transportation Demand Management (ex. State within federal air quality attainment levels; in general, limited levels of bad congestion, parking shortage) poses challenges
- VTrans currently does not build sidewalks along state highways unless the municipality agrees to take over maintenance activities. The underlying issue for VTrans is limited funding to pay for maintenance of sidewalks. This can create a barrier to providing more sidewalks and can also become an issue during development review through the Act 250 process, as VTrans may

... encourage a culture shift to support and reward innovative thinking ...

recommend a permit condition that requires a developer to build a sidewalk, but the municipality may or may not be willing to accept maintenance responsibility

- An existing VTrans policy does not permit crosswalks without evidence of existing safe pedestrian access on both sides of the right-of-way
- Different levels of biking and walking confidence and comfort require different design considerations
- There is a need to change the paradigm so that biking and walking are seen as viable transportation options (rather than purely recreational), particularly in developed areas such as the downtowns and village centers
- VTrans lacks a consistent process for getting internal and external stakeholder and modal input during many key points in project development
- The majority of VTrans' projects are currently system preservation – how can multimodal needs and opportunities be addressed

within the scopes of these projects?

- There is a need for a culture shift to support and reward innovative thinking within VTrans
- VTrans' internal ability to consider biking and walking in project scoping and design is limited. This gets to: the Agency's capacity, as there is currently a single bicycle/pedestrian coordinator responsible for review of all VTrans projects and programs; training, as additional Agency staff should be trained to utilize the designer resources available; and accountability, as Agency staff will need to consistently be held to the expectation that all modes will be considered in project scoping and design)
- State economic development goals should be considered more directly within transportation planning practices.



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... designing safe transitions for all modes between rural areas and town centers ...



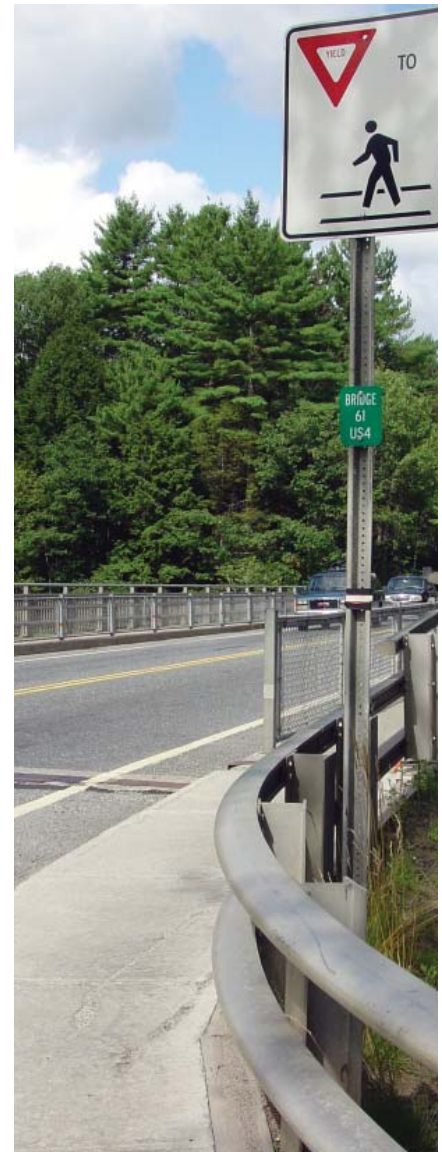
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VSS considerations

- Include guidance on how to weigh and balance tradeoffs between different users
- Include guidance on selecting the appropriate design vehicle(s)
- Build consideration of the surrounding context into design practices
- Include information on designing to meet future needs and goals (as well as current conditions)
- Include fine-grained land use classifications beyond “urban” and “rural”
- Where appropriate, include expanded consideration of local/regional land use plans in order to support a greater understanding of the “surrounding context” into design practices
- Reference stormwater regulations
- Include guidance on designing for transit (need to determine whether to include specific guidance or reference other documents)
- Define a process for getting transit agency feedback in the appropriate Agency policies, guidelines, development review, project development, etc.
- Include strategies for supporting Complete Streets within the scope of preservation projects
- Include more guidance for trucks
- Include information on how to determine when large trucks should be a design vehicle (and when not)
- Possibly include reference to a new “toolbox” with a menu of ITS strategies for different modes and contexts
- Include TDM as a formal consideration during design
- Integrate existing bicycle/pedestrian design guidance
- Include consideration of bicycle priority routes
- Provide guidance on selecting the best bicycle facility type in different contexts and include innovative treatments
- Provide guidance on where sidewalks and crosswalks should be built (or at least considered) by VTrans

. . . relationship between multimodal transportation and land use planning. . .

- Include guidance on accommodating transit stops and bike lanes safely within limited right-of-way
- Include guidance on designing from the outside in when developing cross-sections
- Include maintenance and operation activities as a consideration during all phases of design
- Address the process for handling design exceptions
- Include guidance on designing safe transitions (for all modes) between rural areas and town centers
- Include green design practices and guidance on designing infrastructure for resilience to future disasters
- Include a more a more accessible online format to improve ease of use for VTrans design staff and other internal/external stakeholders and to better-integrate related documents
- Clarify and document the design decision-making process
- Clarify the VSS's relationship to other documents and other steps during the project development process
- Include multiple acceptable design values (ex. required and optional) for different facility types
- Include illustrations and photographic guidance for design concepts in the VSS
- Include substantially more guidance on intersection design (i.e. roundabouts)
- Include information on the target audience for the VSS and clarification about the extent to which communities must adhere to it
- Address issues of scale in facility design
- Include guidance on how to design for easy maintenance and how to maintain for multimodal use
- Include consideration of downtown designations and other state designated centers
- Include information on designing for operations (signal timing, etc.)



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...use transportation demand management strategies to mitigate the impacts ...

Other opportunities

The PSG suggested that VTrans:

- Develop a more consistent process for providing input on local and regional land use plans, and build systematic consideration of those plans into VTrans practices
- Revisit the role of LOS in the VSS. Consider using other terminology
- Work with municipalities to build TDM and multimodal considerations into development review
- Consider transit earlier in the project development process
- Play a leadership role in educating towns about the relationship between multimodal transportation and land use planning
- Incentivize local innovation
- Engage diverse partners (ex. public health and environmental constituencies) in support of multimodal transportation
- Use targeted ITS solutions at dangerous locations to improve safety, particularly for bicycles and pedestrians
- Educate travelers about the options available to them
- Provide transit and other travel data to software developers/entrepreneurs
- Expand internal awareness of existing VTrans multimodal practices
- Establish a formal structure for considering TDM as an option during project scoping
- Use TDM strategies to mitigate the impacts of major construction and shift travel behavior
- Set policy targets for mode shift and work to achieve those targets
- Don't let modeling of trends become destiny, and design to change trends when appropriate
- Develop policy guidance on how to prioritize modes in different contexts
- Educate the public about why investment in walking and bicycling is important
- Have discussions with municipalities about ownership and maintenance of Class 1 highways as components of a statewide multimodal system



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. . . revised to better accommodate the needs of all users.



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- Exercise the design flexibility supported by existing liability protection in state statute
- Expand multimodal considerations during corridor design and project scoping to avoid “scope creep” later in the process when multimodal features are added
- Consider restructuring the project definition process so that TDM is the first solution considered.
- Coordinate the VSS update with the current project scoping process update

The PSG identified a number of internal and external documents, standards, and procedures that should be integrated with the VSS during the update process or revised to better accommodate the needs of all users. The project team also identified a list of additional documents that may need revision based on a review of VTrans’ website. These documents are listed below.

VTrans Documents

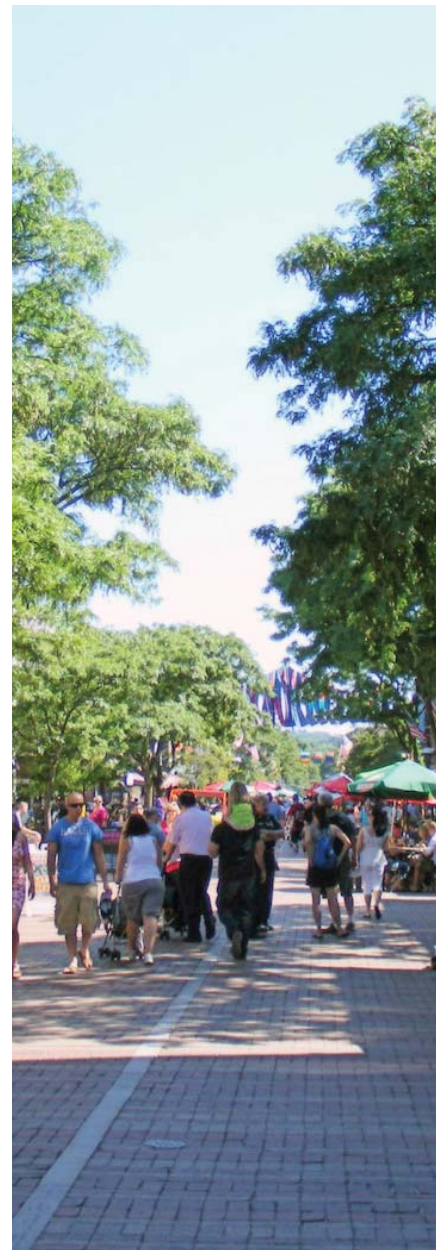
- *Bicycle and Pedestrian Facility Planning and Design Manual* (2002)
- *Pedestrian and Bicycle Policy Plan* (2008)
- *Highway System Policy Plan* (2004)
- *Project Development Process Manual*
- *Project Scoping Manual* (1995)
- *Engineering Instructions* (ongoing)
- *Complete Streets Guidelines* (2012)
- *Highway Level of Service Policy* (2007)
- *Street Tree Policy* (draft)
- *Landscape Guide* (2002)
- *Guidelines for Pedestrian Crossing Treatments* (2015)
- *Vermont Corridor Management Handbook* (2005)
- *Traffic Calming Guidelines* (draft)
- *VTrans Enhancements to Transportation Projects* (2007)
- *Traffic Calming Standard Drawings*
- *On Road Bicycle Plan* (currently being developed)
- *Vermont Freight Plan* (2012)
- *Vermont Statewide Freight Study* (2001)

... balance the needs of all users and accomplish the agency's mission ...

- *Vermont Strategic Plan* (2013)
- *Public Transit Policy Plan* (2012)
- *Long Range Transportation Business Plan* (2009)
- *Vermont Airport System and Policy Plan* (2007)
- *Vermont State Rail Plan* (2006)
- *Asset Management Implementation Plan* (2014)
- *A Guide to Transportation and Land Use Connections: Experiences from Northwest Vermont* (2007)
- *Transportation Planning Initiative Manual and Guidebook* (2007)
- *Byways Program Manual* (2000)
- *Construction Manual* (2014)
- *Right of Way Manual* (2012)
- *Better Backroads Manual* (2009)
- *The Orange Book – A Handbook for Local Officials* (2014-2016)
- *Access Management Program Guidelines* (2005)
- *Work Zone Safety and Mobility Guidance* (2007)
- *Traffic Calming Study and Approval Process for State Highways* (2003)
- *Structures Design Manual* (2010)
- *Strategic Highway Safety Plan* (2012-2016)
- *Traffic Impact Study Guidelines* (2008)
- *Class 1 Town Highway White Paper* (2015)

Other documents

- Green Book (AASHTO)
- Highway Safety Manual (AASHTO)
- Manual on Uniform Traffic Control Devices
- Local and Regional Plans
- Resource Manual guidebook (new)
- Guide for Geometric Design of Transit Facilities



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...revised and expanded this framework based on feedback...

Work Plan

The purpose of this report is to provide VTrans with a detailed work plan to guide the process for revising the VSS and other related documents and practices.

Throughout the M2D2 workshop series, members of the PSG identified and discussed a number of possible revisions and augmentations to the VSS and other related documents and practices that would reflect the current state of practice in transportation project design and help VTrans better address and balance the needs of all users and accomplish the agency's mission. PSG members also raised and discussed a variety of considerations regarding the process for conducting the VSS update and approaches for coordinating with and communicating about the update to VTrans' partners.

Following the M2D2 workshop series, the project team compiled and analyzed the suggested revisions and developed a broad framework for updating the content and structure of the VSS.

The project team also developed recommendations for revising other related documents and practices, communicating to internal and external stakeholders about the revisions, and conducting training on using the new VSS. The project team then revised and expanded this framework based on feedback from the VTrans Project Sponsor Group in January 2015.

This work plan is organized into the following sections:

- I. Overview of recommended revisions to the VSS (a table with detailed recommended revisions is provided in Appendix A)
- II. Recommended revisions to other documents, standards, guidance and procedures
- III. Recommended revision process
- IV. Framework for future periodic updates to the VSS
- V. Managing internal and external communication and collaboration
- VI. Conducting internal and external training



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Section I. Overview of Recommended Revisions to the VSS

During the M2D2 workshop series, participants identified a number of gaps and needs regarding both the content and structure of the VSS, as described above in the section titled “Issues Identified during the M2D2 workshop series.” Based on these identified gaps and needs, the project team recommends that VTrans:



1. **Revise** the VSS following the framework summarized in Table II below, and outlined in greater detail in Appendix A of this work plan.
2. **Develop** a user-friendly online interface for the VSS in order to make the VSS more accessible to VTrans staff and external users, create clearer linkages with other relevant VTrans documents, and improve VTrans’ ability to make updates over time.
3. **Integrate** or more clearly reference other national and VTrans design guidance within the VSS to create a centralized

point of entry for accessing design resources.

Table II below provides a summary of the recommended revision framework for the VSS. This includes the addition of several new chapters based on gaps identified by the PSG during the M2D2 workshop series.




Detailed recommended revisions are provided in **Appendix A** of this work plan. These detailed revisions are intended to serve as a starting point as VTrans initiates the process to revise the VSS, but the list of revisions will likely need to be revisited and modified as the process moves forward.

Table II. Summary of Recommended Revisions to the VSS

Primary Need(s)		Recommended Revisions	
1. Introduction (Currently Chapter 1.0)			
<div>Revision/ Augmentation</div> <div></div>	<div>Include revised and augmented introduction section that addresses:</div> <ul style="list-style-type: none">• Purpose of the VSS• Policy statement about VTrans’ framework for making design decisions, including the importance of considering context• Intended users of the VSS and where/when the VSS apply• Role of the VSS within the full VTrans project development process and broader planning process	<ul style="list-style-type: none">• Relationship between the VSS and other guidance, documents, and standards• Description of how updates, revisions, and clarifications to VTrans design standards will be made and where these updates can be found, as well as direction to consult these updates before moving further into the design process	
2. Project Design Decision-Making Framework (NEW)			
<div>New Chapter</div> <div></div>	<div>Add new chapter that outlines the general process and key issues to consider during transportation facility design, including:</div> <ul style="list-style-type: none">• Guidance on how the VSS relates to the VTrans Project Development Process Manual and when design engineers become a part of the project development team• A framework for assessing context and identifying the appropriate design vehicle(s) that includes consideration of adopted plans and identified priority corridors for freight, transit and active transportation• A framework for weighing tradeoffs in balancing different needs	<ul style="list-style-type: none">• Guidance on incorporating ITS and TDM into project development• Guidance on the appropriate internal and external outreach processes during project development decision-making• Guidance on the level of flexibility designers can/should exercise, and a process for addressing design exceptions• A description of how interim updates are made to the VSS	

Primary Need(s)

Recommended Revisions

3. Functional Classification Sections (Currently Chapters 2.0-6.0)		
<div>Revision/ Augmentation</div> <div></div>	<div>For these sections, the project team recommends the following revisions and augmentations where appropriate:</div> <div>Roadway classifications:</div> <ul style="list-style-type: none">• Move to a corridor approach with distinctions beyond “urban” and “rural” for each functional class based broadly on the “context zones” in the ITE manual on Designing Walkable Urban Thoroughfares.*• Add section on considerations for designing safe transitions <div>Expand standards and guidance on designing to meet the needs of a variety of users of the transportation network, including:</div> <ul style="list-style-type: none">• Maintenance vehicles (add)• Transit vehicles and facilities (add)• Trucks (add)• Bicycles (update/expand existing)• Pedestrians (update/expand existing)• Other vehicles (add)	<div>Design values/tables:[†]</div> <ul style="list-style-type: none">• Include a range of appropriate design values within tables• Revise specific values in tables as necessary to be consistent with other VTrans documents and current national standards• Include visual illustrations of design concepts <div>Other considerations:</div> <ul style="list-style-type: none">• Modify/revisit LOS requirements• Revise and expand Special Design Considerations as needed, including the addition of considerations such as:<ul style="list-style-type: none">– Surrounding land uses– Existing community land use plans and corridor plans– Stormwater management– Resilient design/green design
4. Intersection Design (NEW)		
<div>New Chapter</div> <div></div>	<div>Include new chapter that provides guidance on designing safe intersections for diverse users within a variety of contexts. The project team recommends modeling this chapter after the NACTO Urban Street Design Guide.</div>	
5. Level of Improvement (Currently Chapter 7.0)		
<div>Create Separate LOI Policy Document</div>	<div>Revisit the role of this chapter in the VTrans design process and consider moving the content to a standalone policy document for use during the project definition process.</div>	
6. Definitions and Key Concepts (NEW)		
<div>New Chapter</div> <div></div>	<div>Add new section with definitions for key terms and design concepts within the VSS, including illustrations where appropriate. A draft list of key terms and concepts is available in Appendix B of this Work plan, and is intended to serve as a starting point for developing the definitions section in the updated VSS.</div>	

* Institute of Transportation Engineers. (2010). *Designing Walkable Urban Thoroughfares: a context sensitive approach*. <http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>

** National Association of City Transportation Officials. (2013). *Urban Street Design Guide*. <http://nacto.org/usdg>

† The current VSS include a number of tables with ‘design values’ – numeric specifications for designing safe roadways including speeds, sight distances, feet of horizontal clearance, lane widths, etc.

Section II. Recommended Revisions to Other Documents, Standards, Guidance and Procedures

In addition to the recommended revisions to the VSS, VTrans staff and other stakeholders also identified a number of barriers and opportunities within other VTrans practices and processes to better support multimodal transportation and meet the needs of a variety of users of the transportation system. Throughout the M2D2 workshop series, several themes emerged regarding other VTrans

documents, standards, guidance and procedures:

The PSG discussed the need to include a greater/more explicit consideration of multimodal needs and opportunities earlier during planning and project development, as well as during design.

The PSG also pointed to the need for a reorganization or restructuring of existing manuals, guidance,

policies and documents on VTrans' website to improve ease of use and accessibility of these documents and clarify the relationships between different documents within VTrans' planning and project development practices.

Stakeholders also discussed integrating or referencing other design-related guidelines and policies more directly within the VSS to form a "one stop shop" collection of online design resources.

The SGA project team conducted an evaluation of the full list of documents identified and developed a short list of documents to prioritize for revision based on:

1. Their relationships to the VSS and design practices;
2. The need for or anticipated impact of revisions in supporting multimodal project development and delivery and achieving VTrans' mission; and
3. Consistency with the six recommendations resulting from VTrans and SGA's initial 2013 effort.

This list of documents prioritized for revision or augmentation is outlined in **Table III**. These documents have been identified as a high priority, but there will likely be a number of additional documents that will need to be referenced or integrated with the updated VSS. VTrans should continue to work with internal and external stakeholders to evaluate and revise these priority documents in coordination with the VSS update, and will need to build these documents in to the schedule for updating the VSS to ensure alignment across revision efforts.

Table III. Recommended List of Other Documents, Standards, Guidance, & Procedures to Revise

Document	Primary Need(s)
1. Vermont Corridor Management Handbook (2005)	Revise to expand multimodal considerations and context processes for receiving stakeholder input.
2. Project Development Process Manual and flow chart	Revise to expand multimodal considerations and context processes for receiving stakeholder input. (Note: VTrans is currently revisiting the project development process)
3. Project Scoping Manual (1995)	Revise to expand multimodal considerations, TDM, ITS, and processes for receiving stakeholder input.
4. VTrans Enhancements to Transportation Projects (2007)	Update policy as necessary to support multimodal needs and reference within VSS
5. VTrans Level of Service Policy (2007)	Update policy as necessary to support multimodal needs and reference within VSS
6. VTrans Guidelines for Pedestrian Crossing Treatments (2015)	Integrate or reference within VSS (Note: VTrans recently revised this document)
7. Bicycle and Pedestrian Facility Planning and Design Manual (2002)	Integrate or reference within VSS and revise as necessary
8. Structures Design Manual (2010)	Reference within VSS and revise as necessary
9. Engineering Instructions (ongoing)	Integrate or reference within VSS and revise as necessary
10. Design Standard Drawings	Integrate or reference within VSS and revise as necessary
11. Complete Streets Guidance, evaluation matrix and checklists (2012)	Integrate or reference within VSS and revise as necessary
12. Access Management Program Guidelines (2005)	Integrate or reference within VSS and revise as necessary
13. Traffic Calming Guidelines (draft)	Integrate or reference within VSS and revise as necessary
14. Landscape Guidance (2002)	Integrate or reference within VSS and revise as necessary

...stakeholders also identified a number of barriers and opportunities ...

Section III. Recommended Revision Process

Revision of the VSS is a substantial undertaking that will require both significant staff time and a well-thought-out revision process. This process will need to include collecting additional information about existing state and national design guidance and best practices,

drafting and revising the new standards, and collecting input and feedback from a variety of partners and stakeholders.

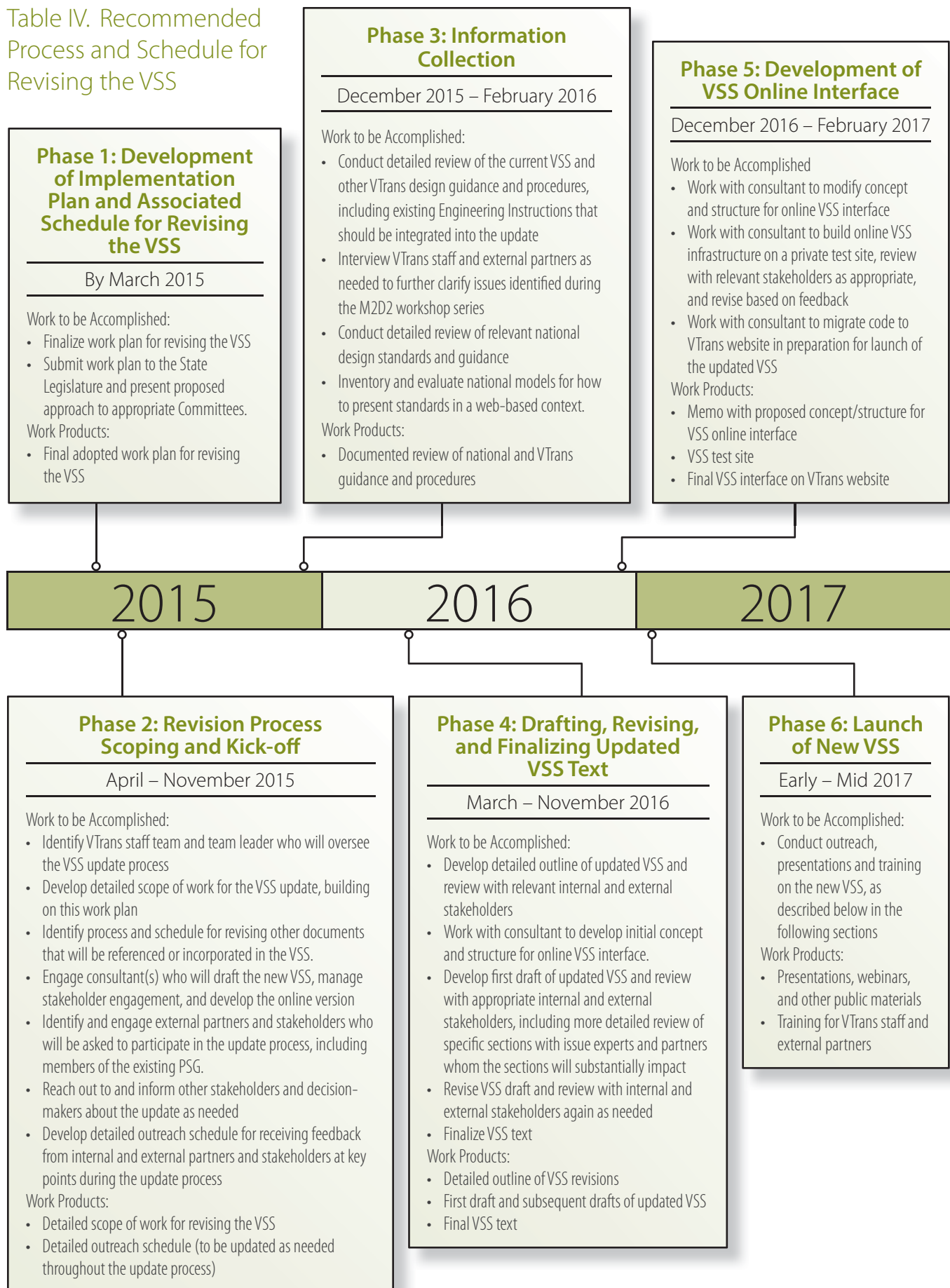
Table IV outlines a general recommended process and schedule for revising the VSS, developing the new online interface, and launching and communicating about the new VSS to VTrans' customers and partners. This process and schedule are intended as starting points that

should be further developed and refined, and the proposed timeline may evolve as VTrans begins the revision process. **Table IV** is organized into six broad phases, beginning with the finalization of this Work plan and submittal and presentation to the State Legislature in March 2015. The recommended process below includes hiring an external consultant(s) to draft the revised text for the VSS, manage stakeholder engagement, and develop the new online format.



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Table IV. Recommended Process and Schedule for Revising the VSS



...keep pace with the national state of the practice in roadway design ...

Section IV. Framework for Future Updates to the VSS

The VSS will need to be updated and modified over time to keep pace with the national state of the practice in roadway design, advances in technology, and evolving state and local priorities and demands placed on the transportation network. As a part of the revision process, SGA recommends that VTrans establish a process for making updates to the

VSS moving forward. This should include:

- Development of a general timeline for periodic major review and revision to the VSS;
- Development of a protocol for making more minor updates and adjustments to VTrans' design standards as issues are identified. This protocol could either build on the existing

Engineering Instructions process or involve a new process for making direct updates to the online version of the Vermont State Standards, or some combination of the two; and

- Identification of staff lead(s) within VTrans tasked with maintaining and updating the new online Vermont State Standards as needed.

Section V. Managing Internal and External Communication and Collaboration

While VTrans project managers and designers are the primary users of the VSS, a variety of other VTrans staff and external stakeholders reference and rely on the standards or are impacted by changes to VTrans design practices. These stakeholders include design consultants, municipal and Regional Planning Commission staff, state agency staff, trade and professional organizations, and advocacy groups, among others.

These stakeholders will more readily understand, accept and use the revised VSS if they are meaningfully engaged in the revision process.

Involving a variety of internal and external stakeholders in the update will also help ensure that the VSS adequately address the diverse needs of these partners, while simultaneously helping to educate partners about decision-making processes and constraints within VTrans, leading to clearer communication and expectations during future transportation projects.

There are a number of categories of stakeholders that should be considered for engagement. The list of stakeholder groups below will need to be refined to ensure

that the appropriate agencies and entities are being engaged in the most effective way and at the most appropriate point in the process.

1. **VTrans staff** representing all divisions at a variety of levels including executive staff, managers, planners, engineers, operations staff, maintenance staff, and modal specialists;
2. **Other impacted/interested state agencies** including the Agency of Natural Resources, the Agency of Commerce and Community Development, the Department of Health, the Natural Resources Board, and others;

3. **Federal agencies** including FHWA, FTA, FMCSA, and FRA;
4. **Regional Planning Commissions (RPCs)** throughout the state;
5. **Local governments** including representatives from public works departments and planning commissions, as well as statewide organizations such as the Vermont League of Cities and Towns;
6. **Law enforcement, DMV enforcement, and emergency responders** from around the state;
7. **Transit agencies** throughout the state;
8. **Railroads** operating in Vermont;
9. **Design and engineering consultants and contractors** with whom VTrans works closely;
10. **Professional organizations and trade associations** including the Vermont Planners Association, the American Council of Engineering Companies, the American Society of Landscape Architects, the Associated General Contractors of Vermont, Vermont Truck and Bus Association, and others;
11. **Real estate developers** in Vermont communities around the state;
12. **Regional economic development corporations** throughout the state;
13. **Advocacy groups and non-profit organizations** that work on modal issues or issues related to mobility, the environment, economic development, social equity, and public health;
14. **Land owners, business owners, institutions, and schools** in Vermont communities around the state; and
15. **Members of the traveling public** including residents from rural areas and urban, town, and village centers, as well as travelers with specific needs such as the elderly, disabled travelers, children, etc.

These stakeholders will need to be engaged at different levels and at different points throughout the VSS revision process. **Table V** outlines a broad recommended stakeholder engagement structure for conducting the update process.

Table V. Recommended Tiers for Stakeholder Engagement During the VSS Update Process

Group	Participants	Role
Executive Steering Committee	Division heads, and other leadership as appropriate	<ul style="list-style-type: none"> Establish guiding vision for the VSS revisions Provide feedback at major points throughout the revision process Approve and adopt the revised VSS
VSS Revision Management Team	3–8 VTrans staff representing all agency divisions	<ul style="list-style-type: none"> Oversee the day-to-day process for revising the VSS, including: <ul style="list-style-type: none"> Developing a detailed scope of work and schedule Managing the external consultant team Communicating about the update to key internal and external partners
Consultant Team	<ul style="list-style-type: none"> Primary consultant to conduct VSS revisions Sub-consultant(s) with specific expertise as needed (ex. web developer, technical design experts for specific modes, etc.) 	<ul style="list-style-type: none"> Draft the updated VSS, working closely with the management team Develop user-friendly online interface Develop curriculum for and assist in delivering training
Partner Steering Committee	Small group of internal and external stakeholders who use and reference the VSS regularly or have a significant interest in VTrans design practices, potentially comprised of a subset of the existing PSG who have been actively engaged.	<ul style="list-style-type: none"> Meet regularly with the management team to discuss direction and provide feedback Offer diverse perspectives about the challenges of weighing tradeoffs and balancing needs during design
Broad Stakeholder Outreach	Comprehensive group of external stakeholders, expanded from the existing PSG to address gaps in representation. Should include representatives from all of the categories of stakeholders listed above.	<ul style="list-style-type: none"> Provide feedback on interim versions of the revised VSS at major milestones (VTrans will engage these stakeholders through a combination of group meetings and direct one-on-one outreach) Represent and communicate back to constituents about the update Help ensure broad support for the revised VSS

... consistency within the design decision-making process ...

Section VI. Conducting Internal and External Training

Once the new VSS are in place, VTrans will need to provide ongoing training for staff who reference the standards and related documents in order to ensure effective and consistent use and interpretation throughout the agency. Training should also be made available to other agencies and stakeholders who routinely partner with VTrans on planning and design of state roadway facilities or use the VSS to inform their own design practices. This includes local government and Regional Planning Commission staff who frequently engage with VTrans in planning, approving and designing state transportation facilities within their jurisdictions.

Conducting regular training will provide a variety of benefits to VTrans and its partners, including opportunities for closer interaction across VTrans divisions and between VTrans staff and external stakeholders with diverse needs and modal areas of expertise.

Training should be designed to achieve the following objectives:

- Helping to establish a policy framework and culture for making design decisions within VTrans;
- Preparing managers, technical staff and consultants to use the VSS to effectively consider context and weigh tradeoffs in making design decisions;
- Improving consistency within the design decision-making process, including internal and external outreach practices;
- Keeping staff and consultants up to date on VTrans' design-related policies and practices as they evolve over time, including future Engineering Instructions released by the agency;
- Identifying consistent challenges VTrans staff face in designing facilities and ways to address those challenges; and
- Increasing awareness among external partners about



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VTrans' decision-making processes and design considerations and constraints, leading to better communication and clearer expectations.

VTrans can deliver training sessions in a combination of formats – including in-person workshops, live web-based webinars, and web-based on-demand training modules – to accommodate a variety of participants who use and rely on the VSS to different degrees and have varying levels of time and flexibility available to participate in training. All participants should

receive access to workshop materials and supporting documents for ongoing reference as needed.

Brochures, websites, regular newsletters, and videos describing the initiative can also be helpful for informing the public and policy makers about the purpose and benefit of updating the VSS and other changes to VTrans practices and procedures that may result from the VSS update.

Table VI outlines a recommended framework for providing training at a variety of levels.

Table VI. Training: Level, Purpose, Attendees, Format and Duration

Level	Purpose	Attendees	Format and Duration
In-Person Training and Presentations			
Tier 1: Executive Overview	Provide a high-level overview of the updated VSS, the VTrans design decision-making framework, and other broad implications of the revisions for VTrans practices and processes.	VTrans leadership, FHWA/FTA/FRA, legislators, leadership from other state agencies (can host separate presentations for different audiences as needed).	1-2 hour presentation with question and answer
Tier 2: In-Depth VSS User Training	Provide regular users of the VSS with a thorough understanding of the revised standards, their relationship to other VTrans documents, and other implications for the design process (including internal and external outreach).	VTrans project managers, engineers, designers, planners, and consultants (could also include specific external partners who use the VSS very regularly and/or engineering students).	8+ hour workshop, repeated frequently
Tier 3: Partner Training	Provide external partners with an understanding of the updated VSS, VTrans design decision-making practices, and processes for coordinating with outside partners during design.	Partners who use/reference the VSS or interact with VTrans during project design, including municipal and RPC staff, state agency staff, transit agencies, etc (can host separate workshops tailored to different audiences as needed).	4-8 hour workshop, repeated somewhat frequently
Tier 4: General Overview	Provide interested stakeholders with a basic overview of the revised VSS, the revision process, and the purpose and role of the VSS in VTrans' decision-making.	Elected officials, NGOs, modal interest groups, and members of the general public.	<ul style="list-style-type: none"> Public meeting: 1-2 hour public presentation with question and answer Webinar: 1.5 hour webinar (with recording and slides available on VTrans website)
Online Training			
Interactive Training Modules	Provide regular VSS users with in-depth understanding of specific sections/modes/subject areas within the VSS through short interactive modules that can be completed on-demand.	Designed for VTrans staff, consultants, and external partners who use the VSS regularly, but could be made publicly available to anyone.	1-2 hours per module, available for participants to complete on their own schedules (updated as necessary).

...meet and balance diverse needs and priorities for the state transportation network.

Summary and Next Steps

VTrans has determined that the VSS are in need of revision to both keep pace with the state of the practice in highway engineering and ensure that Vermont transportation facilities are designed to meet and balance a variety of current state, community and traveler needs and priorities. VTrans and SGA have developed this work plan to establish a framework for updating

the content and structure of the VSS and other related documents and practices, communicating about the revisions to internal and external stakeholders, and conducting training on using the new standards.

This work plan is the final deliverable of the first phase of the VSS update process. VTrans will submit this work plan to

the Vermont State Legislature in March of 2015, and will then begin work on implementing the recommendations by initiating the VSS revision process. Implementing this work plan will help VTrans better weigh tradeoffs in designing transportation facilities within a variety of contexts and meet and balance diverse needs and priorities for the state transportation network.



Appendix A. Detailed Recommended Revisions and Augmentations to the VSS

This appendix provides detailed recommended revisions to the VSS based on the broad revision framework summarized in this work plan. The SGA project team developed this framework in response to the outcomes of the Multimodal Development and Delivery (M2D2) workshop series in the fall of 2014, and then revised, expanded, and refined the recommendations based on feedback from the VTrans Project Sponsor Group in January of 2015. These detailed revisions are intended to serve as a starting point as VTrans initiates the process to revise the VSS, but the list of revisions will need to be revisited, modified, and further-developed as the process moves forward.

This appendix is organized according to the structure the project team recommends for the revised VSS, which follows the basic structure of the existing VSS

but includes several additional chapter and subsections as well as minor reorganization of a number of existing subsections. A comparison between the current and recommended VSS chapters is provided below in **Table A-1**.

The following series of tables provide detailed recommended revisions for each chapter. The chapters and subsections within the tables below have been categorized as follows based on the identified primary action(s) needed:

- **Revision (R)** – The chapter or subsection needs revision to better reflect all modes and/or integration of the modes, or address other identified issues and needs;
- **Augmentation (A)** – The chapter or subsection is missing key guidance or considerations and needs to be augmented to better reflect all modes and/

Table A-1. Comparison Between Current and Recommended VSS Organization

Current (1996) VSS Chapters	Recommended New VSS Chapters
1. Introduction	1. Introduction
	2. Design Decision-Making Framework (New)
	3. Roadway Classifications (New)
	4. Guidelines In Designing for All Roadway Users (New)
2. Freeways	5. Freeways
3. Principal Arterial Roads and Streets	6. Principal Arterial Roads and Streets
4. Minor Arterial Roads and Streets	7. Minor Arterial Roads and Streets
5. Collector Roads and Streets	8. Collector Roads and Streets
6. Local Roads and Streets	9. Local Roads and Streets
	10. Intersection Design (New)
7. Level of Improvement	
	11. Definitions and Key Concepts (New)

or integration of modes, or address other identified issues and needs;

- **New (N)** – There is a new chapter or subsection needed to address to a key gap or barrier identified during the M2D2 workshop series.

During the M2D2 workshop series, stakeholders discussed the need to integrate or reference other design-related guidelines and policies more directly within the VSS to form a “one stop shop” collection of online design resources. The tables below provide recommendations for places within the revised VSS where other VTrans design standards, policies, and guidance should be referenced, linked to, or integrated directly. In addition to these VTrans documents, the project team recommends providing reference as appropriate to the latest versions of the following national standards and guidelines within the VSS:

- AASHTO. (2011). *A Policy on Geometric Design of Roadways and Streets*. https://bookstore.transportation.org/collection_detail.aspx?ID=110.
- AASHTO. *Highway Safety Manual*. <http://www.highwaysafetymanual.org/Pages/default.aspx>.
- AASHTO. (2014). *Guide for Geometric Design of Transit Facilities*. https://bookstore.transportation.org/item_details.aspx?id=2215.
- AASHTO. (2012). *Guide for Planning, Designing, and Operating Pedestrian Facilities*. https://bookstore.transportation.org/collection_detail.aspx?ID=116.
- AASHTO. (2004). *Guide for the Development of Bicycle Facilities*. https://bookstore.transportation.org/item_details.aspx?id=119.
- National Association of City Transportation Officials. (2013). *Urban Street Design Guide*. <http://nacto.org/usdg>.
- National Association of City Transportation Officials. (2014). *Urban Bikeway Design Guide*. <http://nacto.org/cities-for-cycling/design-guide>.
- Institute of Transportation Engineers. (2010). *Designing Walkable Urban Thoroughfares: a context sensitive approach*. <http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>.
- FHWA. (2009). *Manual on Uniform Traffic Control Devices*. <http://mutcd.fhwa.dot.gov>.



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Chapter 1. Introduction (Revise/Augment)





The current Introduction chapter of the VSS includes:

- A brief overview of the purpose and history of the standards;
- An overview of the roadway functional classification system and its role in the organization of the VSS;
- A brief discussion of how decisions and commitments made during project development should be carried through and incorporated into design;
- An overview of four land use contexts in Vermont that should be considered in design, including 1) large towns and cities, 2) small towns and villages, 3) suburban commercial/residential corridors, and 4) rural corridors;
- A description of how the standards are intended to be used by VTrans designers, as well as municipalities; and
- A brief description of how to handle design exceptions.

The SGA project team recommends preserving the existing framework for the Introduction section but expanding the discussion of the purpose and role of the VSS based on points raised during the M2D2 workshop series. Recommended revisions to this chapter include: updating the descriptions of the purpose and history of the VSS; adding a broad policy statement about VTrans' framework for making design decisions; expanding the existing discussion of the relationship between the VSS and other phases of project development; listing and linking to other VTrans design guidance (many of which were developed after the VSS and are not referenced in the current standards); and adding a subsection on how updates to VTrans' design practices will be incorporated into the VSS moving forward.

Table A-2. Chapter 1 – Introduction

Overview of the purpose of the VSS and role in decision-making

			
VSS Section	Need	Description of Revisions and/or Augmentations Needed	VTrans Documents to Link/Integrate
Purpose of design standards	R	Revise and update language in current subsection 1.1 for consistency with current VTrans decision-making practices and policy priorities.	As appropriate, reference and link to documents that:
VTrans policy framework for design	N	Add subsection providing brief policy statement about VTrans' framework for making design decisions, including points such as the importance of considering context, the role of the state's Complete Streets law, and others as appropriate.	<ol style="list-style-type: none"> 1. Establish VTrans policy priorities; 2. Describe the role of design in the overall project development process; and 3. Provide updates to VTrans design practices: Vermont Long Range Transportation Business Plan
History of the VSS	R/A	Update current subsection 1.2 ("How the standards were developed") to include an overview of the current VSS revision process beginning in 2014.	<ul style="list-style-type: none"> • VTrans modal plans as appropriate • Project Development Process Manual and flow chart • Complete Streets Guidance, evaluation matrix and checklists • Engineering Instructions • Others as needed
Relationship between the VSS and other planning and project development practices	R/A	Update and expand current subsection 1.4 (titled "Project Planning Standards: Linkages to project development process") to include a description of the role of the VSS within the VTrans project development process and broader planning processes. This section should reference, link to, and be consistent with the VTrans Project Development Process Manual and flow chart.	
Intended users of the standards	N	Add new subsection providing a description of the target audiences for the VSS, including: <ul style="list-style-type: none"> • Primary intended users, such as VTrans project managers and engineers • Other users who reference the VSS, including other VTrans staff, local roadway designers, etc. 	



VSS Section



Need

Description of Revisions
and/or Augmentations NeededVTrans Documents
to Link/Integrate

Applicability of the VSS	R/A	<p>Revise and expand existing subsections 1.6 and 1.7 (titled “General Use of the Standards” and “Use by Municipalities”), to clarify:</p> <ul style="list-style-type: none"> • Which VTrans project types the standards apply to, and which projects are exempt • When the standards are required vs. advisory in the design of municipally-owned transportation facilities • Other cases in which VTrans staff and other partners may find it beneficial or necessary to reference the standards 	
Roadway design within the Vermont context	R/A	<p>Revise and expand subsection 1.5 to include a high-level discussion of current agency and state priorities. This could include the role transportation facilities should play in achieving a variety of goals, such as those related to:</p> <ul style="list-style-type: none"> • Economic development • Resilience to disasters • Preservation of natural assets • Land use planning and encouragement of development in priority growth centers • Responding to changing demographics, and supporting mobility for aging residents and residents in rural areas <p>This subsection should reflect the priorities established in VTrans long-range planning documents.</p> <p>The SGA project team recommends moving the discussion of specific roadway design contexts currently included in this subsection (large towns and cities, small towns and villages, etc.) into a later chapter.</p>	
Other VTrans design guidance	N	<p>Add new subsection describing and linking to all VTrans’ design-related manuals and guidance not included directly within the VSS, including:</p> <ul style="list-style-type: none"> • Bicycle and Pedestrian Facility Planning and Design Manual (2002) • Structures Design Manual (2007) • Design Standard Drawings • Complete Streets Guidance, evaluation matrix and checklists (2012) • VTrans Crosswalk Guidelines (2004) • Access Management Program Guidelines (2005) • Traffic Calming Guidelines (draft) • Landscape Guidance (2002) • Others as needed <p>Along with links, this section should include brief descriptions of each document and the contexts in which each document should be referenced during design.</p>	
Updates to the VSS	N	<p>Add new subsection that:</p> <ul style="list-style-type: none"> • Describes how design updates, revisions, and clarifications will be made moving forward, including the role of VTrans Engineering Instructions and other internal design guide modifications • Provides links to and brief descriptions of all Engineering Instructions released since the latest major VSS update (this will require periodically updating this section) • Encourages readers to check these updates before moving forward with design. 	

Chapter 2. Design decision-making framework (NEW)





During the M2D2 workshop series, PSG members discussed the need to provide designers with guidance on how to consider and weigh tradeoffs during design decision-making. Stakeholders also discussed a lack of consistency within the design process, particularly regarding the process and timing for soliciting feedback from internal and external stakeholders during design. The SGA project team recommends adding a new chapter to the VSS that outlines the

general process and key issues to consider during transportation facility design, including:

- A framework for assessing context and identifying the appropriate design vehicle(s)
- A framework for weighing tradeoffs in balancing different needs
- Guidance on the appropriate internal and external outreach processes during design decision-making
- A process for addressing design exceptions

Table A-3. Chapter 2 – Design Decision-Making Framework (NEW)

New chapter outlining the transportation project design process and key issues to consider during design

 VSS Section	 Need	 Description of Revisions and/or Augmentations Needed	 VTrans Documents to Link/Integrate
Overview of design process	N	<p>Provide summary of key stages in the transportation design process. This section should:</p> <ul style="list-style-type: none"> • Reference, link to, and be consistent with the design process outlined in the VTrans Project Development Process Manual and flow chart (which is currently being revised) • Discuss the role of the state's Complete Streets law and the need to consider all users of the transportation system during design • Include instruction to check for design guidance updates (ex new Engineering Instructions) before moving further into the design process 	<p>As appropriate, reference and link to documents that:</p> <ol style="list-style-type: none"> 1. Discuss the relationship between design and overall planning and project development practices with VTrans; and 2. Outline processes or protocols for addressing specific considerations (ex. stormwater management) at key phases during the design process: <ul style="list-style-type: none"> • Vermont Corridor Management Handbook • Project Development Process Manual and flow chart • Project Scoping Manual • Complete Streets Guidance, evaluation matrix and checklists • VTrans Project Operational Stormwater Management Protocol • Other relevant guidance on managing environmental assets within VTrans ROW • Others as needed
Framework and checklist for assessing context	N	<p>Provide an overview of broad points to consider in assessing project context, including:</p> <ul style="list-style-type: none"> • Roadway functional classification and more fine-grained distinctions in roadway classification (described in more detail on pg A-7) • Guidance on incorporating ITS and TDM into the project design process • Other information about current and future conditions on and around the facility, such as: <ul style="list-style-type: none"> – Surrounding land uses, downtown and other state center designations, planned development projects, etc. – Surrounding natural, recreational, historical, and archeological resources – Any existing safety issues – Projected changes in population, density, demographic shifts, etc. – Visions for the future of the project area provided in local, regional and corridor plans – Whether the facility is on a designated state bicycle priority corridor – Whether the facility has existing transit service or may have future service – Whether the facility holds importance for shipment of freight – Counts of walk and bike traffic, or estimates of likely demand based on surrounding land uses and densities – Possible implications of changes in density or land use over time, such as the future addition of transit service or increased pedestrian travel on the facility – Whether the facility is located in a floodplain or river corridor and may be vulnerable to damage from floods 	



VSS Section



Need

Description of Revisions
and/or Augmentations NeededVTrans Documents
to Link/Integrate

Identifying appropriate design vehicle(s)	N	<p>Provide an overview of a framework for identifying design vehicle(s) for a project, including consideration of:</p> <ul style="list-style-type: none"> • Current conditions and travel volumes and vehicle classifications on the corridor • Anticipated or desired future conditions along the corridor • Adopted plans and identified priority corridors for freight, transit and active transportation • Tradeoffs involved between different design vehicles (including between the scale of transportation facilities, ease of maintenance, safety for bicycles and pedestrians, preservation of community character, etc.) • Times when it may be appropriate to consider using a smaller or atypical design vehicle 	
Balancing needs and weighing tradeoffs	N	<p>Provide:</p> <ul style="list-style-type: none"> • A description of the role of project managers and designers in balancing a variety of needs and goals for each transportation facility • An overview of the types of tradeoffs designers frequently make in balancing needs • A list of key points to consider in making decisions about tradeoffs • A discussion of when designers should aim to balance the needs of a variety of modes versus prioritize specific mode(s) based on context. • Clarification that the VSS provide a framework rather than a formula for making decisions about tradeoffs 	
Internal and external outreach during design	N	<p>Provide a summary of:</p> <ul style="list-style-type: none"> • Key phases during the design process when internal and/or external partners should be consulted for feedback or informed of progress, changes to project scope, etc. • Key partners to consult during these phases as appropriate <p>This section should reference, link to, and be consistent with the design process outlined in the VTrans Project Development Process Manual and flow chart (which is currently being revised). Should also link to the Public Outreach Guidebook which is currently under development.</p>	
Design flexibility and exceptions	R/A	<ul style="list-style-type: none"> • Move existing “Design Exceptions” subsection to this chapter (currently found within the Introduction section) • Provide guidance on the level of flexibility designers can/should exercise and the point at which deviations from the standards should be treated as exceptions. • Add more detailed description of the process designers should follow in obtaining approval for exceptions to the VSS. 	

Chapters 3 – 9. Roadway Facility Design (Revise/ Augment)

Organization of the current VSS is based on the roadway functional classification system. The VSS provide design standards and guidance for:

1. Freeways,
2. Principal arterial roads and streets,
3. Minor arterial roads and streets,
4. Collector roads and streets, and
5. Local roads and streets, accounting for Chapters 2.0-6.0 of the current VSS.

Where appropriate, the VSS also provide separate standards and guidance for rural roads and urban roads within each functional class.

The SGA project team recommends three major changes to this group of chapters:

1. Add new introductory chapter that outlines a framework for more fine-grained, context-based classification of roadways to supplement the existing functional classification system.
2. Add and expand guidance on designing roadways to accommodate all users of the transportation network.
3. Revise and update the existing functional classification chapters to include greater consideration of all users of the transportation network and address other identified gaps and issues.

These recommended revisions are described briefly below and outlined in detail in the following table.

Add New Introductory Chapter Outlining a Framework for Context-Based Classification of Roadways

During the M2D2 workshop series, PSG members discussed a need for more fine-grained roadway classifications within the VSS to account for the variety of land use contexts beyond “rural” and “urban” found throughout Vermont. Current national best practices in context-sensitive design incorporate approaches for classifying roadways according to surrounding context

as well as function, and a number of national resources – including the ITE manual, *Designing Walkable Urban Thoroughfares: A context-sensitive approach*¹ – provide guidance for building consideration of transects or “context zones” into transportation planning and design practices.

The project team recommends that VTrans adopt a similar framework for the VSS by moving to a corridor approach and defining “Vermont roadway context zones” to account for the types of land uses typically found along Vermont roadways, which may pass through rural areas, suburban communities, strip development, town and village centers, and transitions in between. This framework should not replace the current organization of the VSS according to functional classification, but rather should provide guidance in distinguishing between different roadway contexts and design needs within each functional class. VTrans can build on the four Vermont land use contexts identified in the Introduction chapter of the current VSS (large towns and cities, small towns and villages, suburban commercial/residential corridors, and rural corridors) in defining “context zones,” but should integrate these land use contexts more directly into the design standards and guidance within the functional classification chapters.

The project team recommends that VTrans add a new introductory chapter (Chapter 3 in the table below) that outlines a context-based roadway classification framework and describes each context zone. The project team also recommends that this chapter include sections addressing major issues and considerations that the agency and its partners face in designing roadways that pass through a variety of land use contexts, including:

- Guidance on how to design safe transitions between different types of land uses; and
- Guidance on how to balance statewide travel needs, roadway facility maintenance needs, local travel needs, and community placemaking needs when state highways also serve as town and village main streets.

¹ Institute of Transportation Engineers. (2010). *Designing Walkable Urban Thoroughfares: a context sensitive approach*. <http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>

Add and expand guidance on designing roadways to accommodate all users of the transportation network

State Complete Streets legislation (Vermont Act 34) passed in 2011, requires that “the safety and accommodation of all users of Vermont’s transportation system – including motorists, bicyclists, public transportation users, and pedestrians of all ages and abilities – are considered in all state and municipally managed transportation projects.” The VSS should include guidance on how to design to meet the specific needs of different users of the transportation network, as well as guidance on how to balance these needs collectively in limited right-of-way.

The current Vermont State Standards include limited reference to the design needs of trucks and very little reference to considerations for accommodating transit vehicles. The VSS also do not reference or provide guidance on addressing the unique needs of highway maintenance vehicles. While the standards do reference both bicycles and pedestrians within the existing functional classification chapters, these sections are in need of update and expansion to improve consistency with national best practices and VTrans’ own Bicycle and Pedestrian Facility Planning and Design Manual.

Because many of the broad considerations for each vehicle type and user of the transportation system are consistent across different roadway functional

classifications, SGA recommends adding a new chapter (Chapter 4 in the table below) that provides general guidance on designing to meet the needs of each user of the transportation network. SGA also recommends adding subsections to each functional classification chapter that provide relevant design standards and guidance for accommodating these users on roadways of that functional class.

Revise and update the existing functional classification chapters

The project team recommends several additional revisions to the existing functional classification chapters (Chapters 2.0-6.0 in the current VSS) based on feedback received during the M2D2 workshop series. These revisions include:

- Updating the guidance and specific values in tables as necessary to be consistent with other VTrans documents and current national standards,
- Providing a range of appropriate design values within tables, and
- Including visual illustrations of design concepts where appropriate.





With the exception of the chapter on freeways, these functional class chapters are grouped together in the table below due to similarity in the organization and content of the existing subsections within these chapters, as well as similarity in the recommended revisions.



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Table A-4. Chapter 3 – Roadway Classifications (NEW)

Recommended new introduction for the existing functional classification chapters that describes a new framework for context-based roadway classification. The Smart Growth America project team recommends that this section be tailored to the Vermont context and scale but modeled broadly after the approach outlined in the ITE manual, *Designing Walkable Urban Thoroughfares: a context sensitive approach**

			
VSS Section	Need	Description of Revisions and/or Augmentations Needed	VTrans Documents to Link/Integrate
Context-based roadway classification	N	Provide: <ul style="list-style-type: none"> • A description of the traditional roadway functional classification system and its role in design decisions • A discussion of how surrounding land use context can vary along a corridor • A rationale for expanding the roadway classification approach to account for a broader range of contexts beyond “urban” and “rural” for each functional class • Introduction of a corridor approach to classifying/designing roadways 	As appropriate, reference and link to VTrans documents that provide existing guidance on designing within different land use contexts: <ul style="list-style-type: none"> • Complete Streets Guidance, evaluation matrix and checklists
Vermont roadway context zones	N	Provide description of design context zones found in Vermont. These zones will need to be identified during the VSS revision process and defined within this section. The four Vermont design contexts listed in existing VSS subsection 1.5 (“Transportation Design within the Vermont Context,”) can provide a starting point, as can the context zones provided in ITE’s <i>Designing Walkable Urban Thoroughfares</i> . Vermont context zones could include: <ul style="list-style-type: none"> • Rural • Suburban or transitional • Hamlet or village • Downtown • City center 	
Designing safe transitions	N	Provide guidance and specific design standards as appropriate for designing transitions between different context zones that are safe for all users.	
State highways as main streets	N	Provide description of: <ul style="list-style-type: none"> • The common challenges associated with designing state highways that are also town or village main streets • General strategies of balancing statewide travel needs, roadway facility maintenance needs, local travel needs, and community placemaking needs • Guidelines for exercising design flexibility to meet community needs within the parameters of state and national design standards • Reference to relevant VTrans policies that impact and/or constrain design practices 	





*Institute of Transportation Engineers. (2010). *Designing Walkable Urban Thoroughfares: a context sensitive approach*. “Chapter 4: A Framework for Walkable Urban Thoroughfare Design.” <http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>

Chapter 4 – Designing for All Roadway Users (NEW)

Recommended new chapter that provides considerations for accommodating a variety of users of the transportation network.



VSS Section	Need	Description of Revisions and/or Augmentations Needed	VTrans Documents to Link/Integrate
Overview of the need to provide for a variety of roadway users	N	Provide a brief description of the state's Complete Streets law and its implications for state transportation design practices.	As appropriate, reference and link to:
Overview of roadway design elements and their impacts	N	<p>Provide overview of the design elements that can impact safety, convenience and comfort of travel for different users (illustrated where appropriate), such as:</p> <ul style="list-style-type: none"> • Overall scale of the transportation facility • Lane/shoulder/sidewalk widths • Operating speeds • Frequency of curb cuts • On-street parking • Sidewalks and crossings • Medians <p>• Sight distance</p> <p>• Pavement condition</p> <p>• Pavement markings</p> <p>• Signalization</p> <p>• Landscaping</p> <p>• Other considerations as needed/appropriate</p> <p>This section can link to and/or build on the "Practices and Principals" section provided in VTrans' Complete Streets Guidance.</p>	<ol style="list-style-type: none"> 1. VTrans documents that outline guidance or constraints in designing to accommodate specific roadway users; and 2. Relevant VTrans policies that impact roadway design decisions and tradeoffs, such as: <ul style="list-style-type: none"> • Complete Streets Guidance, evaluation matrix and checklists • Bicycle and Pedestrian Facility Planning and Design Manual • Crosswalk Guidelines • Landscape Guidance • Access Management Program Guidelines • Traffic Calming Study and Approval Process for State Highways • Enhancements Policy • Vermont On-Road Bicycle Plan (currently under development) • Snow and Ice Control Plan for State and Interstate Highways • Other documents as needed
Designing for truck travel	N	<p>Provide descriptions of:</p> <ul style="list-style-type: none"> • Basic needs in terms of safety, convenience and comfort of travel: fast cross-state travel, efficient pickups and deliveries, etc. • Circumstances under which trucks should and should not be considered a primary design vehicle • Standard truck sizes and needs for lane widths and turn radii at different speeds • Other considerations as needed/appropriate 	
Designing for transit travel	N	<p>Provide descriptions of:</p> <ul style="list-style-type: none"> • Basic needs in terms of safety, convenience and comfort of travel: safe loading and unloading of passengers, safe access into and out of travel lanes, safe pedestrian connections to transit stops, reliable service/headways, etc. • Circumstances under which transit should be considered during design (including corridors where no current transit service exists in some cases) • Standard bus sizes and basic needs for lane widths and turn radii at different speeds • Bus stop design and placement considerations • Other considerations as needed/appropriate 	
Designing for maintenance	N	<p>Provide descriptions of:</p> <ul style="list-style-type: none"> • Basic needs in terms of safety, convenience and comfort of travel: space to plow travel lanes without crossing the center line if sight distance is short, ability to use the same maintenance vehicle along a full corridor for cost-effectiveness, etc. • Typical circumstances under which maintenance vehicles should be given a greater or lower priority in balancing tradeoffs during design • Standard maintenance vehicle sizes and needs for lane widths and turn radii at different speeds • Snow management, including storage and disposal • Other considerations as needed/appropriate 	

 VSS Section	 Need	 Description of Revisions and/or Augmentations Needed	 VTrans Documents to Link/Integrate
Designing for bicycles	N	<p>Provide descriptions of:</p> <ul style="list-style-type: none"> • Basic needs in terms of safety, convenience and comfort of travel (including tiered descriptions of different bicycling confidence levels) • Circumstances under which bicycles should be given a greater or lower priority in design (ex. role of state on-road bicycle priority routes) • Overview of approaches for accommodating bicycles, including common and innovative bicycle facility types • A framework for selecting the appropriate bicycle facility based on transportation and land use context, anticipated user group(s), and other factors • Other considerations as needed/appropriate <p>This section should integrate the core elements of the VTrans Bicycle and Pedestrian Facility Planning and Design Manual.</p>	
Designing for pedestrians	N	<p>Provide descriptions of:</p> <ul style="list-style-type: none"> • Basic needs in terms of safety, convenience and comfort of travel (including specific travel needs for the elderly, disabled travelers, children, etc.) • Circumstances under which pedestrians should be given a greater or lower priority in design (ex. based on surrounding land uses and destinations, density, etc.) • Overview of approaches for accommodating pedestrians (pedestrian islands, bump-outs, signalization strategies, midblock crossings, etc.) • A framework for selecting the appropriate pedestrian accommodations based on transportation and land use context, anticipated user group(s), and other factors • Other considerations <p>The VTrans Bicycle and Pedestrian Facility Planning and Design Manual should be referenced and/or integrated into this section and should include reference to national ADA requirements as appropriate.</p>	
Other vehicles	N	<p>List and provide descriptions of basic design needs for other vehicles (such as law enforcement vehicles, vehicles carrying agriculture equipment, low-speed neighborhood electric vehicles, etc.), and how these users should be considered during design.</p>	
Complete Streets evaluation matrix	R/A	<p>Integrate/link to the existing Complete Streets Evaluation Matrix found in VTrans' Complete Streets Guidance, which provides direction on roadway design features and/or treatments that should be considered during construction and reconstruction projects for different functional classifications and contexts. This matrix should be updated and revised as appropriate (ex. to include additional roadway design features and/or context zones).</p>	

Chapter 5 – Freeways (revise/augment)

Geometric design standards and other design guidance for freeways



VSS Section



Need



Description of Revisions
and/or Augmentations Needed



VTrans Documents to
Link/Integrate

Basic geometric standards	R	Update this subsection to reference the latest AASHTO design guidance.	As appropriate, reference and link to VTrans documents that provide design-related guidance not currently integrated into the VSS:
Special design guidelines	R/A	<p>For this subsection:</p> <ul style="list-style-type: none"> Revisit existing list of considerations and accompanying descriptions and revise/expand as necessary. An updated list could include considerations for: <ul style="list-style-type: none"> Preservation of historical/archaeological resources (revise/expand existing) Preservation of natural, recreational, and scenic resource (revise/expand existing) Preservation of scale and community character in village and city entrances (revise/expand existing) Supporting economic vitality (revise/expand existing) Aligning with regional and local plans (new) Stormwater management (new) Designing for resilience (new) Revise list of common tools as necessary to reflect current Vermont and national design state of the practice 	<ul style="list-style-type: none"> Structures Design Manual Engineering Instructions Others as needed



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Chapter 6 – Principal Arterial Roads and Streets (revise/augment)

Chapter 7 – Minor Arterial Roads and Streets (revise/augment)

Chapter 8 – Collector Roads and Streets (revise/augment)

Chapter 9 – Local Roads and Streets (revise/augment)

Geometric design standards and other design guidance for the functional classifications listed above (Chapters 3.0-6.0 in the current VSS). These chapters have been grouped together within this table due to similarity in organization and content of existing VSS subsections within these chapters, as well as similarity in recommended revisions for these chapters and subsections.

 VSS Section	 Need	 Description of Revisions and/or Augmentations Needed	 VTrans Documents to Link/Integrate
Basic geometric standards	R	Update these subsections in Chapters 6-9 to reference the latest AASHTO design guidance.	As appropriate, reference and link to:
Level of service	R/A	Consider revising/expanding these subsections in Chapters 6-9 to include additional performance measurement approaches and performance targets beyond Level of Service (LOS), such as those provided in the NACTO Urban Streets Design Guide. Also consider exploring options for modifying LOS terminology (A-F) to remove negative connotations associated with a lower LOS, and consider expanding the current discussion of contexts in which it may be appropriate to design for a lower LOS.	<ol style="list-style-type: none"> 1. VTrans documents that provide design-related guidance not currently integrated into the VSS; 2. VTrans documents that outline guidance or constraints in accommodating specific roadway users; and 3. Relevant VTrans policies that impact roadway design decisions and tradeoffs:
Design speed	R/A	Consider modifying these subsections in Chapters 6-9 to include a discussion of how to identify and design to a “target speed” – a desired speed of travel based on goals for the facility and surrounding land uses – rather than designing to operating speed.	<ul style="list-style-type: none"> • Structures Design Manual • Engineering Instructions • Complete Streets Guidance, evaluation matrix and checklists • Crosswalk Guidelines • Landscape Guidance • Access Management Program Guidelines • Bicycle and Pedestrian Facility Planning and Design Manual • Traffic Calming Study and Approval Process for State Highways • Enhancements Policy • Vermont On-Road Bicycle Plan (currently under development) • Snow and Ice Control Plan for State and Interstate Highways • Relevant guidance on managing stormwater, vegetation, and other environmental assets within VTrans ROW • Others as needed
For subsections:	R/A	For these subsections within Chapters 6-9:	
<ul style="list-style-type: none"> • Sight distances • Lane and shoulder widths • Bridge widths and structural capacities • Vertical clearance • Horizontal clearance • Alignment • Grades • Cross-slope • Superelevation 		<ul style="list-style-type: none"> • Where appropriate, add discussion of accommodating the travel needs of all roadway users in terms of safety, convenience, and comfort • In cases where separate guidance is currently provided for rural vs. urban principal arterials, expand discussion to include each Vermont context zone (context zones can be grouped together as appropriate) • Review for consistency with VTrans and national design standards and revise as necessary. • Expand tables to provide a range of values, including design minimums and other values that may be preferable given sufficient right-of-way • Add visual illustrations of concepts as appropriate 	
Transitions	N	Add new subsections within Chapters 6-8 (arterial and collector chapters only) providing design guidance and standards as appropriate on designing safe transitions between land use contexts.	
Considerations for trucks	N	Add new subsections within Chapters 6-9 that provide any specific geometric design standards and other considerations for accommodating trucks on each roadway functional class. These subsections should reference and link to the “Designing for trucks” subsection in Chapter 4.	



VSS Section	Need	Description of Revisions and/or Augmentations Needed	VTrans Documents to Link/Integrate
Considerations for transit vehicles	N	Add new subsections within Chapters 6-9 that provide any specific geometric design standards and other considerations for accommodating transit on each roadway functional class. These subsections should reference and link to the “Designing for transit” subsection in Chapter 4.	
Considerations for maintenance vehicles	N	Add new subsections within Chapters 6-9 that provide any specific geometric design standards and other considerations for snow removal and accommodating maintenance vehicles on each roadway functional class. These subsections should reference and link to the “Designing for maintenance” subsection in Chapter 4.	
Considerations for bicycles	R/A	Expand and revise existing subsection within Chapters 6-9 on bicycle and pedestrian considerations to: <ul style="list-style-type: none"> • Be consistent with the VTrans Bicycle and Pedestrian Facility Planning and Design Manual (including values provided in tables for accommodating bicycles in shared use lanes and shoulders) and national standards • Include discussion of any specific geometric design standards and other considerations (such as recommended facility types) for accommodating bicycles on each functional class within various context zones These subsections should reference and link to the “Designing for bicycles” subsection in Chapter 4.	
Considerations for pedestrians	R/A	Expand and revise existing subsection within Chapters 6-9 on bicycle and pedestrian considerations to: <ul style="list-style-type: none"> • Be consistent with the VTrans Bicycle and Pedestrian Facility Planning and Design Manual, ADA guidelines, and other national standards • Include discussion of any specific considerations (such as recommended frequency of crossings, other recommended features, etc.) for accommodating pedestrians on each functional class within various context zones These subsections should reference and link to the “Designing for pedestrians” subsection in Chapter 4.	
Special design guidelines	R/A	For these subsections in Chapters 6-9: <ul style="list-style-type: none"> • Revisit existing list of considerations and accompanying descriptions and revise/expand as necessary. An updated list could include considerations for: <ul style="list-style-type: none"> — Preservation of historical/archaeological resources (revise/expand existing) — Preservation of natural, recreational, and scenic resource (revise/expand existing) — Preservation of scale and community character in village and city entrances (revise/expand existing) — Supporting economic vitality (revise/expand existing) — Aligning with regional, corridor, and local plans (new) — Stormwater management (new) — Designing for resilience (new) • Revise list of common tools as necessary to reflect current Vermont and national design state of the practice 	





Chapters 10. Intersection Design (NEW)

During the M2D2 workshop series, stakeholders pointed to the lack of guidance on designing safe intersections as a significant gap within the current VSS. The project team recommends adding a chapter to address this gap. The following recommended structure for the new chapter is based broadly on NACTO's Urban Street Design Guide.¹

¹National Association of City Transportation Officials. (2013). *Urban Street Design Guide*. "Design Controls: Performance measurement." <http://nacto.org/usdg/design-controls/performance-measures>

Table A-5. Chapter 10 – Intersection Design (NEW)

New chapter providing guidance on designing safe intersections for a variety of users of the transportation network within diverse contexts.

			
VSS Section	Need	Description of Revisions and/or Augmentations Needed	VTrans Documents to Link/Integrate
Intersection design principles	N	Provide overview of key concepts to consider in designing intersections. The following design principles from the Urban Street Design Guide can serve as a starting point but should be tailored to the Vermont context: <ul style="list-style-type: none"> • Design intersections to be as compact as possible • Analyze Intersections as part of a network, not in isolation • Integrate time and space • Consider intersections as shared space • Utilize excess space as public space • Design for the future 	As appropriate, reference and link to: <ol style="list-style-type: none"> 1. VTrans documents that provide intersection design guidance that is not currently integrated into the VSS; 2. VTrans documents that outline guidance or constraints in designing intersections to accommodate specific roadway users; and 3. Relevant VTrans policies that impact intersection design decisions and tradeoffs: <ul style="list-style-type: none"> • Engineering Instructions • Complete Streets Guidance, evaluation matrix and checklists • Bicycle and Pedestrian Facility Planning and Design Manual • Crosswalk Guidelines • Landscape Guidance • Traffic Calming Study and Approval Process for State Highways • Enhancements Policy • VTrans Project Operational Stormwater Management Protocol • Other relevant guidance on managing environmental assets within VTrans ROW
Overview of intersection design elements and their impacts	N	Provide overview of the intersection design elements that can impact safety, convenience and comfort of travel for different roadway users (illustrated where appropriate), such as: <ul style="list-style-type: none"> • Crossings • Corner radii • Visibility and sight distance • Traffic signals (cycle lengths, leading pedestrian intervals, fixed vs. actuated signal timing, etc.) 	
Designing intersections for a variety of users	N	Provide guidance on designing intersections to accommodate travel needs of different roadway users including: <ul style="list-style-type: none"> • Private automobiles • Trucks of various sizes • Transit vehicles and transit stop design/placement considerations • Bicycles, including tiered descriptions for different comfort/confidence levels • Pedestrians, including descriptions of specific considerations for the elderly, disabled travelers, children, etc. • Maintenance vehicles of various types and sizes • Other vehicle types as needed/appropriate (ex. law enforcement, agriculture equipment, etc.) 	



VSS Section



Need

Description of Revisions
and/or Augmentations NeededVTrans Documents
to Link/Integrate

Design standards for intersections, by intersection type	N	<p>Provide specific design standards and guidance for major Vermont intersection types organized by functional class and context as needed. Intersection types could include:</p> <ul style="list-style-type: none"> • Major intersections • Intersections of major and minor roads • Minor intersections • Roundabouts • Complex intersections • Intersections near at-grade railroad crossings <p>Include tables with geometric standards and visual illustrations where appropriate.</p>	
Special design guidelines	N	<p>Provide guidance on special considerations in designing intersections, such as:</p> <ul style="list-style-type: none"> • Preservation of historical/archaeological resources • Preservation of natural, recreational, and scenic resources • Preservation of scale and community character in village and city entrances • Supporting economic vitality • Aligning with regional, corridor, and local plans • Stormwater management • Designing for resilience 	

Level of Improvement (Remove from VSS)

Current chapter 7.0 outlines a policy for determining the level of investment that should be made in existing transportation facilities to make the best use of limited resources. The chapter provides a framework for deciding between full reconstruction, rehabilitation, or preservation based on the overall importance of the transportation facility, as determined based on functional class, average daily traffic, and equivalent single axle loadings, as well as other factors under specific circumstances.

While LOI does have implications for design, it is a policy rather than a design standard and has greater bearing on decisions

made earlier during the VTrans project development process. The VTrans Project Development Process Manual calls for project managers to consider level of improvement during project definition, including during development of a Purpose and Need statement and during initial project scoping. The SGA project team therefore recommends removing this chapter from the VSS and either incorporating the chapter into the update of the Project Development Process Manual or creating a separate Level of Improvement policy document that can be referenced during project definition.



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Chapters 11. Definitions and Key Concepts

The VSS and the language within the standards should be accessible both to VTrans staff and to outside partners who reference the standards in their own design practices or have an interest in the way VTrans makes design decisions. Adding a Chapter with definitions and descriptions of key concepts will help improve the overall accessibility of the VSS, as well as helping to ensure that users of the VSS interpret the standards consistently.

Appendix B provides an initial list of terms and concepts to be included in the new definition chapter. This list will be further developed and refined throughout the VSS revision process based on input from internal and external stakeholders.

Table A-6. Chapter 11 – Definitions and Key Concepts

New section with definitions for key terms and design concepts within the VSS.

			
VSS Section	Need	Description of Revisions and/or Augmentations Needed	VTrans Documents to Link/Integrate
Definitions and key concepts	N	<p>Provide list of key definitions and basic concepts necessary for understanding the VSS. This section should be designed to improve the accessibility of the VSS for external partners. It should include illustrations of concepts where appropriate.</p> <p>A draft list of key terms and concepts is available in Appendix B of this Work plan.</p>	

Appendix B. Definitions and Key Concepts: DRAFT List for Inclusion in revised VSS

The following list of relevant terms and concepts is intended to serve as a starting point for development of the “Definitions and key concepts” section within the revised VSS. This list is currently in draft form and will be expanded, modified, and improved throughout the revision process based on feedback from internal and external stakeholders.

AASHO – American Association of State Highway Officials

AASHTO – American Association of State Highway and Transportation Officials

Access Management

ADA – Americans with Disabilities Act

ADT – Average Daily Traffic

Alignment

Amenities

Auxiliary Lane

Average Running Speed

Bicycle Lane

Clearance

- Horizontal
- Vertical

Clear Zone

Complete Streets

Corridor Management

Cross Slope

Design Speed

Designated Bike Routes

Grade Separation/Grades

Horizontal Clearance

Intersection

Investment Categories

- Reconstruction
- Rehabilitation
- Preservation

Institute of Transportation Engineers (ITE)

Intelligent Transportation Systems (ITS)

- Land Use Context (could be loosely based on the ITE Context Zones):
- Rural (context zone C1/C2) – Most of Vermont (by area)
- Suburban or Transitional (C3) – Fringes of villages or downtowns, suburban areas
- Hamlet or Village (C4) – Fringes or larger towns, examples include centers of Barnard, Jericho, Arlington, Putney

- Downtown (C5) – Centers of larger towns, examples include Wilmington, Randolph, Middlebury, St. Johnsbury

- City Center (C6) – Centers of Burlington, Rutland

Level of Improvement (LOI)

Level of Service (LOS)

Maintenance

Manual on Uniform Traffic Control Devices (MUTCD)

Median

New Construction

Operations

Operating Speed

Pedestrian

Project Development Process

Public Transit

Reconstruction

Recovery Area

Right of Way

Roadway Classification System:

- Interstate/Freeway
- Principal Arterials
- Minor Arterials
- Collectors
 - Urban
 - Rural
- Local Roads

Roundabout

Shared Use Path

Sight Distance

Stormwater

Superelevation

Target Speed

Traffic Control Devices (TCD)

Traffic Calming

Traffic Lane

Transportation Demand Management (TDM)

Travel Lane