Roanoke Valley Transportation
PLANNING ORGANIZATION
Staffed by the REGIONALcommission

Staff Review of the RVTPO Congestion Management Process

November 12, 2018

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Contents

1. Introduction

A Congestion Management Process (CMP) is required for Transportation Management Areas (urbanized areas with >200,000 population). The RVTPO adopted its first CMP Plan in 2014. The CMP Plan identified the Roanoke Valley's Top 10 Areas of Emphasis and highway, transit, and non-motorized strategies to manage congestion for each Area of Emphasis as well as general system-wide strategies. The CMP Plan can be found at http://rvarc.org/wp-content/uploads/2014/01/CMP-Plan_Final-Draft.pdf. With over four years' experience with its CMP Plan, RVTPO can examine what strategies worked well and what issues or obstacles arose.

Section 2 of this document, Compliance Review, discusses how the CMP Plan meets federal requirements based on the Planning Agreement on Performance Based Metropolitan Transportation Planning Responsibilities for the Roanoke Valley Region, comments from the 2016 TMA Certification Review, and guidance from the Federal Highway Administration's Guidebook on the Congestion Management Process. The CMP Plan largely meets federal requirements and addresses two areas well: multimodal performance measures and strategies. Three major aspects could be strengthened: regional objectives, implementation of strategies, and evaluation. In general, compliance might be more easily assessed with reorganization and clarification.

Section 3, Progress Review, reviews the progress of the CMP Plan's proposed actions and identifies the strengths of the CMP Plan and opportunities for improvements. While there has been progress on some actions identified in the CMP Plan, but many infrastructure projects show little progress and are contradicted or superseded by newer plans, studies, and priorities. Strengths of the CMP Plan are the analysis of causes of congestion and the Top 10 Areas of Emphasis derived from innovative use of Google Traffic snapshots and public surveys. To improve congestion management and internal compliance, some general, system-wide strategies and fewer, high-priority infrastructure projects might be more effective than the current long list of projects taken from every relevant plan and study. Finally, proposed actions should be revised considering new resources, technology, and federal performance measure requirements.

Section 4, Standard Practices, examines congestion management processes from several other MPOs. MPOs employ some common practices of MPO congestion management processes, with larger and smaller MPOs diverging in some respects. While strategies are consistent across MPOs, implementation ranges from statements of encouragement to integration with long-range transportation planning.

2. Compliance Review

To assess compliance, staff first reviewed the Planning Agreement on Performance Based Metropolitan Transportation Planning Responsibilities for the Roanoke Valley Region. Staff then reviewed the 2016 TMA Certification Report and lastly the Federal Highway Administration (FHWA) publication "Congestion Management Process: A Guidebook". This chapter only assesses whether the CMP Plan adopted in 2014 complies with federal requirements. Section 3 will address internal compliance and how changes such as technology and requirements affect internal compliance.

2.1 Planning Agreement

An agreement between the RVTPO, the State, and Providers of Public Transportation was made in June 2018 to conduct a cooperative, comprehensive, and continuing transportation planning and programming process for the Roanoke Valley Region. Article 8 of the Planning Agreement, "Congestion Management Process in Transportation Management Areas", references federal legislation of the same name, 23 CFR 450.322. The full text of 23 CFR 450.322 is at this link. Excerpts of the legislation are provided in grey italics with CMP Plan chapter references in bold parenthesis within the code section, comments below each excerpt on how the CMP Plan addresses the legislation and staff suggestions in bold bulleted list.

450.322(a) The transportation planning process in a TMA shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system **(Chapter 7)***, based on a cooperatively developed and implemented metropolitan-wide strategy* **(Chapters 10 & 11)***, of new and existing transportation facilities…through the use of travel demand reduction…, job access projects, and operational management strategies.*

The Top 10 Areas of Emphasis are in several jurisdictions but specific target areas, even though present in all, may not be the same as *a metropolitan-wide strategy*.

Staff suggestions:

- **Clarify how strategies are metropolitan-wide and cooperatively developed.**
- **Identify *travel demand reduction*, *job access projects*, and *operational management strategies*.**

450.322 (b) The development of a congestion management process should result in multimodal system performance measures **(Chapter 8)** *and strategies* **(Chapters 10 & 11)** *that can be reflected in the Metropolitan Transportation Plan and the TIP.*

After several years of tracking VDOT/DRPT required performance measures as well as some locally developed ones, in June 2018, the RVTPO decided to only focus on the federal performance measures and incorporate others only after successfully using the federal ones in decision-making. The CMP Plan identifies several performance measures which are not included in the federal performance measures and thus no longer a focus.

Staff suggestion:

- **Evaluate the benefit of the CMP Plan performance measures.**
- **Describe how the CMP Plan and its identified performance measures will interact with the Metropolitan Transportation Plan and the Transportation Improvement Program.**

450.322(c) The level of system performance deemed acceptable by State and local transportation officials may vary by type of transportation facility, geographic location (metropolitan area or subarea), and/or time of day. In addition, consideration should be given to strategies that manage demand, reduce single occupant vehicle (SOV) travel, improve transportation system management and operations, and improve efficient service integration within and across modes, including highway, transit, passenger and freight rail operations, and non-motorized transport. Where the addition of general purpose lanes is determined to be an appropriate congestion management strategy, explicit consideration is to be given to the incorporation of appropriate features into the SOV project to facilitate future demand management strategies and operational improvements that will maintain the functional integrity and safety of those lanes.

The CMP Plan does not specifically address acceptable levels of system performance and broadly establishes a congestion network in Chapter 7. In general, the CMP Plan discusses:

- strategies that *manage demand* and *reduce single occupant vehicle travel*, such as rideshare and vanpool services, Park-and-Ride lots or agreements, and the improvement and encouragement of transit and non-motorized transportation,
- strategies that *reduce single occupant vehicle (SOV) travel* via the transit and non-motorized strategies,
- *transportation system management and operations* as it relates to traffic signal coordination in certain corridors,
- *efficient service integration within and across modes* via bicycle racks on buses, and
- *addition of general purpose lanes* via specific projects but does not discuss what features of those proposed projects will *maintain the functional integrity and safety of those lanes.*

Staff suggestions:

- **Define the *acceptable level of system performance by type of transportation facility, geographic location, and/or time of day*, as needed.**
- **Review the 2018 Valley Metro Comprehensive Operations Analysis for relevant congestion management strategies to improve the transit system's operation.**
- **Identify other strategies to improve efficient service integration between *highway, transit, passenger and freight rail operations, and non-motorized transport*.**
- **Identify features in proposals for *general purpose lane additions* that will *maintain the functional integrity and safety of those lanes*.**

450.322(d) The congestion management process shall be developed, established, and implemented as part of the metropolitan transportation planning process that includes coordination with transportation system management and operations activities. The congestion management process shall include:

(1) *Methods to monitor* **(Chapter 9 & 13)** *and evaluate* **(Chapter 10)** *the performance of the multimodal transportation system, identify the underlying causes of recurring and non-recurring congestion* **(Chapter 10)***, identify and evaluate alternative strategies* **(Chapter 10)***, provide information supporting the implementation of actions* **(Chapter 12)***, and evaluate the effectiveness of implemented actions* **(Chapter 13)***;*

The CMP Plan includes a robust description of the *methodology* used to *evaluate performance of the transportation system* and identify the Top 10 Areas of Emphasis and describes performance measures to *monitor the transportation system*. It *identifies underlying causes of congestion* for each of the Top 10 Areas of Emphasis, especially non-recurring congestion, and *identifies strategies* to manage the congestion in the Top 10 Areas of Emphasis (Chapter 10) and in general (Chapter 11). *Information supporting the implementation of actions* is provided in Chapter 12 by listing how the CMP Plan provides input/ideas for the prioritization of strategies and projects in the Constrained Long-Range Multimodal Transportation Plan and the Transportation Improvement Program. System-wide performance measures may *evaluate the effectiveness of implemented* system-wide *actions*, but performance measures to evaluate actions that are not system-wide (specific to each Top 10 Area of Emphasis) are not identified.

Staff suggestion:

- **Select performance measures to *evaluate the effectiveness of implemented actions* within each of the Top 10 Areas of Emphasis*.***

(2) *Definition of congestion management objectives* **(Chapter 4)** *and appropriate performance measures* **(Chapter 8)** *to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies* **(Chapters 13)** *for the movement of people and goods. Since levels of acceptable system performance may vary among local communities, performance measures* **(Chapter 8)** *should be tailored to the specific needs of the area and established cooperatively by the State(s), affected MPO(s), and local officials in consultation with the operators of major modes of transportation in the coverage area, including providers of public transportation;*

Chapter 4 does not define objectives as the chapter states. In Chapter 8, the Congestion Management Process robustly establishes *performance measures* (which are listed in Section 3.2 of this document including their status/issues). The Planning Agreement has more detail on the role of State, local officials, and public transportation providers in establishing performance measures. Chapter 13 discusses how strategies can be monitored for each Top 10 Area of Emphasis.

Staff suggestions:

- **Define *congestion management objectives*.**
- **Provide more information regarding *movements of goods*.**
- **Reference the Planning Agreement description of the role of *State, local officials, and public transportation providers* in establishing *performance measures*.**
- **Confirm the value of the identified performance measures and clarify how they relate to decision-making and progress reporting via the Annual Performance Measures Report.**

(3) Establishment of a coordinated program for data collection **(Chapter 8)** *and system performance monitoring* **(Chapter 9)** *to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions. To the extent possible, this data collection program should be coordinated with existing data sources (including archived operational/ITS data) and coordinated with operations managers in the metropolitan area;*

In Chapter 9, performance monitoring is described for transit via National Transit Database (NTD) surveys and non-motorized via greenway/trail user counts and National Bike/Pedestrian Documentation (NBPD) count programs. In Chapter 8, data *collection* is described for some *performance measures*. The performance measures included seem appropriate for *defining the extent and duration of congestion* and *evaluate the efficiency and effectiveness of implemented actions* but may not *determine the causes of congestion*. (Changes in performance measure reporting will be addressed in Section 3 Progress Review.)

Staff suggestions:

- **Cross-check and assess relevancy of performance monitoring activities with the congestion network.**
- **Describe performance monitoring for highways.**
- **Describe *data collection* for each *performance measure*.**
- **Identify data collection methodology to define the extent and duration of congestion and *determine the causes of congestion*.**

(4) Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies that will contribute to the more effective use and improved safety of existing and future transportation systems based on the established performance measures. The following categories of strategies, or combinations of strategies, are some examples of what should be appropriately considered for each area:

(i) Demand management measures, including growth management, and congestion pricing;
(ii) Traffic operational improvements;
(iii) Public transportation improvements;
(iv) ITS technologies as related to the regional ITS architecture; and
(v) Where necessary, additional system capacity.

Chapter 6 identifies the *anticipated performance and expected benefits* in a general sense for transit and non-motorized. Air quality and livability are identified as further benefits of congestion reduction. Chapter 10 describes strategies for the 10 Areas of Emphasis and describes *public transportation strategies* well and describes some *operational, ITS,* and *demand management strategies*. The plan does not address how the identified strategies are expected to *contribute to the more effective use and improved safety of the transportation system*.

Staff suggestion:

- **Explore additional *operation, ITS, and demand management strategies*.**
- **Evaluate the anticipated performance and expected benefits of the congestion management strategies listed in Chapter 10.**

(5) Identification of an implementation **(Chapter 12)** *schedule, implementation responsibilities, and possible funding sources for each strategy (or combination of strategies) proposed for implementation; and*

Chapter 12 on implementation and management does not discuss how each strategy may be implemented. Rather it references the relationship between the CMP and the long-range transportation plan and transportation improvement program for highways, the coordination of transit performance measures with Valley Metro, and the availability of funding sources for non-motorized capital projects.

Staff suggestions:

- **Identify *schedule information, implementation responsibilities, and possible funding sources for each strategy* listed in Chapter 10.**

(6) Implementation of a process for periodic assessment of the effectiveness of implemented strategies **(Chapter 13)***, in terms of the area's established performance measures. The results of this evaluation shall be provided to decision makers and the public to provide guidance on selection of effective strategies for future implementation.*

Chapter 13 discusses monitoring strategy effectiveness. System-wide performance measures are intended to be reported annually. The performance measures reports through 2017, which cover many topics in addition to congestion, are available on the website, but could be more actively promoted to *decision makers and the public*. Project-specific before and after performance measures, for example the Elm Avenue / I-581 interchange project, may have been collected by VDOT but have not been reported to or by the RVTPO.

Staff suggestions:

- **Assess the status of congestion in the Top 10 Areas of Emphasis and system monitoring activities noted in Chapter 13.**
- **Assess the effectiveness of implemented strategies and report the results to decision-makers and the public.**
- **More actively promoted evaluation results and performance measures reports to *decision makers and the public*.**

450.322(h) Congestion management plan. A MPO serving a TMA may develop a plan that includes projects and strategies that will be considered in the TIP of such MPO.

This step is optional and if chosen (as was done in 2014) additional requirements are provided in the code shown below.

(1) Such plan shall:

(i) Develop regional goals to reduce vehicle miles traveled during peak commuting hours and improve transportation connections between areas with high job concentrations and areas with high concentration of low-income households;

(ii) Identify existing public transportation services, employer based commuter programs, and other existing transportation services that support access to jobs in the region; and

(iii) Identify proposed projects and programs to reduce congestion and increase job access opportunities.

(2) In developing the congestion management plan, an MPO shall consult with employers, private and nonprofit providers of public transportation, transportation management organizations, and organizations that provide job access reverse commute projects or job-related services to low-income individuals.

Such goals listed in i.) have not been developed or provided in the CMP Plan. The CMP Plan does not identify the services listed in ii.). For iii.), the CMP Plan does identify proposed projects and programs to reduce congestion as noted in Chapters 10 and 11 but it does not specifically reference which projects or programs are intended to increase job access opportunities.

There is no indication that stakeholders listed in (2) were consulted.

Staff suggestions:

- **Define *peak commuting hours* for the region.**
- **Identify areas *with high job concentrations and areas with high concentration of low-income households.***
- **Develop *regional goals to reduce vehicle miles traveled during peak commuting hours and improve transportation connections between areas with high job concentrations and areas with high concentration of low-income households*.**
- **Describe *existing public transportation services, employer based commuter programs, and other existing transportation services that support access to jobs in the region*.**
- **Identify which projects and programs in Chapter 10/11 will *increase job access opportunities*.**
- **As part of the next CMP Plan update, *consult with employers, private and nonprofit providers of public transportation, transportation management organizations, and organizations that provide job access reverse commute projects or job-related services to low-income individuals*.**

2.2 TMA Certification Review

After becoming a Transportation Management Area (TMA), defined as having an urbanized area population over 200,000, the RVTPO experienced its first TMA Certification Review in 2016. The following excerpt describes the certification review findings of the RVTPO Congestion Management Process.

Recommendation Summary: In becoming a TMA, the TPO should begin to establish a higher-level Congestion Management Process that includes: developing and implementing regional CMP objectives/strategies, defining the CMP network, developing performance measures, collecting data and analyzing congestion. Furthermore, evaluating the effectiveness of the CMP process should also be undertaken by the TPO which includes development of an annual report (see complete recommendation [below]).

Basic Requirement: The State(s) and the MPO must develop a systematic approach for managing congestion through a process that "provides for safe and effective integrated management and operation of the multimodal transportation system. The Congestion Management Process (CMP) applies to TMAs based on a cooperatively developed and implemented metropolitan-wide strategy of new and existing transportation facilities eligible for funding under 23 U.S.C. and title 49 U.S.C. Chapter 53 through the use of travel demand reduction and operational management strategies." (23 CFR 450.320 (a))

Finding of Federal Review: The TPO's congestion management plan addresses Federal requirements through its ongoing programs, corridor studies, and CMP analyses. In particular, the TPO places significant importance on congestion management process strategies and investments. The TPO decided to focus efforts on the concept of a "Top 10" listing. The "Top 10" areas of emphasis were chosen through a combination of comparing public feedback with the frequency of congestion (i.e., "red" time versus "green" times) found in the Google Traffic Snapshots. However, no raw traffic data (e.g., INRIX) appears to be used for the plan. CMP strategies for highway, transit and non-motorized transportation focus on system bottlenecks, incident management and operational improvements to mainly address non-reoccurring congestion and demand management options instead of major capacity expansions or widening projects. System monitoring includes a yearly review of ten CMP performance measures. The TPO is encouraged to work closely with the regional partners to continue implementing the CMP, as well as to educate and highlight the transportation challenges facing the region to non-transportation stakeholders. The TPO is compliant with the requirements for a Congestion Management Process.

Recommendation: In becoming a TMA, the TPO should begin to establish a higher-level Congestion Management Process that includes: developing and implementing regional CMP objectives/strategies, defining the CMP network, developing performance measures, collecting data and analyzing congestion. Furthermore, evaluating the effectiveness of the CMP process should also be undertaken by the TPO which includes development of an annual report. The TPO's CMP should start with a more robust collection and use of datasets which will also go toward using this information to create a Performance Based Planning and Programming (PBPP) framework. To this end, routine data collection and analysis will help describe how CMP outputs feed into and are consistent with other TPO planning and programmatic processes (i.e., the MTP and TIP).

Staff identified specific recommendations from the TMA Certification Review.

Certification Recommendations:

- **Work with regional partners to implement the CMP Plan strategies.**
- **Educate and highlight the transportation challenges facing the region to non-transportation stakeholders.**
- **Identify regional objectives and strategies.**
- **Clarify the definition of the CMP network.**
- **Develop performance measures specific to the congestion problems of the region.**
- **Develop an annual report on the evaluation of the effectiveness of the congestion management process.**
- **Improve data collection and analyze congestion.**
- **Incorporate INRIX data into defining the Top 10 Areas of Emphasis.**
- **Determine how data will be used in performance-based planning and programming.**
- **Describe how the Congestion Management Process interacts with the Metropolitan Transportation Plan and the Transportation Improvement Program.**

2.3 Congestion Management Process: A Guidebook

The FHWA publication "Congestion Management Process: A Guidebook" describes eight actions of congestion management. The chapters in the CMP Plan that addresses each Guidebook action are listed in the table below. Further review of the CMP Plan chapter related to each Guidebook action is provided in Section 3.0 Progress Review.

FHWA Guidebook Action	FHWA Guidebook information	Relevant CMP Plan Chapter(s)	Overview of CMP Plan Chapter Content
1. Regional Objectives	Guidebook encourages specific, measurable, time-bound objectives. Example format: X% increase/decline by year Y.	Chapter 4 "Regional Objectives"	Does not list or describe objectives despite the chapter title, rather an overview of the methodology to identify congested areas is provided.
2. Congestion Network	Can be generic such as 'all major arterials' or specific roads	Chapter 7 "CMP Networks"	Describes the network as highways with low/medium/high congestion as determined through survey results, all transit routes, and current/future bikeway plan corridors. However, the CMP is primarily organized around the Top 10 Areas of Emphasis rather than the Congestion Network.
3. Multimodal Performance Measures	Assess system performance to identify problem areas and communicate this to the public and decision-makers, affecting on-the-ground projects	Chapter 8 "CMP Performance Measures" (Other performance measures are also found in Chapter 9 "CMP Performance Monitoring Plan" and Chapter 13 "Monitor Strategy Effectiveness")	The status of performance measures is described in Section 3.2. Many of these measures are no longer being tracked due to a focus on the federal performance measures.
4. Data Collection/ System Performance Monitoring	Guidebook focuses on Data Collection to monitor system performance.	Chapter 9 "CMP Performance Monitoring Plan" (Data collection also described in Chapter 8)	Data collection described for some performance measures: Highways – perception surveys and Google Traffic snapshots; Transit – NTD survey data bus stop activity index;

FHWA Guidebook Action	FHWA Guidebook information	Relevant CMP Plan Chapter(s)	Overview of CMP Plan Chapter Content
			Non-motorized – greenway/trail counts and NBPD counts.
5. Analyze Congestion Problems and Needs	Identify specific locations with congestion problems and the sources of these problems	Chapter 3 "Overview and Background" Chapter 4 "Regional Objectives" Chapter 5 "Congestion Types – Defined" Chapter 6 "Areas of Application"	Chapters 3 and 4 explain how the Top 10 Areas of Emphasis were derived. Chapter 5 in general notes sources of congestion for highways and non-motorized but none specifically for the Top 10 Areas of Emphasis; for transit, only congestion at Campbell Court is specifically addressed. Chapter 6 describes the results of public input on congested areas.
6. Strategies	(i) Demand management measures, including growth management and congestion pricing; (ii) Traffic operational improvements; (iii) Public transportation improvements; (iv) ITS technologies as related to the regional ITS architecture; and (v) Where necessary, additional system capacity	Chapter 10 "Identification and Evaluation of Strategies" Chapter 11 "CMP General Strategies"	Chapter 10 describes strategies to reduce congestion for the Top 10 Areas of Emphasis. Chapter 11 describes transit and non-motorized general strategies, but not highway general strategies, including demand management measures, traffic operational improvements, intelligent transportation system, or additional capacity needs.

FHWA Guidebook Action	FHWA Guidebook information	Relevant CMP Plan Chapter(s)	Overview of CMP Plan Chapter Content
7. Program and Implement Strategies	For system, corridor, and project strategies, identify the implementation schedule, implementation responsibilities, and possible funding sources	Chapter 10 "Identification and Evaluation of Strategies" Chapter 12 "Implementation and Management"	Chapter 10 is an extensive discussion of strategies for the Top 10 Areas of Emphasis with limited discussion of implementation for some of these strategies. Chapter 12 discusses implementation of highway, transit, and non-motorized strategies.
8. Evaluate Strategy Effectiveness	System-level performance or project-level before & after performance (see Actions 3 & 4) Ensure implemented strategies address congestion Make changes to process based on findings	Chapter 13 "Monitor Strategy Effectiveness"	Chapter 13 identifies yearly reporting of the 10 CMP Performance Measures and states that the highway, transit, and non-motorized strategies at the Top 10 Areas of Emphasis will be monitored for effectiveness.

The difference between Action 3 "Multimodal Performance Measures", Action 4 "Data Collection/ System Performance Monitoring", and Action 8 "Evaluate Strategy Effectiveness" is subtle. The Guidebook does not clarify how "system performance monitoring" is different from "multimodal performance measures". Instead, it focuses on the "data collection" component of Action 4. The Guidebook comments on the overlap between "evaluate strategy effectiveness" and "system performance monitoring". Identifying performance measures (action 3), describing data collection (action 4), and describing how that data will be used in making decisions (action 8) fulfills these requirements.

Staff suggestions:

- **Identify regional objectives.**
- **Examine the Congestion Network.**
- **Describe data collection methodology for performance measures.**
- **Provide more information on highway general strategies.**
- **Clarify which projects/strategies are action items, which projects/strategies are options, and how options will be considered and either become actions or be discarded from further consideration.**
- **Describe how performance measure data will be used in making decisions.**

3. Progress Review

Having a Congestion Management Process that meets federal requirements is the first step. RVTPO compliance with that process is the next step. RVARC staff reviewed the Congestion Management Process to determine progress and identify issues or obstacles to progress, including how changes such as technology and federal performance measure reporting requirements might impact the process.

Chapters 1-7 of the Congestion Management Process deal mainly with background and the methodology behind the Top 10 Areas of Emphasis. Innovative use of Google Traffic snapshots combined with public input resulted in the Top 10 Areas of Emphasis. The Congestion Management Process identifies bottlenecks as the main cause of recurring congestion and incidents as the main cause of non-recurring congestion. Staff noted that except for Exit 150, I-81 is not part of the Areas of Emphasis.

Staff suggestion:

- **Determine methodology and timeline to confirm or revise the Top 10 Areas of Emphasis, including I-81.**

RVARC staff identified actions from Chapters 8 – 13 of the Congestion Management Process, most of which were derived from other plans and studies. Staff suggested changes that could improve internal compliance with the Congestion Management Process as well as compliance with federal regulations (see Section 2) and changes prompted by current conditions – new technology, new federal performance measure reporting requirements, and regional context.

Staff suggestion:

- **Clearly identify actions.**

3.1 Review of Chapter 4: Regional Objectives

Chapter 4, "Regional Objectives", does not describe objectives.

Staff suggestion:

- **Identify regional objectives.**

3.2 Review of Chapter 7: CMP Networks

Chapter 7 defines the region's congestion network for highways. All transit routes and all current and proposed bikeway plan corridors are identified as the CMP Transit Network and the CMP Non-Motorized Network. However, it is unlikely that all bikeway plan corridors and transit routes are relevant to congestion (either experience it or could provide alternative travel for the congestion Top 10 Areas of Emphasis). There is no pedestrian component to the CMP Non-Motorized Network. Data being collected via greenway/trail counts and pedestrian elements of the manual counts are not relevant to the CMP non-motorized networks as currently identified in the CMP Plan.

Staff suggestion:

- **Clearly define the congestion network identifying where efforts should be targeted to reduce and manage congestion.**
- **Identify any congestion problems related to existing bike, pedestrian and transit networks in addition to the highway Top 10 Areas of Emphasis.**

3.3 Review of Chapter 8: Performance Measures

Chapter 8 of the Congestion Management Process list performance measures. The Congestion Management Process identifies ten primary performance measures plus four additional transit-related performance measures. Several of these have not been reported on, due to issues with data availability, staff time availability, or staff capability. Furthermore, there is not a clear path from data to decisions, weakening the impact of performance measure reporting.

Chapter 8 lists congestion-related performance measures to be monitored in the Performance Measures Annual Report.

Chapter 8 Performance Measure	**Status or issues**
Average Annual Daily Traffic by road (p 24)	Not included in Performance Measures Report, no value in monitoring AADT without other metrics for which data is not available
Volume over Capacity ratio and/or Level of Service by road (p 24)	VDOT updates the Travel Demand Model every 5 years, so this would not be an annual performance measure update
Average Travel Time (p 24)	Data not available
Peak Hour Volume (p 24)	Data not available
Public satisfaction (p 24)	Exceeds staff time
Annual vehicle revenue miles traveled per capita (p 24)	Included in Performance Measures Report through 2017
Annual passenger miles traveled per capita (p 24)	Included in Performance Measures Report through 2017
Park and Ride Lots and occupancy (p 24)	Occupancy data not available. Number of spaces and number of lots included in Performance Measures Report through 2017
Number of bicyclists by location (p 24)	Included in Performance Measures Report through 2017
Number of greenway users by location (p 24)	Included in Performance Measures Report through 2017
Annual unlinked passenger transit trips (p 25)	Included in Performance Measures Report through 2017
Annual unlinked passenger transit trips per capita (p 25)	Included in Performance Measures Report through 2017
Annual passenger miles traveled (p 25)	Included in Performance Measures Report through 2017
Annual SmartWay Connector bus ridership (p 25)	Included in Performance Measures Report through 2017
Bus Timepoint Test (p 25)	Not tracked
Bus Route Test (p 25)	Not tracked

Chapter 8 Performance Measure	Status or issues
Passenger Crowding Ratio (p 25)	Not tracked

Recent federal legislation mandates setting targets for three system performance measures that relate to congestion: Interstate Travel Time Reliability, Non-Interstate Travel Time Reliability, and Interstate Truck Travel Time Reliability Index. VDOT will set targets for these and RVTPO will have the option (in October 2018) to adopt VDOT targets or to set its own targets. The RVTPO in June 2018 overhauled its annual performance measures report so that only the federally required performance measures will be included.

3.4 Review of Chapter 9: CMP Performance Monitoring Plan

Although Chapter 9 is titled "CMP Performance Monitoring Plan", it extends the list of performance measures from Chapter 8. The performance measures in Chapter 9 relate to congestion, to transit, and to non-motorized transportation.

Chapter 9 Performance Measure	Status or issues
Highways: Annual congestion perception surveys (p 26)	Not performed Insufficient staff time – not a priority – need to identify this task in the UPWP.
Highways: Annual Google Traffic snapshots (p 26)	Last performed in 2015 Recent advances in technology offer more options May not provide accurate assessment of congestion Analysis methodology unclear Not an industry standard
Transit: National Transit Database surveys every 3 years (p 26)	Completed in 2017 per federal requirement Automated bus counters will replace manual counts and provide annual data
Non-Motorized: Greenway counters (p 27)	Activity is not related to the congestion network Monitored quarterly Infrared and magnetic
Non-Motorized: National Bicycle & Pedestrian Documentation Project (p 27)	Pedestrian element is not related to the congestion network as defined Conducted annually through 2017 Extensive staff time Many volunteers Methodology difficult to implement consistently Unreliable data Unable to identify trends across time or patterns Recent technology offers more options

The industry standards for congestion analysis are travel time runs and traffic counts. Most MPOs, even larger ones, don't have the resources and expertise for travel time runs, and traffic counts provide limited data. Agencies are increasingly turning to smart phone GPS data, or INRIX. INRIX specializes in connected car services and transportation analytics and collects data from hundreds of millions of mobile phones and connected vehicles equipped with GPS devices. When the RVTPO Congestion Management Process was being developed, RVTPO did not have access to INRIX data, and staff pioneered an innovative method using Google Traffic snapshots (which are based on smart phone data).

VDOT has purchased travel time and speed data from INRIX that RVTPO can access. In the Roanoke Valley, INRIX data is available for interstates and major arterials.

The Non-motorized Performance Monitoring Plan consists of automated infrared and magnetic counters at specific locations on some greenways and the National Bicycle & Pedestrian Documentation Project at other on-road locations.

The National Bicycle & Pedestrian Documentation Project has been challenging to conduct. It requires extensive staff time and volunteers and the methodology has been difficult to implement consistently. The data collected has therefore been insufficient to identify trends across time or patterns. In 2018, staff temporarily suspended the National Bicycle & Pedestrian Documentation Project while reviewing alternative bike/ped count methods and evaluating how the data can be useful to RVTPO and localities.

3.5 Review of Chapter 10: Identification and Evaluation of Strategies

Chapter 10 lists projects, primarily taken from existing plans and reports, that improve each of the Top 10 Areas of Emphasis. Staff identified action items for the Areas of Emphasis and assessed progress as "complete", "in progress", or "no progress".

- "Complete" means the project has been completed.
- "In progress" means the project has funding allocated or is in construction.
- "No progress" means that funding has not been identified.
- "No progress – Not a priority" means there is no evidence of intention to pursue the action, such as appearance in more recent plans and studies, inclusion on the Vision 2040 Fiscally Constrained or Vision Lists of Projects, and/or otherwise deemed a priority.
- If part of an action is "Complete" or "In progress", that is noted as well as the status of the remaining part of the action.
- Note - any transit-related status is draft until the Valley Metro Board approves the Transit Development Plan in November 2018.

Area of Emphasis	Action	Status
#1 Elm Avenue and I-581	I-581/Elm Avenue Interchange Project (p 31)	Complete
#1 Elm Avenue and I-581	East Park & Ride Lot (p 32)	No progress, Not a priority
#1 Elm Avenue and I-581	East commuter transit service (p 32)	Not a priority. Rather, 35/36 routes to be improved in 2019.
#1 Elm Avenue and I-581	Study how to increase ridership on Valley Metro routes #35/#36 and #41/#42 (p 32)	Complete. 35/36 route change in progress. 41/42 was studied as part of the 2018 Comprehensive Operations Analysis (COA).
#1 Elm Avenue and I-581	Consider rerouting Valley Metro routes #41/#42 to bypass interchange area (p 32)	Complete. Considered as part of the COA. No change recommended to bypass the interchange area.
#1 Elm Avenue and I-581	Consider rerouting bus to less congested downtown streets (p 32)	Complete. Bus routes in downtown considered as part of the COA.

Area of Emphasis	Action	Status
#1 Elm Avenue and I-581	Consider bike lanes on Elm Avenue (p 32)	No progress, Not a priority; not included in the interchange reconstruction (bike lanes were added to Elm Ave west of this Area of Emphasis)
#1 Elm Avenue and I-581	Wayfinding signs for Lick Run and Mill Mountain Greenways (p 33)	In progress
#1 Elm Avenue and I-581	In cooperation with Virginia Tech Carilion Medical School, RIDE Solutions identify and implement Travel Demand Management strategies, rideshare and vanpool services (p 33)	Ongoing. Carilion operates van pool and shuttle service to Virginia Tech. Smartway route was extended to the medical school. New SW express service added.
#2 Hollins to Hershberger	Widen Hollins Road to four lanes with bike lanes, Orange Avenue to Liberty Road, consider all the way to Plantation Road (p 33)	No progress, Vision List
#2 Hollins to Hershberger	Consider widening Plantation Road to four lanes with curb, gutter, and sidewalk from Liberty Road to Hollins Road (p 34)	No progress, Not a priority
#2 Hollins to Hershberger	Widen the Hollins Road bridge over Tinker Creek (p 34)	Complete
#2 Hollins to Hershberger	Expand transit service to Hollins (p 36)	Desire for expansion reflected in Valley Metro TDP. Locality priority unknown.
#2 Hollins to Hershberger	Increased marketing of “Bike n’ Ride” program (bike racks on buses) (p 36)	No progress, Not a priority
#2 Hollins to Hershberger	Complete Tinker Creek Greenway (p 37)	In progress
#3 Salem	Lynchburg Turnpike and Electric Road – lower roadbed 3 inches to resolve inadequate bridge clearance (p 37)	No progress, being evaluated for funding
#3 Salem	Traffic light synchronization with train traffic at Mill Lane (p 38)	No progress, will likely apply for HSIP

Area of Emphasis	Action	Status
#3 Salem	Managed lane for I-81 detours from exit 140 to 137 (p 38)	No progress, Not a priority
#3 Salem	Civic Center/Hospital bus route separate from Walmart (p 39)	Desire for this route improvement reflected in Valley Metro TDP – new route 93 estimated FY20.
#3 Salem	Increase frequency of #91/#92 to 30 minutes and increasing vehicle size (p 39)	Larger vehicle added Increased frequency to 30-minutes, not a priority.
#3 Salem	Expand transit service to Richfield Retirement Center (p 39)	Desire for this expansion reflected in Valley Metro TDP. Locality priority unknown.
#3 Salem	Develop Salem non-motorized transportation plan (p 39)	Incorporated into Regional Pedestrian, Bikeway and Greenway Plans.
#3 Salem	Increased marketing of "Bike n' Ride" program (bike racks on buses) (p 39)	No progress, Not a priority
#3 Salem	Bike lanes on East Main Street from Electric Road to City of Roanoke limit (p 40)	Under construction – Are you sure??
#3 Salem	Bike lanes on East Main Street from Kessler Mill to Lynchburg Turnpike (p 40)	Kessler Mill to Brand Ave in progress; UPC 8753, Brand Ave to Lynchburg Turnpike under construction
#3 Salem	Sidewalks on East Main Street from VA311 to Kessler Mill Road (p 40)	Kessler Mill to Brand Ave in progress; UPC 1088853, Brand Ave to VA311 UPC 8753
#3 Salem	Complete the Roanoke River Greenway (p 40)	In progress
#3 Salem	New Park and Ride lot at Exit 141 (preferred) or Exit 137 to address overcrowding at Exit 140 Park and Ride (p 40)	Completed an alternative. Exit 140 Park and Ride was expanded
#3 Salem	In cooperation with Roanoke College, RIDE Solutions identify and implement Travel Demand Management strategies, rideshare and vanpool services (p 40)	Attempted No interest from Roanoke College
#4 Cave Spring Corners	Widen 419 to six lanes from Brambleton Avenue to US 220 (p 41)	No progress; Vision List

Area of Emphasis	Action	Status
#4 Cave Spring Corners	Add two southbound left-turn lanes on Route 419 at Cave Spring Corners (p 41)	No progress, Not a priority
#4 Cave Spring Corners	Add two westbound left-turn lanes on Brambleton Avenue at Cave Spring Corners (p 41)	No progress, Not a priority
#4 Cave Spring Corners	Add acceleration lane for the southbound right turn (p 41)	No progress, Not a priority
#4 Cave Spring Corners	Add pedestrian countdown signals and pedestrian crossing signs at each corner of Brambleton Avenue and Route 419 (p 41)	No progress, Not a priority
#4 Cave Spring Corners	Coordinate traffic signals throughout Route 419 (p 41)	In progress, UPC 111307
#4 Cave Spring Corners	Upgrade signals to LED lights (p 41)	No progress, Not a priority
#4 Cave Spring Corners	Add traffic and video sensors at Cave Spring Corners for non-recurring congestion incidents (p 41)	In progress, UPC 111407
#4 Cave Spring Corners	Expand transit service to Cave Spring Corners (p 42)	Desire reflected in Valley Metro TDP. Locality priority unknown.
#4 Cave Spring Corners	ADA-compliant pedestrian infrastructure at Cave Spring Corners (p 42)	No progress, Not a priority
#4 Cave Spring Corners	Sidewalks on Route 419, both sides, from Cave Spring Corners to the next intersection east (p 42)	No progress, Vision List
#4 Cave Spring Corners	Sidewalks on Route 419, both sides, from Cave Spring Corners to the next intersection west (p 42)	No progress, Not a priority
#4 Cave Spring Corners	On-road separated bicycle facility on Route 419 from Salem city limit to US 220 (p 42)	Bicycle accommodations are being discussed as part of the Oak Grove Center Plan, which includes Route 419 between Glen Heather Drive and Valley Avenue.
#4 Cave Spring Corners	Bicycle facilities throughout Route 419 Corridor (p 42)	Striped bike lanes in each direction are in design as part of the Smart Scale 419 Project between Ogden and 220. Construction Ad Date is FY 2020.

Area of Emphasis	Action	Status
		Bicycle accommodations are being discussed as part of the Oak Grove Center Plan, which includes Route 419 between Glen Heather Drive and Valley Avenue.
#4 Cave Spring Corners	Negotiate weekday park-and-ride agreements with churches in or near Cave Spring Corners (p 42)	No progress, Not a priority
#5 Route 419/US220	Access Management from Clearbrook to Red Hill (p 43)	The Route 220 Arterial Preservation Program is analyzing Route 220 from Route 419 south through Henry County, including the section referenced, for intersection and access management improvements.
#5 Route 419/US220	Signal coordination and signal timing (p 43)	In progress, UPC 111407
#5 Route 419/US220	Widen Route 419 to six lanes from Brambleton Avenue to US 220 with bike lanes (p 43)	No progress, Vision List
#5 Route 419/US220	Additional lanes on roads and entrances in Tanglewood Mall area (p 43)	Superseded by Reimagine 419 Plan
#5 Route 419/US220	Redesign Route 419/US 220 interchange with additional lanes (p 43)	Superseded by Reimagine 419 Plan
#5 Route 419/US220	Close the Tanglewood Mall entrance closest to US 220, remove US 220 southbound off-ramp traffic signal (p 43)	Superseded by Reimagine 419 Plan
#5 Route 419/US220	Reversible lane system for peak periods on US 220 from Clearbrook to Route 419 (p 43)	No progress, Not a priority
#5 Route 419/US220	Express transit to Tanglewood Mall (p 45)	Desire reflected in Valley Metro TDP. Locality priority unknown.
#5 Route 419/US220	Consider adjusting transit schedule to match Tanglewood Mall hours (p 45)	Considered as part of COA, no change recommended in Valley Metro TDP.
#5 Route 419/US220	Expand transit on Route 419, including Smart Way expansion and #61/#62 to Cave Spring Corners (p 46)	Desire for 419 service and 61/62 expansion to Cave Spring Corners reflected in Valley Metro TDP. Locality priority unknown. SMART WAY

Area of Emphasis	Action	Status
		Expansion to 419 not recommended in Valley Metro TDP.
#5 Route 419/US220	Bicycle accommodations on US220 from Route 419 to Blue Ridge Parkway (p 46)	No progress, Not a priority
#5 Route 419/US220	Extend Greenway to Tanglewood Mall (p 46)	2018 Greenway Plan identifies an extension of Murray Run Greenway to Tanglewood Mall. No design, funding, or projected completion.
#5 Route 419/US220	Improve pedestrian facilities at Tanglewood Mall western signalized entrance (p 46)	Superseded by Reimagine 419 Plan
#5 Route 419/US220	Add sidewalk to both sides of Route 419 from Tanglewood Mall western and eastern signalized entrances to adjacent intersections, add sidewalks to any future widening project on Electric Road (p 47)	Superseded by Reimagine 419 Plan
#5 Route 419/US220	Add pedestrian infrastructure from apartments across Electric Road to Tanglewood Mall eastern signalized entrance (p 47)	Superseded by Reimagine 419 Plan
#5 Route 419/US220	Park and Ride in Clearbrook area (p 47)	No progress, Not a priority
#6 Apperson and Route 419	Eastbound right-turn lane on Apperson (p 48)	Concept, pursuing funding
#6 Apperson and Route 419	Two northbound left-turn lanes on Route 419 (p 48)	Concept, pursuing funding
#6 Apperson and Route 419	Expand transit to serve commuters, including Smart Way expansion (p 49)	Changes to 91/92 proposed in the Valley Metro TDP along with a new 93 route to serve this area- estimated for FY20. SMART WAY expansion not included in the TDP.
#6 Apperson and Route 419	Park and Ride near Downtown Salem/ Roanoke College (p 49)	No progress, Not a priority
#6 Apperson and Route 419	Wider travel lanes or paved shoulders in intersection improvements (p 50)	Concept, pursuing funding
#6 Apperson and Route 419	Complete Mason's Creek Greenway (p 50)	In progress

Area of Emphasis	Action	Status
#6 Apperson and Route 419	Extend Hanging Rock Trail (p 50)	In progress
#6 Apperson and Route 419	Bicycle accommodations on Apperson Drive from City of Roanoke limit to Electric Road (p 50)	Wider lanes, intend to improve accommodation
#6 Apperson and Route 419	Relocate Roanoke River Greenway on Route 419 when Apperson Drive bridge is built (p 50)	In progress
#7 Route 24 / Vinton	Widen Route 24 from City of Roanoke limit to Pollard Street to six lanes (p 50)	No progress, Route 24 to be studied in 2020
#7 Route 24 / Vinton	Bike lanes on Route 24 from City of Roanoke limit to Chestnut Street (p 50)	No progress, Vision List. Route 24 to be studied in 2020
#7 Route 24 / Vinton	Access management on Route 24 (p 50)	No progress, Route 24 to be studied in 2020
#7 Route 24 / Vinton	Study Virginia Avenue and 3rd Street (p 50)	No progress, Route 24 to be studied in 2020
#7 Route 24 / Vinton	Consistent two-way bus service throughout Vinton (p 51)	Change to 35/36 route in progress, planned for 2019.
#7 Route 24 / Vinton	Study park-and-ride lots (p 51)	No progress, Not a priority
#7 Route 24 / Vinton	Study regional transit commuter service (p 51)	No progress, not a priority.
#7 Route 24 / Vinton	Expand transit into Roanoke County (p 51)	For the area past Vinton, no progress, desire reflected in the long-range Transit Vision Plan but not in the short-range Transit Development Plan.
#7 Route 24 / Vinton	Bike lanes on Washington Avenue from Roanoke City limit to Bedford County limit (p 52)	No progress, bicycle accommodations part of 2019 study
#7 Route 24 / Vinton	Complete Roanoke River Greenway (p 52)	In progress
#7 Route 24 / Vinton	Complete Tinker Creek Greenway (p 52)	In progress
#7 Route 24 / Vinton	Complete Glade Creek Greenway (p 52)	Phase I complete
#7 Route 24 / Vinton	Widen Washington Avenue from Bypass Road to Roanoke County limit with sidewalks (p 52)	No progress, pedestrian accommodations part of 2019 study

Area of Emphasis	Action	Status
#8 Orange Ave / Challenger Corridor	Redesign I-581 / Orange Avenue interchange for freight (p 53)	No progress, Not a priority
#8 Orange Ave / Challenger Corridor	Consider development of alternate routes (p 53)	No progress, Not a priority. Pursuing signal coordination between City and County
#8 Orange Ave / Challenger Corridor	Consider road improvements to Hollins Rd, Gus Nicks Blvd, and King St to alleviate Orange Ave congestion (p 53)	No issues with Gus Nicks Blvd. Hollins Rd continues to receive improvements but rebuilding the railroad bridge as originally conceived is no longer being considered. King St is a candidate for curb/gutter/sidewalk but not on any plans.
#8 Orange Ave / Challenger Corridor	Study intersection improvements to increase capacity (p 53)	VDOT evaluated the use of innovative intersections along portions of the corridor; however, their use is constrained by heavy turning movement volumes and right-of-way limitations. Future coordination between VDOT, the City of Roanoke, and Roanoke County to coordinate traffic signals may yield some throughput improvement for the corridor. Future study is needed to evaluation all available options to preserve capacity and improve throughput.
#8 Orange Ave / Challenger Corridor	Widen Orange Avenue from 11th Street NE to 13th Street NE to six lanes (p 53)	11th to Gus Nicks on Vision List, Smart Scale application
#8 Orange Ave / Challenger Corridor	Turning lanes and signals at Blue Hills Dr and Orange Ave (p 53)	Complete
#8 Orange Ave / Challenger Corridor	Reversible lane for peak traffic (p 53)	No progress, Not a priority
#8 Orange Ave / Challenger Corridor	Study intersection improvement of Orange Avenue and Granby Road for freight movement (p 54)	No progress, Not a priority
#8 Orange Ave / Challenger Corridor	Commuter express transit service between Bonsack and Downtown Roanoke (p 55)	Studied in 2014, idea included in 2016 Transit Vision Plan, service not included in 2018 Transit Development Plan.
#8 Orange Ave / Challenger Corridor	Expand all-day transit to Blue Hills Industrial Park (p 55)	31X implemented for peak hours.

Area of Emphasis	Action	Status
		All-day service proposed along with 31/32 and 35/36 route changes in Valley Metro TDP.
#8 Orange Ave / Challenger Corridor	Bicycle accommodations on Orange Avenue from Williamson Road to Roanoke County limit (p 55)	No progress, Not a priority
#9 Exit 150 and Route 11	Complete Exit 150 Access Management Improvements Project (p 56)	Completed
#9 Exit 150 and Route 11	Botetourt County develop vision master plan for Exit 150 interchange (p 56)	Completed
#9 Exit 150 and Route 11	Permit and encourage mixed-use developments (p 56)	An Urban Development Area was established for Exit 150 in November 2016 as part of the comprehensive plan. Consultant services were funded by OIPI. This amended the future land use map, which has an impact on rezoning requests. In 2016 County adopted Gateway Crossing Area Plan which includes mixed use developments. In December 2016, the County approved a new permitted use in the zoning ordinance, "dwelling, mixed use", which allows for residential units above one or more non-residential uses. In 2017, OIPI awarded the County $65,000 to adopt amendments to the zoning ordinance to allow for development according to the principles of traditional neighborhood design. Adoption of the overlay zoning is anticipated by the end of 2018.
#9 Exit 150 and Route 11	Study reversible I-81 lane, High Occupancy Vehicle tolled lane, and Variable Speed Zone dynamic road signs (p 57)	No progress, Not a priority
#9 Exit 150 and Route 11	Study transit expansion in Botetourt County for commuters within and between activity nodes (p 59)	Desire for service expansions reflected in Transit Vision Plan. No service planned in Valley Metro TDP.

Area of Emphasis	Action	Status
#9 Exit 150 and Route 11	Expand Exit 150 Park and Ride (p 59)	No progress, unsuccessfully submitted for funding, on Constrained List
#9 Exit 150 and Route 11	Improve wayfinding and bicycle accommodations on US Bicycle Route 76 (p 59)	Study completed in 2017. Share the Road signs added to Route 311. No design, funding, or projected completion for other recommendations from the 2017 study.
#10 Brandon Avenue Corridor	Study bus route #65/#66 (p 60)	65/66 adjustments studied in COA. Recommendation for new Brandon Avenue corridor transit service included in Valley Metro TDP. Local priority unknown.
#10 Brandon Avenue Corridor	Direct transit route between Carilion Roanoke Memorial Hospital and Lewis Gale Medical Center (p 60)	Recommendation for new Brandon Avenue corridor transit service included in Valley Metro TDP. Estimated implementation for FY21.
#10 Brandon Avenue Corridor	Bicycle accommodations on Grandin Road from Brandon Avenue to Memorial Avenue (p 61)	No progress, No intention of pursuing.
#10 Brandon Avenue Corridor	Construct Greenway to Tanglewood Mall (p 61)	2018 Greenway Plan identifies an extension of Murray Run Greenway to Tanglewood Mall. No design, funding, or projected completion.

From the above detailed actions, staff identified actions that recur among the Areas of Emphasis. These recurring actions could be considered general strategies, which are discussed in the next section, 3.6, Review of Chapter 11: General Strategies.

Action	Areas of Emphasis
Add or expand Park and Ride lots	1, 3, 4, 5, 6, 9
Expand, reroute, or study transit service	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Bicycle accommodations	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Sidewalks	2, 3, 4, 7
Improve or expand Greenways	1, 2, 3, 5, 6, 7, 10
In cooperation with other organizations, RIDE Solutions identify and implement Travel Demand Management strategies, rideshare and vanpool services	1, 3
Add travel lanes	2, 4, 5, 7, 8
Add turn lanes	4, 5, 6, 8
Increased marketing of “Bike n’ Ride” program (bike racks on buses)	2, 3
Signal coordination and timing	3, 4, 5
Access management	5, 7, 9

Reversible lane	5, 8, 9

3.6 Review of Chapter 11: General Strategies

Chapter 11, "General Strategies", relates only to transit and non-motorized and did not include general highway strategies. The recurring actions identified in the previous section, 3.5, Review of Chapter 10: Identification & Evaluation of Strategies, could be considered general strategies that relate to highway, transit, and non-motorized.

Actions	**Status**
Buses accommodate bicycles (p 62)	Current
Bus arrival variable message sign at bus stops (p 62)	Variable messaging will be available on smartphone apps, not on signs at bus stops
On-board GIS system (p 62)	In progress
Automatic passenger counters (p 62)	In progress
Market Bike and Ride (p 62)	No progress, Not a priority
On-road wayfinding for Greenway connectivity (p 62)	No progress, City intends to pursue after installation of wayfinding signs on Greenways

Staff suggestions:

- **Combine "Identification and Evaluation of Strategies" with "General Strategies".**
- **Determine which actions are regional priorities and eliminate others.**
- **Review recent plans, such as Reimagine 419 Plan or the Transportation and Economic Development Study, that identify projects or actions that contradict or supersede those in the Congestion Management Process.**
- **List only one or two high priority infrastructure actions per Area of Emphasis.**
- **Develop performance measures specific to each of the Top 10 Areas of Emphasis.**
- **Identify system-wide or general highway strategies.**

3.7 Review of Chapter 12: Implementation and Management

The discussion of implementation strategies in Chapter 12, "Implementation and Management", is weak. It does not identify when the projects will be pursued, who is responsible for them, and possible funding sources. It does not identify schedule, responsibility, or possible funding for general or system-wide strategies either.

Action	**Status**
Use VDOT ITS project cost estimator spreadsheets when available (p 63)	VDOT developed cost estimator tools and uses them routinely.

Staff suggestion:

- **Identify implementation schedule, responsibility, and possible funding sources for each strategy.**

3.8 Review of Chapter 13: Monitor Strategy Effectiveness

In addition to monitoring strategy effectiveness, Chapter 13 lists additional performance measures related to carpooling, transit, and non-motorized transportation. The Chapter 13 performance measures are reviewed first, then the strategy effectiveness monitoring.

Chapter 13 Performance Measures	**Status**
Expand National Bicycle & Pedestrian Documentation count locations to include each of the Top 10 Areas of Emphasis (p 65)	No progress, will be considered after considering other bike/ped count methodology
Expand Greenway count program with additional locations (p 65)	Greenway program expanded though count locations do not correspond with Areas of Emphasis
Consider other bike/ped count methods (p 65)	In progress
Greenway user survey (p 65)	Included in 2018 Greenway Plan
Bicycle user survey (p 65)	No progress, Exceeds staff time
Monitor transit usage (Areas of Emphasis #1, #6, #9)	Performed during 3-year NTD Surveys
Monitor parking policies (Area of Emphasis #1)	No progress, Exceeds staff time
Monitor whether more carpools are registered in this area (Areas of Emphasis #2, #4, #5)	No progress, Not a priority
Monitor bus stop activity (Area of Emphasis #3)	Performed during 3-year NTD Surveys
Monitor congestion after completion of interchange reconstruction project (Area of Emphasis #9)	No progress, Not a priority
Monitor park-and-ride usage (Area of Emphasis #9)	No progress, Exceeds staff time

Staff suggestions:

- **Monitor and report federally mandated system and transit performance measures and targets.**
- **Describe how performance measure data will be used in decision making.**
- **Combine performances measures into a single section.**
- **Investigate INRIX data and bike/ped count methods as possible new performance measures.**

Chapter 13 directly addresses monitoring strategy effectiveness with other chapters touching on it briefly.

Actions	**Status**
Annual performance measures review (p 64)	Some performance measures were included in annual reports through 2017
Create maps of future V/C estimates for each Area of Emphasis (p 64)	No progress
Create Activity Density Maps and review annually (p 65)	No progress
Annual week-long review (p 6)	Reviewed in 2018

Actions	Status
Suggested update every 4-6 years (p 26) or 5-7 years (p 65)	Not applicable until 2018-2021
Report worsening of congestion at certain locations to the Policy Board (p 69, 70, 71, 73, 75)	No progress, Google Traffic snapshots not reviewed since 2015

The RVTPO Congestion Management Process does not clearly describe who will assess strategy effectiveness, how to assess strategy effectiveness, or how this data will be used in making decisions. Section 4 of this document has more information on how other MPOs handle this task.

Staff suggestion:

- **Create maps of the Top 10 Areas of Emphasis from the current Travel Demand Model.**
- **Describe how performance measure data will be used in making decisions.**

4. Review of Standard Practices from Other MPOs

Understanding how other metropolitan planning organizations (MPOs) address congestion management, what they have found feasible and effective, can guide the RVTPO's efforts. In 2010, FHWA published case studies of congestion management processes from seven MPOs. Staff reviewed the FHWA case studies as well as congestion management processes from six other MPOs, including mid-size MPOs comparable to the RVTPO. State-level process and oversight influence MPO functions, so Virginia MPO congestion management processes received particular attention. In Virginia, the MPOs that are Transportation Management Areas (TMA) and therefore required to have a congestion management process are Hampton Roads TPO, Richmond Regional TPO, and the Washington DC Area Council of Governments. In addition, Fredericksburg Area MPO, which is not a TMA, has a congestion management process.

FHWA Case Studies Reviewed (2010)		
Agency	*Metropolitan Area*	
Atlanta Regional Commission	Atlanta, GA	
Wilmington Area Planning Council	Wilmington, DE	
Capital District Transportation Committee	Albany, NY	
Capital Area Metropolitan Planning Organization	Austin, TX	
Delaware Valley Regional Planning Commission	Philadelphia, PA	
Southern Pennsylvania Commission	Pittsburgh, PA	
Puget Sound Regional Council	Seattle, WA	
Congestion Management Processes Reviewed		
Metropolitan Planning Organization (MPO)	*Metropolitan Area*	*Year*
Sarasota/Manatee MPO	Sarasota, FL	2016
Winston-Salem Urban Area MPO	Winston-Salem, NC	2012
Greensboro Urban Area MPO	Greensboro, NC	2017
Memphis Urban Area MPO	Memphis, TN	2015
Syracuse MPO	Syracuse, NY	2015
Virginia MPO/TPOs		
Fredericksburg Area MPO	Fredericksburg, VA	2015
Hampton Roads TPO	Hampton Roads, VA	2014
Richmond Regional TPO	Richmond, VA	2016
Metropolitan Washington Council of Governments	Washington, DC	2018

Agencies are the designated MPO of the region.

4.1 Reporting and updates

The RVTPO publishes congestion performance measures annually as part of its performance measures report. Most MPOs produce some sort of report that includes congestion:

- Report on performance measures, including congestion performance measures
- Report on the state of transportation, including congestion
- Report on congestion

The frequency of the report is every year or every two years. One MPO issues its report every three years due to the availability of data.

Some MPOs publish only the reports, and do not publish a separate document or plan of their congestion management process. For those that publish a CMP plan, the timeframe is variable, with most MPOs updating as needed. Some MPOs tie their congestion management process update to the update of their long-range transportation plan.

In Virginia, Hampton Roads TPO issues an annual report and updates the CMP every four years. Washington Council of Governments issues a report every other year. Richmond Regional TPO synchronizes its CMP updates with updates of the long-range transportation plan. Fredericksburg Area MPO updated its CMP five years after adopting its first CMP.

4.2 Integration with long-range transportation plans

Not all congestion management processes clearly identify how they interact with the long-range transportation plan or Transportation Improvement Plan (TIP). Others describe a high-level interaction:

- Synchronized updates of the congestion management process and long-range transportation plan
- The objectives of the congestion management process are the same as the congestion-related objectives in the long-range transportation plan
- Objectives of the congestion management process address goals from the long-range transportation plan

Some MPOs describe a more integrated relationship between the congestion management process and the long-range transportation plan and TIP:

- Incorporate congestion management elements into projects that are in the long-range transportation plan and TIP.
- Feed projects identified in the congestion management process to the long-range transportation plan and TIP.
- Screen projects submitted to the long-range transportation plan and TIP for congestion alleviation.
- Prioritize projects in the long-range transportation plan and TIP by congestion alleviation and other factors.

In Virginia, Hampton Roads TPO uses its CMP to identify candidate projects for the long-range transportation plan and uses congestion data in its ranking of projects in its long-range transportation plan. Richmond Regional TPO synchronizes updates of the CMP with long-range transportation plan updates. Washington Council of Governments requires a congestion management documentation form with projects submitted for inclusion in the long-range transportation plan and TIP. Fredericksburg Area MPO does not identify how the CMP is integrated with its long-range transportation plan.

4.3 Network and Performance Measures

To define the congestion network, MPOs use functional classification, performance measures, and public input. Some MPOs incorporated other road characteristics as well, such as transit routes, key connections, or data availability. Many, but not all, MPOs identified priority corridors, like the RVTPO's Top 10 Areas of Emphasis, ranging from an in-depth analysis of two corridors per year to listing a dozen

or so priority corridors, with one larger MPO identifying 100 congested corridors (at least one per jurisdiction).

Agencies use performance measure data to identify congestion corridors:

- Travel time runs
- Level of Service, Volume/Capacity Ratio
- Travel Time Index, Planning Time Index
- Public input

Larger MPOs conduct travel time runs, but this is rarely done in-house. Instead, localities, states, or hired consultants collect the data. Less often, smaller MPOs use Level of Service and Volume/Capacity Ratio to identify congestion, recognizing the limitations of these data. When FHWA completed the case studies in 2010, newer measures such as Travel Time Index or Planning Time Index, made possible by smartphones, was just becoming available in limited areas, and MPOs were discussing it but hadn't yet incorporated it into their congestion management process. Many MPOs consider public input as well.

In addition to identifying and monitoring congested corridors, MPOs use performance to assess regional conditions. Some MPOs use hours of delay as an overall regional congestion metric. Other performance measures assess modes other than single occupancy vehicle, based on the assumptions that trips by other modes replace single occupancy vehicle trips and that single occupancy vehicle trips contribute to congestion. Finally, some MPOs include crash data in congestion reports to emphasize the holistic nature of the transportation system.

Evaluating congestion before and after projects that were implemented to reduce congestion was not commonly discussed in congestion management processes. Agencies that mentioned this activity cited lack of resources as a challenge to collecting before-and-after data and commented on the difficulty of interpreting the data when it is easily influenced by factors other than the project.

4.4 Strategies and Implementation

After identifying congested corridors, MPOs develop and implement strategies. Many MPOs struggle with implementation: taking actions and pursuing projects that alleviate congestion. Implementation makes the congestion management process effective and meaningful.

Congestion management strategies are consistent throughout all MPOs reviewed. Regional strategies promote modes other than single occupant vehicles, target operational improvements (such as signal coordination), or identify elements that can be incorporated into road projects. Some MPOs take it further and apply strategies to specific corridors or intersections, developing lists of projects.

However, because the MPO typically does not implement projects, lists of projects are ineffective without communication and trust between the MPO and its localities and states.

Some MPOs use committees to achieve that communication, but committees are more typical of larger MPOs than of mid-size MPOs like the RVTPO. Examples of committees are:

- Management & Operations
- Regional Operations Committee
- Congestion Management Process Advisory Committee

- Operations & Safety Committee
- Operations Committee
- Bottleneck Committee
- Congestion Management Process Working Group
- Congestion Management Process Steering Committee

Many committees are composed entirely of planners and engineers. Some committees include citizens, while other MPOs report seeking input from an existing citizen advisory group (in addition to the congestion committee). One committee includes enforcement and emergency personnel.

Both strategies and implementation benefit from committees. Committee functions are:

- Steering committee for development of the congestion management process
- Selecting and/or categorizing the congestion management strategies
- Implementing the congestion management process

Some ways that MPOs implement strategies or projects identified in the congestion management process are the same ways they integrate the congestion management process with the long-range transportation plan and Transportation Improvement Program (TIP):

- Incorporate congestion management elements into projects that are in the long-range transportation plan and TIP.
- Feed projects identified in the congestion management process to the long-range transportation plan and TIP.
- Screen projects submitted to the long-range transportation plan and TIP for congestion alleviation.
- Prioritize projects in the long-range transportation plan and TIP by congestion alleviation and other factors.

5.0 Conclusion and Summary of Suggestions

The following factors are relevant to the consideration of updating the CMP Plan:

- Not all strategies proposed in the CMP Plan proved to be feasible, to generate useful data, or to be relevant to congestion management,
- New technology and resources for congestion management are now available,
- New federal requirements have replaced congestion-related performance measures that the CMP Plan mandated tracking in the RVTPO Annual Performance Measures Report,
- Newer projects, studies, and plans contradict or supersede actions identified in the CMP Plan, and
- The CMP Plan suggests an update every four to seven years.

Throughout Sections 2 and 3, staff noted suggestions for improving compliance with federal legislation and internal compliance. Staff also identified specific recommendations from the TMA Certification Review. The complete list of staff suggestions and certification review recommendations is provided below, grouped by the eight actions of congestion management presented in the FHWA Guidebook.

Regional Objectives

- Define congestion management objectives. / Identify regional objectives. (p 5, 10, 14, 15)
- Define the acceptable level of system performance *by type of transportation facility, geographic location, and/or time of day*, as needed. (p 4)
- Develop regional goals to reduce vehicle miles traveled during peak commuting hours and improve transportation connections between areas with high job concentrations and areas with high concentration of low-income households. (p 8)

Congestion Network

- Provide more information regarding movements of goods. (p 5)
- Define peak commuting hours for the region. (p 8)
- Describe existing public transportation services, employer based commuter programs, and other existing transportation services that support access to jobs in the region. (p 8)
- Clarify the definition of the CMP network. (p 10)
- Incorporate INRIX data into defining the Top 10 Areas of Emphasis. (p 10)
- Examine the Congestion Network. (p 14)
- Determine methodology and timeline to confirm or revise the Top 10 Areas of Emphasis, including I-81. (p 15)
- Clearly identify the congestion network identifying where efforts should be targeted to reduce and manage congestion. (p 16)

Multimodal Performance Measures

- Select performance measures to evaluate the effectiveness of implemented actions within each of the Top 10 Areas of Emphasis. (p 5)
- Reference the Planning Agreement description of the role of State, local officials, and public transportation providers in establishing performance measures. (p 5)
- Confirm the value of the identified performance measures and clarify how they relate to decision-making and progress reporting via the Annual Performance Measures Report. (p 5)
- Identify data collection methodology to define the extent and duration of congestion and *determine the causes of congestion*. (p 6)
- Develop performance measures specific to the congestion problems of the region. (p 10)
- Describe how performance measure data will be used in making decisions. (p 14, 29, 30)
- Monitor and report federally mandated system and transit performance measures and targets. (p 29)
- Combine performances measures into a single section. (p 29)
- Investigate INRIX data and bike/ped count methods as possible new performance measures. (p 29)
- Develop performance measures specific to each of the Top 10 Areas of Emphasis. (p 28)

Data Collection/ System Performance Monitoring

- Cross-check and assess relevancy of performance monitoring activities with the congestion network.
- Describe performance monitoring for highways.
- Describe data collection for each performance measure. (p 6, 14)
- Improve data collection and analyze congestion. (p 10)
- Identify data collection methodology to define the extent and duration of congestion and determine the causes of congestion. (p 6)

Analyze Congestion Problems and Needs

- Define the acceptable level of system performance by type of transportation facility, geographic location, and/or time of day, as needed. (p 4)
- Identify areas with high job concentrations and areas with high concentration of low-income households. (p 8)
- As part of the next CMP Plan update, consult with employers, private and nonprofit providers of public transportation, transportation management organizations, and organizations that provide job access reverse commute projects or job-related services to low-income individuals. (p 8)
- Identify any congestion problems related to existing bike, pedestrian, and transit networks in addition to the highway Top 10 Areas of Emphasis. (p 16)

Strategies

- Clarify how strategies are metropolitan-wide and cooperatively developed. (p 3)
- Identify travel demand reduction, job access projects, and operational management strategies. (p 3)
- Explore additional operation, ITS, and demand management strategies. (p 7)
- Identify features in proposals for general purpose lane additions that will maintain the functional integrity and safety of those lanes. (p 4)
- Provide more information on highway general strategies. (p 14)
- Clarify which projects/strategies are action items, which projects/strategies are options, and how options will be considered and either become actions or be discarded from further consideration. (p 14)
- Clearly identify actions. (p 15)
- Combine “Identification and Evaluation of Strategies” with “General Strategies”. (p 28)
- Determine which actions are regional priorities and eliminate others. (p 28)
- Review recent plans, such as Reimagine 419 Plan or the Transportation and Economic Development Study, that identify projects or actions that contradict or supersede those in the Congestion Management Process. (p 28)
- Review the 2018 Valley Metro Comprehensive Operations Analysis for relevant congestion management strategies to improve the transit system’s operation. (p 4)
- List only one or two high priority infrastructure actions per Area of Emphasis. (p 28)
- Identify system-wide or general highway strategies. (p 28)
- Identify other strategies to improve efficient service integration between highway, transit, passenger and freight rail operations, and non-motorized transport. (p 4)

Program and Implement Strategies

- Evaluate the benefit of the CMP Plan performance measures. (p 4)
- Evaluate the anticipated performance and expected benefits of the congestion management strategies listed in CMP Plan Chapter 10. (p 7)
- Describe how the CMP Plan and its identified performance measures will interact with the Metropolitan Transportation Plan and the Transportation Improvement Program. (p 4, 10)
- Identify schedule information, implementation responsibilities, and possible funding sources for each strategy listed in Chapter 10. (p 7, 29)
- Assess the status of congestion in the Top 10 Areas of Emphasis and system monitoring activities noted in Chapter 13.
- Assess the effectiveness of implemented strategies and report the results to decision-makers and the public.
- More actively promoted evaluation results and performance measures reports to decision makers and the public. (p 7)
- Identify which projects and programs in CMP Plan Chapter 10/11 will increase job access opportunities. (p 8)
- Determine how data will be used in performance-based planning and programming. (p 10)
- Describe how performance measure data will be used in decision making. (p 29, 30)
- Work with regional partners to implement the CMP Plan strategies. (p 10)
- Educate and highlight the transportation challenges facing the region to non-transportation stakeholders. (p 10)

Evaluate Strategy Effectiveness

- Develop an annual report on the evaluation of the effectiveness of the congestion management process. (p 10)
- Create maps of the Top 10 Areas of Emphasis from the current Travel Demand Model. (p 30)