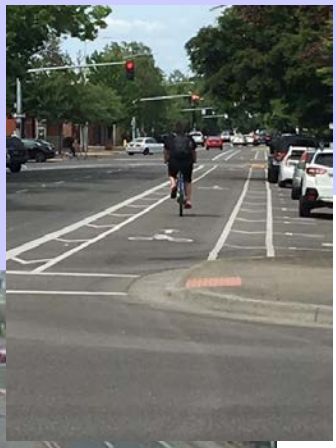
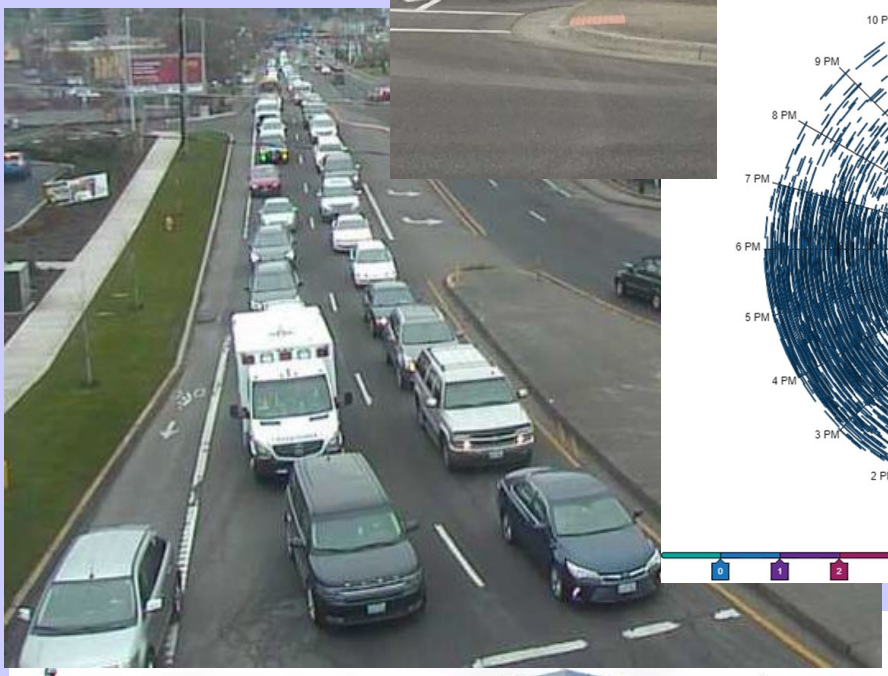
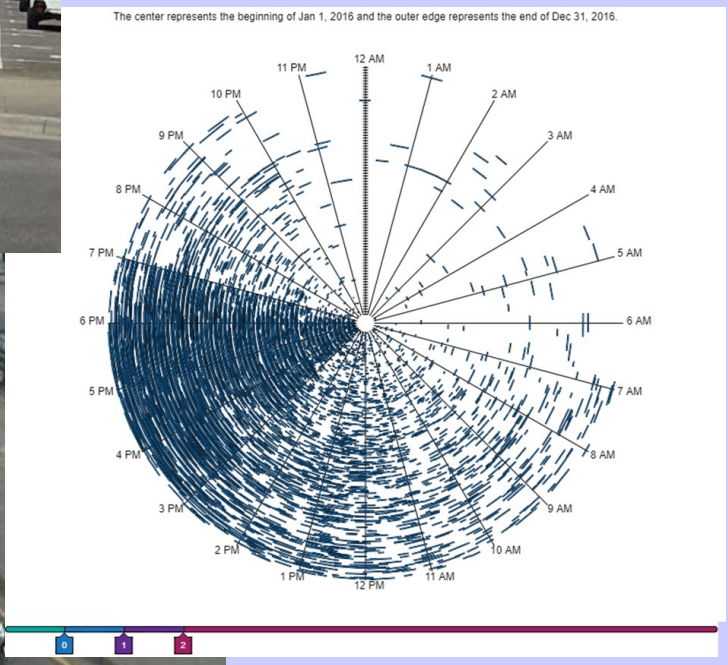
SKATS
Congestion Management Process







Adopted by the SKATS Policy Committee on September 27, 2022

Cover Photos, clockwise from top:

Upper Left: Church Street, Downtown Salem Buffered Bike Lane
Left: State Street and Cottage Street, Salem
Middle: Union Street Bridge, Salem
Upper Right: Winter-Maple Neighborhood Greenway, Salem
Right: River Road and Lockhaven, Keizer
Bottom: Keizer Transit Station, photo by Cherriots

The maps contained in the CMP are for planning purposes only and reflect the best information available at the time of publication. They are subject to change and revision.

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Congestion Management Process
2022 Update

Adopted by the SKATS Policy Committee
on
September 27, 2022

Salem-Keizer Area Transportation Study
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503-588-6177

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SKATS is the federally mandated metropolitan planning organization designated by the governor to develop an overall transportation plan and to allocate federal funds for the region.

The Policy Committee (PC) is an 8-member committee that provides a forum for elected officials and representatives of agencies involved in transportation to evaluate transportation needs in the region and make decisions on allocation federal transportation funds.

Project web site: **http://www.mwvcog.org/programs/transportation-planning/skats/planning-programs/regional-transportation-system-plan-rtsp/**

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Executive Summary

SKATS Congestion Management Process

The SKATS Congestion Management Process (CMP) was developed to meet federal requirements applicable to metropolitan areas with a population over 200,000. This is the latest update to the CMP since it was first developed and adopted in 2003, aligning this document with the federal transportation planning regulations from the MAP-21 and FAST acts.

The objectives that guide the development and implementation of this CMP come directly from the SKATS Metropolitan Transportation Plan (MTP), which is the Salem metropolitan area's long-range transportation plan. These objectives stem from five Goals defined in the MTP:

1) Accessibility (Goal 1)
2) Safety (Goal 3)
3) Efficiency (Goal 5)
4) Multimodal System (Goal 6)
5) Vibrant Regional Economy (Goal 9)

There are four objectives that are associated with these Goals:

1) Limit the increase in congestion during peak hours along the regional corridors
2) Minimize the number of fatalities, injuries and collisions associated with the regional system
3) Provide a multi-modal system
4) Maximize the efficient use of the existing system

A set of performance measures are used to quantify these objectives. They provide insight into the existing level of vehicular congestion and track progress in the programs and projects that have been implemented. Over the years since the CMP was first adopted, the performance measures used have changed with the availability of data. Currently the measures are focused on vehicular travel time (travel time index and planning time index), transit ridership and several related to pedestrian and bicycle usage. Near-term changes include more detailed transit related measures (as the Transit ITS project is implemented and data is made available), and revisions to vehicular travel time with the installation of Bluetooth readers on several of the major corridors in Salem.

One key part of this update to the SKATS CMP is expanding the number and type of strategies to be used at either the regional or corridor level. These strategies were evaluated as to how well they support the four objectives and that could be tracked with the data available.

The CMP is a contributing document to MTP and will be reviewed and revised before any update to the MTP commences (every four years). This will ensure that the long-

range plan reflects the latest information available on the operation of the regional transportation systems.

CMP

Summary

Outlined within this document is the *process* that has been developed to identify, measure, and address vehicular congestion on the regional roads within the Salem-Keizer metropolitan area. As vehicular congestion is one consideration for making investments in the regional transportation system, the process discussed is tied with other work performed by the Salem-Keizer Area Transportation Study (SKATS) as part of updating the Metropolitan Transportation Plan and the Transportation Improvement Program.

I. Introduction

The requirement for metropolitan planning organizations (MPOs) to have a 'Congestion Management System (CMS)' was first introduced with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The CMS was intended to augment and support effective decision making as part of the overall metropolitan transportation planning processes. As a result of the population within SKATS passing 200,000 with the 2000 Decennial Census, the first CMS for the Salem-Keizer area was written and adopted in 2003. In 2005, with the passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) the name was revised to 'Congestion Management Process (CMP)'. A significant update took place in 2015 in conjunction with the update to the Regional Transportation Systems Plan (RTSP)[1]. In 2018, the document was revised again to align with new federal planning requirements that MPOs adopt the performance-based planning paradigm for all long and short-range planning work. Finally, in 2020 there was a change in the data source used for tracking vehicular congestion, which was accompanied by a new analysis platform that increased the analysis options available. This document reflects all these changes, plus other work to fully address the federal requirements.

The specific requirements for a CMP are codified in **23 CFR §450.322,** wherein**:**

> **"…**a TMA shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system, based on a cooperatively developed and implemented metropolitan-wide strategy… through the use of travel demand reduction (including intercity bus operators, employer-based commuting programs such as a carpool program, vanpool program, transit benefit program, parking cash-out program, shuttle program, or telework program), job access projects, and operational management strategies."

[1] Now known as the SKATS Metropolitan Transportation Plan, or MTP.

II. Defining Vehicular Congestion

Travel is a derived demand; people want or need to accomplish a task (such as going to work or attending school, shopping, recreating, etc.) and typically will travel from their home to a destination to perform the task. Less often people will travel just to travel; typically, there is a purpose. In our more connected Internet-affected world, travel also increasingly involves goods or services (such as groceries or an order placed online) being delivered to the home. These substitute for a household-based trip, but still require a vehicle on the roads, and thus add to the congestion level.

The focus of a federally required CMP is on *vehicular congestion*, and in particular, vehicles traveling on the regionally significant roadways. Two types of vehicular congestion are defined: *recurring* and *non-recurring*. Recurring vehicular congestion occurs repeatedly at approximately the same location at roughly the same time of day (particularly noticeable during weekday work commutes). Non-recurring vehicular congestion is typically attributed to factors such as a crash, inclement weather, work zones, or special events.

Table 1: Types of Vehicular Congestion

Recurrent	Non-Recurrent
Signals	Incidents
Recurrent	Work zones
	Holiday
	Weather

Below is a pie chart (**Figure 1**) of the derived causes of vehicular congestion in Marion and Polk counties[2]. The data is for 2019 and is based on travel on the portions of the National Highway System (NHS) in both counties. These results supersede previous work at the national level that was included in past editions of this report. The work goes beyond the previous report in identifying congestion that could be attributable to two or more causes. It should be noted that as the results include the portions of the NHS outside the SKATS boundary, they are not necessarily a true representation of the causes of vehicular congestion within SKATS. In mid-to-late 2022 it should be possible to estimate the causes for each of the CMP corridors used in this report (and defined in Section IV) with a refined tool currently under development. Until that time, these results are provided as informational only[3].

[2] Analysis is by the Center for Advanced Transportation Technology (CATT) Laboratory at the University of Maryland, using data from a variety of sources including INRIX and Waze. The analysis was funded by the Bureau of Transportation Statistics.

[3] The analysis will be included in a future update to the CMP and will be included on the Congestion Management pages of the SKATS Hub: https://skats-mwvcog.hub.arcgis.com/

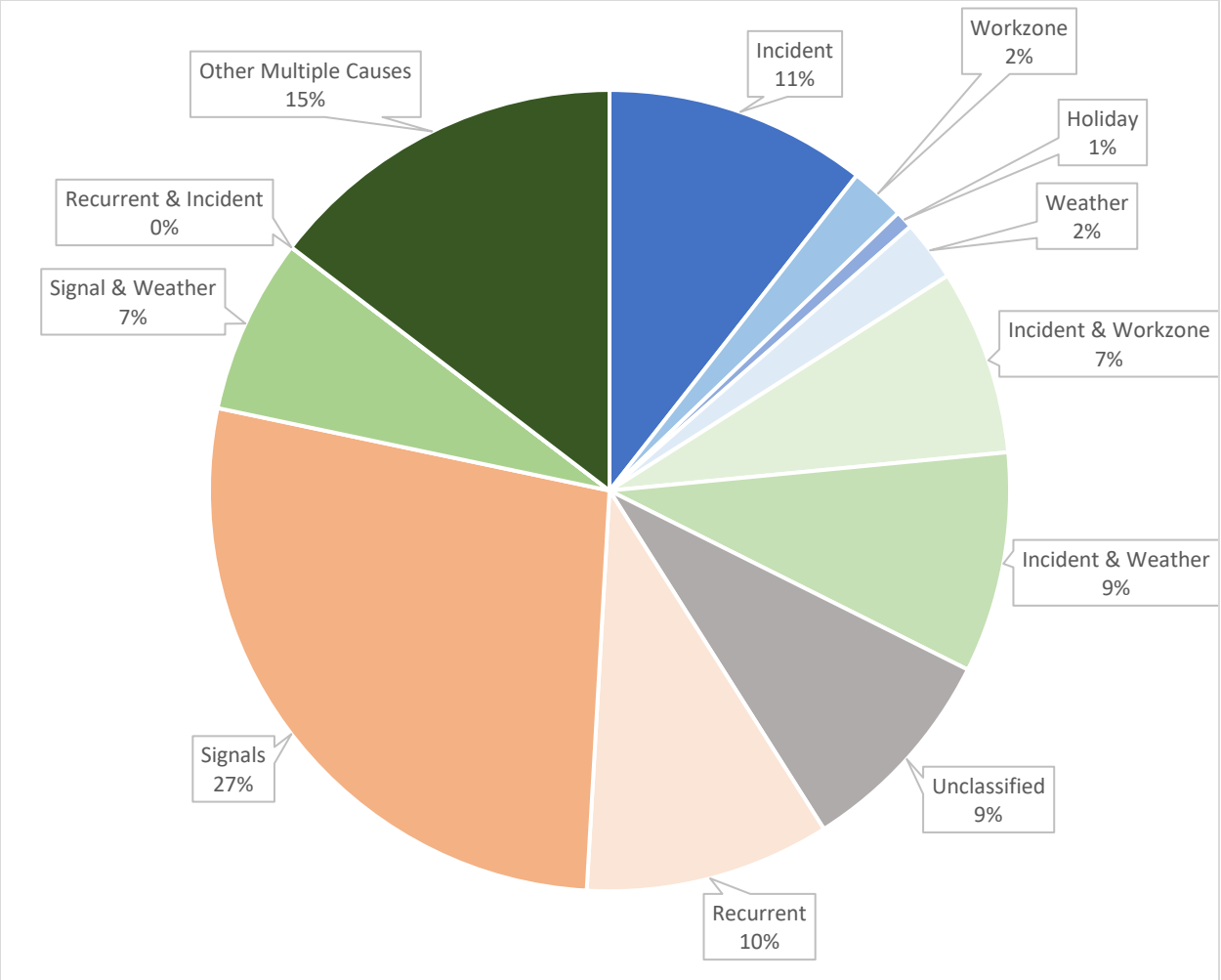


Figure 1: Causes of Congestion, Marion and Polk Counties, NHS Only, 2019 (Source: RITIS, INRIX)

The strategies used to mitigate recurrent and non-recurrent vehicular congestion will be discussed in Section VIII.

III. Regional Objectives for Managing Congestion

The CMP is meant to be an integral part of the regional transportation process, and as such, is tied to the MTP[4]. Results from using the process outlined in this document are used in project identification, evaluation, and selection when updating the MTP. The MTP is the guiding document for all regional transportation planning work carried out within Salem-Keizer, and the relevant Goals and Objectives from that document will be used to guide the development of the CMP. There are five Goals of the SKATS MTP that are most relevant when considering vehicular congestion:

1. Accessibility (Goal 1)
2. Safety (Goal 3)
3. Efficiency (Goal 5)
4. Multimodal System (Goal 6)
5. Vibrant Regional Economy (Goal 9)

In order to achieve the Goals identified, four objectives from the MTP will be used along with a set of associated performance measures and indicators. These objectives are related to vehicular congestion, or the causes of congestion as discussed previously (see Section II and/or Figure 1). The four CMP objectives that will be used are:

1. Limit the increase in congestion during peak hours along the regional corridors
2. Minimize the number of fatalities, injuries and collisions associated with the regional system
3. Provide a multi-modal system
4. Maximize the efficient use of the existing system

The primary objective used to determine whether the strategies and actions identified later in this document are addressing vehicular congestion is "*Limit the increase in congestion during peak hours along the regional corridors"*. The performance measures and indicators that are associated with this objective are used to track vehicular congestion along the corridors within SKATS.

The other three CMP objectives align with the causes of vehicular congestion identified in FHWA's *Traffic Congestion and Reliability: Trends and Advanced strategies for Congestion Mitigation* (2005). The second objective addresses collisions and the results. Collisions and other traffic incidents cause congestion as emergency responders work to tend to the injured and others work to move the vehicles from the travel lanes. The third objective addresses efforts to make it possible for people to use the mode of their choice. Providing a multi-modal system gives people options for use in their travels beyond just a personal vehicle; as more people use alternative travel modes, we would expect vehicle congestion to decrease. The fourth objective of maximizing the efficient use of the existing system

[4] At the time of this update, the 2019-2043 Regional Transportation Systems Plan was the adopted long-range plan for SKATS. If the Goals and Objectives in future Plans change, they will be considered for inclusion in future updates to the CMP.

addresses both poor signal timing and bottlenecks. Strategies such as improved traffic signals, more adaptive timing of individual signals and better coordination between signals, access management, and adding turn lanes or through lanes where needed are the types of projects that can improve traffic flow through the area, although efficiency implies also looking at the cost of these strategies – plus, impacts to safety must also be taken into account.

The objectives and strategies described above have been historically used by ODOT, Cherriots and the local jurisdictions within SKATS to mitigate congestion, increase options beyond single-occupant vehicles, and improve safety for all travelers.

IV. Regional Corridors of Interest

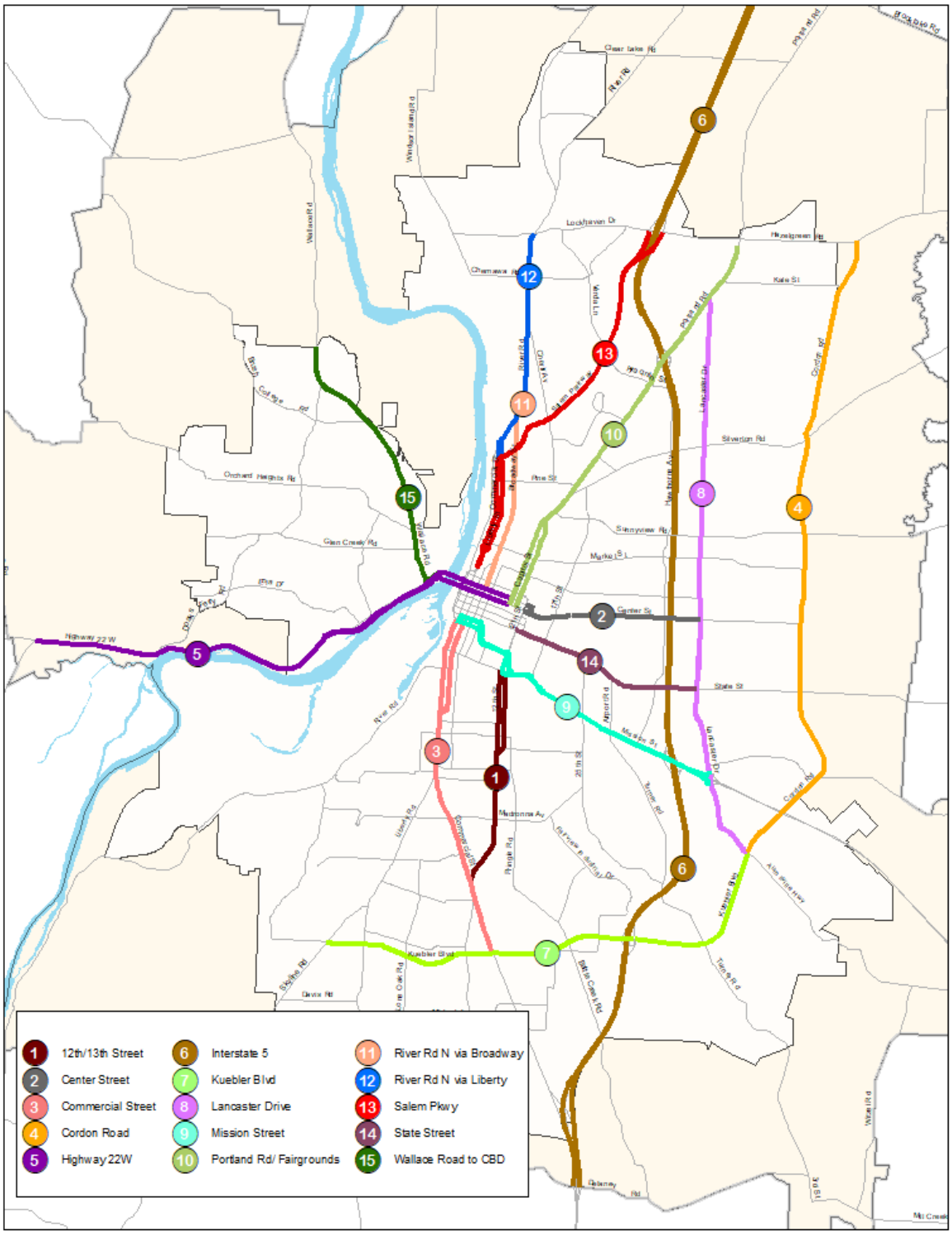
Currently there are 15 corridors (**Table 2** and **Map 1**) that have been identified and included in the regional CMP. These corridors represent roads that connect areas where there is a demand to travel, such as from residential areas to concentrations of work locations. They also include the main routes for travel through the Salem-Keizer area (i.e., I-5 and Oregon Highway 22). Transit service is available along all or a portion of many of these corridors. Many also have complete facilities for walking and biking. For more information on each corridor, please refer to the Congestion Management portion of the SKATS Transportation ArcHub: https://skats-mwvcog.hub.arcgis.com/pages/congestion-management

Table 2: Corridors of Regional Interest

Corridor #	Corridor Name	Length (miles)	Start	End
1	12th/13th St.	3.4	Mission St.	Commercial St S.
2	Center St.	2.9	12th St.	Lancaster Dr.
3	Commercial St. S	4.0	Ferry St.	I-5 ramps
4	Cordon Rd.	7.1	Lancaster Dr/Aumsville Hwy	Hazel Green Rd.
5	Highway 22W	6.1	55th Av NW	Winter/Summer St
6	Interstate 5	15.0	Delaney Rd.	Brooklake Rd.
7	Kuebler Blvd.	8.9	Skyline Blvd.	Lancaster Dr/Aumsville Hwy
8	Lancaster Dr.	6.5	Kuebler Blvd.	Portland Rd.
9	Mission St.	3.8	Liberty St.	Lancaster Dr.
10	Portland Rd/Fairgrounds Rd	5.0	Marion St.	Chemawa Rd.
11	River Rd N via Broadway	3.9	High St at Marion St	Lockhaven Dr.
12	River Rd N via Commercial/Liberty	4.0	Division St.	Lockhaven Dr.
13	Salem Parkway	4.2	I-5/Chemawa Ramp	Division St.
14	State St.	2.3	12th St.	Lancaster Dr.
15	Wallace Rd to CBD[5]	3.0	Michigan City Av.	Summer St.

[5] This corridor follows Center St./Marion St. in downtown Salem to Capitol St.

CMP Corridors



Map 1: Corridors for CMP Analysis

V. Means of Measuring Vehicular Congestion

Congestion may be defined by four qualities or dimensions: **intensity**, **duration**, **extent,** and **variability**. These four dimensions allow a better understanding of how the roads or transit services are being impacted by user demand. **Intensity** represents the number of vehicles or people that are part of the event. **Duration** is the temporal dimension, measuring how long the congestion event lasts. The segment or length of the corridor included in the congestion event is the **extent**. **Variability** is the measure for how frequently congestion takes place on that roadway segment.

There are three main measures of vehicular congestion used: Bottleneck identification, travel time index, and planning time index. All three are calculated from the RITIS[6] platform for the corridors defined in Section IV. Shown in **Table 3** are the measures and how they address the dimensions of congestion listed above.

- Bottleneck identification is performed automatically by the RITIS platform based on comparing the travel speeds/times on each segment of a corridor during a selected time period (e.g., the AM commute period) with the travel speeds/times at an uncongested period.
- Travel time index (TTI) is the ratio of the peak-period travel time to the travel time along the corridor based on the free-flow speed. This is a measure of average congestion along a corridor. For example, a TTI of 1.2 represents that it takes 20 percent longer during that period compared to the free-flow period[7].
- Planning time index (PTI) is the ratio of the 95th percentile travel time to the travel time based on the free-flow speed. The PTI represents the extra time a person would need to allocate to a trip to ensure they make it to their destination on-time 29 out of 30 times. For example, a PTI of 1.5 means that for a 10-minute trip, a person would need to allocate 15 minutes.

In addition, there are a set of the federally required performance measures that can provide additional information on congestion from a reliability point-of-view for a subset of the regional corridors[8]. These are *Truck Travel Time Reliability on the Interstates*, *Percent Person-Miles on the NHS Reliable,* and *Annual Hours of Peak Hour Excessive Delay per Capita.* These are also shown in **Table 3**.

[6] Regional Integrated Transportation Information System – See Section VI for more information.

[7] Free-flow for INRIX data is calculated on the 66th percentile speed on that segment for all time periods.

[8] Those corridors that are also on the National Highway System, composed of roads with functional classification of Principal Arterial and above.

Table 3: Measures Used to Measure Vehicular Congestion and Provision of Alternatives

Measure	Intensity	Duration	Extent	Variability	Mitigation
Bottleneck	X	X	X	X	
Travel Time Index		X		X	
Planning Time Index		X		X	
Transit Ridership – Corridor	X	X	X	X	X
Percent of Sidewalks – Corridor					X
Percent of Bicycle Facilities – Corridor					X
Percent of Signals Interconnected					X
Truck Travel Time Reliability (I-5)				X	
Percent Person-Miles NHS Reliable				X	
Annual Hours of Peak Hour Excessive Delay per Capita	X?	X?			

VI. Data Collection

Data for all CMP related analysis comes from two main sources: Vehicular related data is from INRIX and analyzed in the RITIS (Regional Integrated Transportation Information System)[9] platform that the Oregon Department of Transportation (ODOT) has made available to MPOs and local governments within Oregon. The contract ODOT has with INRIX/CATT Lab provides data and analysis for the years 2016 to 2030. Transit ridership data is provided by the Salem Area Mass Transit District[10].

In this age of big data, there are an increasing number of vendors that are collecting, processing, and providing travel data for different modes. Additional data sources may be included in future versions of this report if they have adequate coverage and provide data or information that is relevant to the tasks required. It is acknowledged that region-wide, or even for the corridors of interest, there is a paucity of data on bicycling, walking, and other non-vehicular modes[11]. Currently two walking/bicycling counters are installed on the Union Street and Minto-Brown Island bridges.

[9] RITIS is developed, owned, and operated by the Center for Advanced Transportation Technology (CATT) Laboratory at the University of Maryland.

[10] Currently ridership is at the route level. Later in 2022 it is anticipated that stop-level ridership data will be available.

[11] For example, the percent of people teleworking likely changes more than is captured by the current methods (primarily via the U.S. Census and self-reporting via Cherriots Transportation Options.

VII. Data Analysis Procedures

As mentioned above, most of the data analysis for vehicular congestion takes place on the RITIS platform. The platform has procedures for calculating and identifying bottleneck locations and calculating the travel time index and planning time index for each corridor (for weekdays, weekends, and all week), and producing graphics for use in reports. The federal performance measures can also be calculated via RITIS, simplifying their inclusion in the CMP related reports available on the SKATS Hub[12].

Travel Time Index = Travel Time / Free-flow Travel Time

Planning Time Index = 95 percent Travel Time / Free-flow Travel Time

Bottlenecks are identified when the speed along a segment is 60 percent or below the free-flow speed, that segment is considered to be *congested*. Groups of segments that are congested are grouped, and the first segment is labeled the bottleneck.

[12] See https://skats-mwvcog.hub.arcgis.com/pages/congestion-management

VIII. Strategies for Use Regionally and/or by Corridor

The agencies and jurisdictions within SKATS have been funding a variety of programs (e.g., the Regional Traffic Signal Control Center and Cherriots Transportation Options) and building a wide range of projects to address vehicular congestion for many decades. In 2018 a Working Group was formed to assist SKATS staff in evaluating 43 strategies for their applicability and suitability to the local conditions[13]. These strategies came from the previous SKATS CMP, CMPs of MPOs from across the country and from FHWA CMP-related documents. The strategies were placed into one of eight categories:

1) Transportation Demand Management (TDM)
2) Transportation System Management (TDM)
3) Intelligent Transportation Systems (ITS)
4) Operational Modifications (OM)
5) Transit (T)
6) Roadway Capacity Increases (RC)
7) Land Use (LU)
8) Pricing (P)

Each strategy was scored by SKATS staff and members of the Working Group in a limited Delphi process. The scoring used the four objectives discussed in Section III and considered how well the strategy would address each objective. The results from each Working Group member were then averaged to produce an initial ranking. After discussion of the preliminary results with the members of the Working Group, which included issues of political acceptability and how the strategy "fit" in the region, a final list of strategies that were determined to be feasible for implementation within SKATS was developed. The list of strategies, by category, is presented in **Table 4**. Strategies are appropriate at the regional level, along a specific corridor, or in some cases, both. Further information on each of the strategies is provided in **Appendix A**, along with a list of all strategies that were considered.

[13] The Working Group was comprised of staff from the local jurisdictions, ODOT, and SAMTD.

Table 4: Strategies to Address Vehicular Congestion

Category	Strategy	Cost[14]	Focus
TDM	Shift peak travel	$	Regional or Corridor
TDM	Telework	$	Regional
TDM	Employer-based TDM Outreach	$	Regional or Corridor
TDM	Park and Ride Facilities	$-$$	Regional or Corridor
TDM	Ridesharing Services / Ride Matching	$	Regional
TDM	Travel mode outreach	$	Regional
TDM	Parking Management	$-$$	Corridor
TDM	Parking Facility Information Signs	$$	Corridor
TSM	Increase bicycling infrastructure	$$	Corridor
TSM	Increase infrastructure for walking	$$	Corridor
TSM	Access management	$$	Corridor
ITS	Adaptive Signal Controllers	$$	Corridor
ITS	Traffic Control Center	$	Regional
ITS	Signal interconnects	$$	Corridor
ITS	Traffic signal modernization	$$	Corridor
ITS	Traffic Monitoring	$$	Corridor
ITS	Traveler Information Services	$$	Regional or Corridor
OM	Turning Movement	$$	Corridor
OM	Incident Management	$-$$	Regional or Corridor
OM	Limited Intersection Modifications	$$	Corridor
OM	Maintenance Management	$	Corridor
OM	Road Diets	$-$$	Corridor
T	Transit Service Expansion	$$-$$$	Regional or Corridor
T	Transit Experience Enhancements	$	Regional or Corridor
T	Transit Signal Priority	$$	Corridor
T	Transit Vehicle Monitoring	$$	Regional
RC	Bottleneck Removal	$$-$$$	Corridor
RC	Major Roadway Expansion	$$$	Corridor
RC	Minor Roadway Expansions	$$-$$$	Corridor
RC	"Move the Goal Posts" – modify mobility targets	$	Corridor
LU	Mixed use zoning		Regional or Corridor

[14] These reflect the relative cost of the strategy compared to all others and not a specific value. These range from lower cost ($) to higher cost ($$$).

IX. Implementation of the Strategies

Implementation of the CMP strategies occurs on two levels: regional (systemwide) and corridor. Most of the regional strategies listed in **Table 4** already have dedicated and on-going federal, state, or local funding, including several funded by SKATS, ODOT or Cherriots, such as the Regional Traffic Signal Control Center, the Cherriots Transportation Options (TO) program, and ODOT's incident management program. Shown in **Table 5** is a high-level implementation schedule and the jurisdiction designated as responsible for each of the strategies.

There are several ways that the corridor strategies listed in **Table 5** are developed. Often these strategies are considered during a planning study along one of the Regional CMP corridors (e.g., the city of Salem's *Commercial-Vista Corridor Study* [2017]). Typically included in the planning study is a discussion of the alternative strategies considered and whether they are applicable to the situation on that segment of the corridor.

The strategy and/or projects that are selected as part of the planning studies are then adopted into that jurisdiction's Transportation System Plan (TSP) – or in the case of ODOT owned roads, into a Facility Plan – after which the projects are eligible to be considered for inclusion in the next update to the SKATS MTP and finally as a funded project in the SKATS Transportation Improvement Program (TIP).

The process to include projects in either the MTP or TIP links the proposed solution to the regional goals and objectives and how well the project will help achieve the performance metrics for those goals. When a project is submitted for consideration to be included in the SKATS TIP, information from the CMP will be included as applicable. However, vehicular congestion along a corridor is just one metric that is considered when selecting projects for either the MTP or TIP[15].

Prior to including a project that adds vehicular capacity, such as additional lanes, in either the MTP or TIP, the applicant must demonstrate that other congestion reducing strategies have been considered. Applicants must fill out a checklist to determine the need for a CMP assessment for the proposed project. The checklist includes information that is necessary to perform a CMP analysis and whether it meets the CMP process requirements for the consideration of alternatives and the incorporation of TDM and other operational strategies into the project. A sample checklist is included in **Appendix C**.

[15] For more information on the project selection process see Appendix C of the 2019-2043 RTSP and Chapter 5 of the TIP.

Table 5: Responsibilities and Schedule for Strategies

Category	Strategy	Schedule	Responsibilities
TDM	Shift peak travel	On-Going	Cherriots TO
TDM	Telework	On-Going	Cherriots TO
TDM	Employer-based TDM Outreach	On-Going	Cherriots TO
TDM	Park and Ride Facilities	On-Going	Local Jurisdictions
TDM	Ridesharing Services / Ride Matching	On-Going	Cherriots TO
TDM	Travel mode outreach	On-Going	Cherriots TO
TDM	Parking Management	On-Going	Salem, Oregon DAS
TDM	Parking Facility Information Signs	Near- to Mid-Term	Salem
TSM	Increase bicycling infrastructure	As projects develop	Local Jurisdictions
TSM	Increase infrastructure for walking	As projects develop	Local Jurisdictions
TSM	Access management	Long-term	ODOT, Local Jurisdictions
ITS	Adaptive Signal Controllers	Near-term	ODOT, Local Jurisdictions
ITS	Traffic Control Center	On-going	SKATS, Salem
ITS	Signal interconnects	On-going	Local Jurisdictions
ITS	Traffic signal modernization	Near-term	Local Jurisdictions
ITS	Traffic Monitoring	On-going	ODOT, Salem, SKATS
ITS	Traveler Information Services	On-going	ODOT
OM	Turning Movement	As projects develop	Local Jurisdictions
OM	Incident Management	On-going	ODOT, Local Jurisdictions
OM	Limited Intersection Modifications	As projects develop	ODOT, Local Jurisdictions
OM	Maintenance Management	On-going	ODOT, Local Jurisdictions
OM	Road Diets	As projects develop	Local Jurisdictions
T	Transit Service Expansion	Near- to Long-term	SAMTD
T	Transit Experience Enhancements	On-going	SAMTD
T	Transit Signal Priority	Near-term	SAMTD, Local Jurisdictions
T	Transit Vehicle Monitoring	On-going	SAMTD
RC	Bottleneck Removal	As projects develop	ODOT, Local Jurisdictions
RC	Major Roadway Expansion	Long-term	ODOT, Local Jurisdictions
RC	Minor Roadway Expansions	Mid- to Long-term	ODOT, Local Jurisdictions
RC	"Move the Goal Posts" – modify mobility targets		ODOT
LU	Mixed use zoning	Near- to Long-term	Local Jurisdictions

Table 6: Regional Strategies Currently in Operation

Category	Strategy	In Place
TDM	Shift peak travel	Regional
TDM	Telework	Regional
TDM	Employer-based TDM Outreach	Regional
TDM	Park and Ride Facilities	Regional or Corridor
TDM	Ridesharing Services / Ride Matching	Regional
TDM	Travel mode outreach	Regional
ITS	Traffic Control Center	Regional
ITS	Traveler Information Services	Regional
OM	Incident Management	Regional or Corridor
T	Transit Service Expansion	Regional or Corridor
T	Transit Experience Enhancements	Regional or Corridor
T	Transit Vehicle Monitoring	Regional
LU	Mixed use zoning	Regional or Corridor

Table 7: Corridor Strategies Currently in Operation

Category	Strategy	Corridor[16]	Notes
TDM	Park and Ride Facilities	15	
TDM	Parking Management	1, 2, 3, 9, 10, 11, 12, 14,15	Currently only at the Salem CBD end of corridors.
TDM	Parking Facility Information Signs		Currently only at the Salem CBD end of a few corridors
TSM	Increase bicycling infrastructure	2, 11, 12. 14	Projects funded but not completed
TSM	Increase infrastructure for walking	2, 14, 15	Projects funded but not completed
TSM	Access management		Proposed for funding
ITS	Adaptive Signal Controllers	9	Test corridor
ITS	Signal interconnects	4	Funding awarded but not started
ITS	Traffic signal modernization	All	Proposal is to update all controllers in the area over the next four years.
ITS	Traffic Monitoring		Additional Pan Tilt Zoom cameras planned in next five years.
OM	Turning Movement	1	Added SB to WB right-turn lane at Vista.
OM	Limited Intersection Modifications	7	Development will modify several intersections.
OM	Maintenance Management		As needed when work is undertaken.
OM	Road Diets	11	Planned and funded but not yet constructed.
T	Transit Experience Enhancements	Many	Recently completed project to provide stop amenities. Current project for real-time arrival information.
T	Transit Signal Priority	11	By fall 2022
RC	Major Roadway Expansion	6	Add one lane each direction, Delaney to Kuebler.

[16] See Table 2 for name of corridor and location

RC	Minor Roadway Expansions	2, 14	Add center turn lane. Partially funded but not constructed
RC	"Move the Goal Posts" – modify mobility targets	1	Applies only to ODOT facilities
LU	Mixed use zoning	11, 12	In progress for other corridors.

X. Evaluation of Implemented Strategies

Evaluating the effectiveness of a strategy depends on whether the strategy is corridor-based or implemented regionally. For many of the corridor-based strategies, examining the before/after TTI (travel time index) and PTI (planning time index) will show if there has been any change after the strategy has been implemented. Regional strategies are harder to evaluate, but measures such as PHED (Peak Hour Excessive Delay per capita), which is currently calculated for all the national highway system (NHS) roads in the region, can be used with some caveats.

As multiple strategies are often implemented along a corridor, it will not always be apparent how each individual strategy is contributing to any change in the performance measure(s) used for evaluation. Further, each strategy addresses different aspects of vehicular congestion, and for some, the connection is secondary to the primary benefit of implementing the strategy (e.g., "Increase infrastructure for walking" will have a limited direct reduction on vehicular congestion along a corridor but will make it safer for people to walk to a transit stop or local store).

Shown in **Table 8** is each of the strategies and the method(s) that will be used to evaluate the effectiveness post-implementation. As shown in the table, there are several strategies that are identified as a "Supportive Strategy" which currently do not have a method of evaluation associated with them (e.g., "Traffic Monitoring"). As alluded to above, these strategies are still important as they meet the other objectives identified for this CMP (e.g., safety) or play a complementary and supporting role to other strategies.

Table 8: Method of Evaluating Strategies

Category	Strategy	Focus	Evaluation
TDM	Shift peak travel	Both	PHED
TDM	Telework	Regional	PHED, US Census or survey
TDM	Employer-based TDM Outreach	Both	Transit ridership, PHED
TDM	Park and Ride Facilities	Both	Mainly long trips outside area, PHED, US Census or surveys
TDM	Ridesharing Services / Ride Matching	Regional	Mainly long trips outside area, PHED
TDM	Travel mode outreach	Regional	PHED, transit ridership, US Census, or surveys
TDM	Parking Management	Corridor	Supportive strategy
TDM	Parking Facility Information Signs	Corridor	Supportive strategy
TSM	Increase bicycling infrastructure	Corridor	Mainly shorter trips, US Census, or surveys
TSM	Increase infrastructure for walking	Corridor	Mainly short trips, US Census, or surveys
TSM	Access management	Corridor	TTI, PTI
ITS	Adaptive Signal Controllers	Corridor	TTI, PTI
ITS	Traffic Control Center	Regional	PHED
ITS	Signal interconnects	Corridor	TTI, PTI possibly
ITS	Traffic signal modernization	Corridor	TTI, PTI possibly
ITS	Traffic Monitoring	Corridor	Supportive strategy
ITS	Traveler Information Services	Both	Supportive strategy
OM	Turning Movement	Corridor	TTI, PTI
OM	Incident Management	Both	TTI, PTI, PHED
OM	Limited Intersection Modifications	Corridor	TTI, PTI
OM	Maintenance Management	Corridor	TTI, PTI
OM	Road Diets	Corridor	TTI, PTI
T	Transit Service Expansion	Both	Transit Ridership
T	Transit Experience Enhancements	Both	Transit Ridership
T	Transit Signal Priority	Corridor	TTI, PTI, Transit Ridership
T	Transit Vehicle Monitoring	Regional	Depends on implementation
RC	Bottleneck Removal	Corridor	TTI, PTI, PHED
RC	Major Roadway Expansion	Corridor	TTI, PTI, PHED
RC	Minor Roadway Expansions	Corridor	TTI, PTI, PHED
RC	"Move the Goal Posts" – modify mobility targets	Corridor	TTI, PTI, PHED
LU	Mixed use zoning	Both	Supportive strategy

XI. Reporting

Contained within this document is the *process* that has been developed to identify, measure, and address vehicular congestion on roads within SKATS. Of equal importance is providing the information to the policymakers, public and staff of the member jurisdictions in a concise way and in a format that is easily understood. The reporting is accomplished by a combination of an online map and yearly corridor reports available from the SKATS Transportation Portal: https://skats-mwvcog.hub.arcgis.com/pages/congestion-management . The online map presents many of the existing characteristics of each corridor, such as the speed limits, transit routes, and crash locations. The corridor reports provide a yearly synopsis of the calculated bottlenecks, information on the top bottleneck, and the TTI and PTI values for the AM (7-8 AM) and PM (5-7 PM) peak periods.

XII. Next Steps

Data collected from the strategies that are used for congestion identification and analysis will be updated on a yearly basis. The reports prepared for the public and policy makers that use the data will also be updated yearly (typically in January to reflect the previous calendar year). The strategies contained within this document will be reviewed on a regular basis, based on the evaluation data that is collected and analyzed. This document will be reviewed and updated every four years, typically a year before the start of the update to the Metropolitan Transportation Plan.

Appendix A – List of Strategies

Table A-1: List of Strategies

Category	Strategy	Cost	Focus	Schedule	Lead(s)	Evaluation	Notes
TDM	Shift peak travel	$	Regional or Corridor	On-going	Cherriots Transportation Options (TO)	PHED	Employers would take the initiative to allow this option for their employees. Cherriots TO provides encouragement and information to employers.
TDM	Telework	$	Regional	On-going	Cherriots TO	PHED, US Census or surveys	Employers would take the initiative to allow this option for their employees. Cherriots TO provides encouragement and information to employers.
TDM	Employer-based TDM Outreach	$	Regional or Corridor	On-going	Cherriots TO	Transit ridership, PHED	Employers would inform their employees of options for traveling to/from work. Cherriots TO provides encouragement and information to employers.
TDM	Park and Ride Facilities	$-$$	Regional or Corridor	On-going	SAMTD, Local Jurisdictions	Mainly long trips outside area, PHED, US Census or surveys	Build new or enhance existing facilities. Many may use existing parking lots with permission of property owner.
TDM	Ridesharing Services / Ride Matching	$	Regional	On-going	Cherriots TO	Mainly long trips outside area, PHED	Cherriots TO is the local lead, but the effort is a statewide effort as part of "Get There" run by ODOT.
TDM	Travel mode outreach	$	Regional	On-going	Cherriots TO	PHED, transit ridership, US Census or surveys	Part of the outreach to inform and encourage by Cherriots TO.
TDM	Parking Management	$-$$	Corridor	On-going	Salem, Oregon DAS	Supportive strategy, not directly measurable.	Manage the amount of on and off-street parking. Efforts include pricing and permits for parking on- and off-street.

TDM	Parking Facility Information Signs	$$	Corridor	On-going	Salem	Supportive strategy, not directly measurable.	For downtown parking garages, Salem has installed signage in the Chemeketa Parkade.
TSM	Increase bicycling infrastructure	$$	Corridor	As projects develop	Local Jurisdictions	Mainly shorter trips, data from US Census or surveys.	Facilities include, but are not limited to, protected bicycling facilities, bicycle lanes on roads, bike racks and lockers at destinations. Typically included in projects that build a new road or that bring an older road up to standards.
TSM	Increase infrastructure for walking	$$	Corridor	As projects develop	Local Jurisdictions	Mainly shorter trips, data from US Census or surveys.	Facilities, but are not limited to, include sidewalks, paths, crossings, and medians. Typically included in projects that build a new road or that bring an older road up to standards.
TSM	Access management	$$	Corridor	Long-term	ODOT, Local Jurisdictions	TTI, PTI	Limit access points along corridor from adjoining land uses by consolidating driveways and limiting number of turns (i.e., right-in, right-out).
ITS	Adaptive Signal Controllers	$$	Corridor	Near-term	ODOT, Local Jurisdictions	TTI, PTI	Signal timing patterns are changed by the controller to reflect the traffic along the corridor. ODOT and Salem have started to install these along the OR22E/Mission Street corridor.
ITS	Control Center	$	Regional	On-going	SKATS, Salem	PHED	Regional Traffic Signal Control Center (RTSCC) to oversee operations on region's roads. From there the signals can be retimed due to crashes or other events. ODOT's NW Traffic Operations Center dispatches roadside assistance to ODOT controlled roads within Salem and beyond.
ITS	Signal interconnects	$$	Corridor	On-going	Local Jurisdictions	TTI, PTI possibly. Supportive strategy, may	Cables to connect signals to each other and the RTSCC to allow for timing data to

						not be directly measurable.	go to the signals and video and other data to go from signals to the RTSCC.
ITS	Traffic signal modernization	$$	Corridor	Near-term	Local Jurisdictions	TTI, PTI possibly. Supportive strategy, may not be directly measurable.	Update controllers, revise signal timing, provide transit and emergency vehicle prioritization.
ITS	Traffic Monitoring	$$	Corridor	On-going	ODOT, Salem, SKATS	Supportive strategy may not be directly measurable. Possibly use clearance times for crashes?	Traffic cameras, Bluetooth, or other sensors to provide data to the RTSCC and/or NWTOC on current traffic operations.
ITS	Traveler Information Services	$$	Regional or Corridor	On-going	ODOT	Supportive strategy may not be directly measurable.	Message signs, mobile apps, data to Tripcheck.com based on the information received via Traffic Monitoring. Also includes data provided by third parties that use on-vehicle or cellphone data.
OM	Turning Movement	$$	Corridor	As projects develop	Local Jurisdictions	TTI, PTI	Channelization, turn pockets, and center turn lanes are representative projects. Moving turning vehicles out of the travel lanes increases safety and efficiency.
OM	Incident Management	$-$$	Regional or Corridor	On-going	ODOT, Local Jurisdictions	TTI, PTI, PHED	Faster response to incidents, coordination amongst RTSCC, NWTOC, and E911.
OM	Limited Intersection Modifications	$$	Corridor	As projects develop	ODOT, Local Jurisdictions	TTI, PTI	Minor modifications to existing intersections including widening and lane restriping.
OM	Maintenance Management	$	Corridor	On-going	ODOT, Local Jurisdictions	TTI, PTI	Procedures to minimize maintenance and construction related congestion
OM	Road Diets	$-$$	Corridor	As projects develop	Local Jurisdictions	TTI, PTI	Converting a 4-lane road to 3-lane to get turning movements out of the travel lane, also can provide space for bike lanes.

T	Transit Service Expansion	$$-$$$	Regional or Corridor	Near to Long term	SAMTD	Transit Ridership	Increase the frequency, geographic coverage, or both of service within Salem-Keizer. Requires additional funding for operations. Addresses congestion, environmental and equity goals.
T	Transit Experience Enhancements	$	Regional or Corridor	On-going	SAMTD	Transit Ridership	Enhancements make waiting and riding the bus less onerous. Examples include: shelters; fare cards; rider info on bus arrival, etc.
T	Transit Signal Priority	$$	Corridor	Near-term	SAMTD, Local Jurisdictions	TTI, PTI, Transit Ridership	Allow transit vehicles to extend green time at signals along corridors to keep to schedule. Requires coordination between SAMTD and local jurisdictions. First phase is along Lancaster Dr in 2022.
T	Transit Vehicle Monitoring	$$	Regional	On-going	SAMTD	Depending on implementation, this may not have any direct impact on ridership.	Install devices on vehicles to allow location and other information to be transmitted to transit control center and the traveling public via apps, website and station displays.
RC	Bottleneck Removal	$$-$$$	Corridor	As projects develop	ODOT, Local Jurisdictions	TTI, PTI, PHED	Options for bottleneck removal will be developed during the planning process of a project.
RC	Major Roadway Expansion	$$$	Corridor	Long-term	ODOT, Local Jurisdictions	TTI, PTI, PHED	New lanes for an existing facility or a completely new road, greater than 1/2 mile in length.
RC	Minor Roadway Expansions	$$-$$$	Corridor	Medium-term	ODOT, Local Jurisdictions	TTI, PTI, PHED	New lanes for an existing facility roadway under 1/2 mile in length.
RC	"Move the Goal Posts"	$	Corridor		ODOT	TTI, PTI, PHED	Redefine what constitutes congestion (e.g., alternate mobility targets).
LU	Mixed use zoning		Regional or Corridor	Near-term	Local Jurisdictions	Supportive strategy may not be directly measurable.	For each jurisdiction with land use authority to implement.

						Targets mainly short trips, such as walking. US Census or surveys.	

Table A-2: Strategies for Possible Use in Later Years

Category	Strategy	Cost	Focus
TSM	New or converted HOV Lanes	$$-$$$	Corridor
TSM	New or converted HOT Lanes	$$-$$$	Corridor
ITS	Speed Harmonization	$-$$	Corridor
OM	Reversible Lanes	$$	Corridor
RC	Grade-separated Railroad Crossings	$$$	Corridor
RC	Grade-separated Intersections	$$$	Corridor

Table A-3: Strategies for Possible Use

Category	Strategy	Cost	Focus
TDM	Individualized Outreach Programs	$$	Regional
TDM	Commute Trip Reduction Ordinances	$	Regional
T	Bus Rapid Transit	$$	Corridor
T	Dedicated Transit Lanes	$$-$$$	Corridor
LU	Transit Oriented Development	Varies	Regional or Corridor
P	Tolling	$$$	Corridor
P	Road Pricing	?	Regional

Appendix B. Equity Analysis of the Strategies

Presented in **Table B-1** is the list of the strategies that are either being used or being considered for use within SKATS to address vehicular congestion on the regional corridors. The consideration of the social equity impacts for each of the strategies is derived primarily from *Social Equity Impacts of Congestion Management Strategies* (Shaheen, et al 2019)[1]. The reader is directed to that document for more information on considerations for the strategies.

Table B-1: Strategies Considered and Equity Considerations

Category	Strategy	Cost	Focus	Equity Considerations
TDM	Shift peak travel	$	Both	No?
TDM	Telework	$	Regional	Yes 5.6
TDM	Employer-based TDM Outreach	$	Both	Yes
TDM	Park and Ride Facilities	$-$$	Both	Yes 4.1
TDM	Ridesharing Services / Ride Matching	$	Regional	Yes?
TDM	Travel mode outreach	$	Regional	Yes
TDM	Parking Management	$-$$	Corridor	Yes 2.2
TDM	Parking Facility Information Signs	$$	Corridor	Yes 2.3
TSM	Increase bicycling infrastructure	$$	Corridor	Yes 4.5
TSM	Increase infrastructure for walking	$$	Corridor	Yes 4.5
TSM	Access management	$$	Corridor	No?
ITS	Adaptive Signal Controllers	$$	Corridor	No
ITS	Control Center	$	Regional	No?
ITS	Signal interconnects	$$	Corridor	No?
ITS	Traffic signal modernization	$$	Corridor	No
ITS	Traffic Monitoring	$$	Corridor	No?
ITS	Traveler Information Services	$$	Both	No 3.8
OM	Turning Movement	$$	Corridor	No?
OM	Incident Management	$-$$	Both	No 3.10
OM	Limited Intersection Modifications	$$	Corridor	Maybe
OM	Maintenance Management	$	Corridor	No?
OM	Road Diets	$-$$	Corridor	Yes 4.4
T	Transit Service Expansion	$$-$$$	Both	Yes 3.12
T	Transit Experience Enhancements	$	Both	Yes 3.12
T	Transit Signal Priority	$$	Corridor	Yes 3.1

[1] Available at: https://escholarship.org/uc/item/9z9618mn

T	Transit Vehicle Monitoring	$$	Regional	No?
RC	Bottleneck Removal	$$-$$$	Corridor	Maybe
RC	Major Roadway Expansion	$$$	Corridor	Yes 4.7
RC	Minor Roadway Expansions	$$-$$$	Corridor	Yes 4.7
RC	"Move the Goal Posts"	$	Corridor	No
LU	Mixed use zoning		Both	Yes TODs 4.2

Appendix C: Sample Checklist and Projects Excluded

Projects along the CMP corridors within SKATS that result in a *significant* increase in SOV carrying capacity need to show that alternatives were considered and that future increases in vehicular congestion are being mitigated by operational management strategies. The checklist provides the means for project sponsors to document whether this additional analysis is required, and the analysis completed. While project sponsors are encouraged to complete the checklist for all projects along a designated CMP corridor, it is only required for projects adding general purpose travel lanes (i.e., not turn lanes or other auxiliary lanes).

The project checklist and list of project types excluded are shown below. At the end of this Appendix are the relevant federal regulations.

Congestion Management Process Project Checklist

This checklist should be completed by project sponsors to assist in determining whether a CMP assessment is required. This form is meant to address the requirement in 23 CFR 450.322 (e) for nonattainment and maintenance areas regarding adding a *significant* increase in single occupant vehicle carrying capacity to a facility.

A. Project Description
    a. Project Title: _____
    b. Location: _____
    c. CMP Corridor: _____
    d. Sponsor: _____
B. Project Purpose and Need (Describe the specific problem(s) or need the project is designed to address:

    _____

    _____

    _____

    _____
C. Is the project on the CMP excluded list? (see below for list): YES NO
D. Project Objectives: Identify the specific objectives or benefits of the project
    a. Relieve Vehicular Congestion
    b. Improve Safety
    c. Eliminate an Identified Bottleneck
    d. Enhance Freight and/or Goods Movement
    e. Improve Mobility and Accessibility
    f. Other: _____
E. Are federal funds requested for the project? YES NO

a. Source: _____
b. Total Project Cost Estimate: _____

F. Does the project *significantly* expand/increase single occupant vehicle (SOV) capacity? (Does it add or subtract SOV capacity equivalent to at least ½ mile of a general purpose travel lane?): YES NO

If NO, further evaluation is NOT required.

Systemwide CMP Compliance

A. Is this project intended to address a congestion-related issue identified in the adopted Metropolitan Transportation Plan (MT), Congestion Management Process (CMP) and/or the appropriate jurisdictional plan(s)?
   a. YES NO
B. Does the project result from a planning process related to an Outstanding Issue identified in the adopted RTSP and the appropriate jurisdictional plan(s)?
   a. YES NO
C. Does the project result from another planning process?
   a. YES NO
   b. Describe: _____

Project Specific CMP Compliance

Check the strategies listed below that have been considered prior to determining the need for SOV expansion. For alternatives that were considered, please provide a brief description of how it was considered, and if appropriate, the estimated reduction in congestion.

Category	Strategy	Considered	Notes
TDM	Shift peak travel		
TDM	Telework		
TDM	Employer-based TDM Outreach		
TDM	Park and Ride Facilities		
TDM	Ridesharing Services / Ride Matching		
TDM	Travel mode outreach		
TDM	Parking Management		
TDM	Parking Facility Information Signs		
TSM	Increase bicycling infrastructure		
TSM	Increase infrastructure for walking		
TSM	Access management		

ITS	Adaptive Signal Controllers		
ITS	Control Center		
ITS	Signal interconnects		
ITS	Traffic signal modernization		
ITS	Traffic Monitoring		
ITS	Traveler Information Services		
OM	Turning Movement		
OM	Incident Management		
OM	Limited Intersection Modifications		
OM	Maintenance Management		
OM	Road Diets		
T	Transit Service Expansion		
T	Transit Experience Enhancements		
T	Transit Signal Priority		
T	Transit Vehicle Monitoring		
RC	Bottleneck Removal		
RC	Major Roadway Expansion		
RC	Minor Roadway Expansions		
RC	"Move the Goal Posts"		
LU	Mixed use zoning		

Capacity Management and Protection

A. Project Components – Indicate the design features and/or strategies such as access control, TSM, or TDM that will be included with the project o ensure the long-term management and protection of the added capacity.
    a. Access Management
    b. TSM
    c. TDM
    d. Other: _____

Project Types Excluded

The list below is not meant to be exhaustive, but to highlight the types of projects that are excluded from the required CMP evaluation. Ask SKATS staff if there are questions about the applicability to a particular project. In general, if the project does not involve adding (or subtracting) at least ½ mile of general-purpose travel lane, it is likely excluded.

- Access Management
- Bicycle / Pedestrian
    - Facilities including paths, sidewalks, and crossings and safety islands
- Transit
    - Bus lanes
    - Transit shelters
    - Transit ITS
- ITS
    - Message signs
    - Interconnects
    - Traffic signals and controllers, ramp metering
- Freight
    - Truck climbing lanes
- Environmental
    - Drainage, including culvert replacement
    - Slide correction
- Efficiency
    - Park and ride lots
    - Rideshare projects
    - Passing lanes
    - Median turn lanes
    - Left/right turn lanes
    - Channelization
- Safety
    - Projects
    - Railroad grade crossing related projects
    - Illumination installation
- Maintenance
    - Seismic retrofit
    - Bridge deck replacement
    - Other bridge repair, including piers
    - Roadway maintenance projects

Relevant Federal Regulations

23 CFR 450.320 (b) – "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."

23 CFR 450.320 (d) – "In a TMA designated as nonattainment area for ozone or carbon monoxide pursuant to the Clean Air Act, Federal funds may not be programmed for any project that will result in a significant increase in the carrying capacity for SOVs (*i.e.* , a new general purpose highway on a new location or adding general purpose lanes, with the exception of safety improvements or the elimination of bottlenecks), unless the project is addressed through a congestion management process meeting the requirements of this section."

23 CFR 450.320 (e) – "In TMAs designated as nonattainment for ozone or carbon monoxide, the congestion management process shall provide an appropriate analysis of reasonable (including multimodal) travel demand reduction and operational management strategies for the corridor in which a project that will result in a significant increase in capacity for SOVs (as described in paragraph (d) of this section) is proposed to be advanced with Federal funds. If the analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor and additional SOV capacity is warranted, then the congestion management process shall identify all reasonable strategies to manage the SOV facility safely and effectively (or to facilitate its management in the future). Other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation into the SOV facility itself, shall also be identified through the congestion management process. All identified reasonable travel demand reduction and operational management strategies shall be incorporated into the SOV project or committed to by the State and MPO for implementation."

Appendix D: Documents Consulted

Federal Guidance:

- The Congestion Management Process: A Guidebook FHWA 2011
- Incorporating Travel-Time Reliability into the Congestion Management Process: A Primer, FHWA, 2015
- Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation, FHWA 2005

CMPs from Other MPOs:

- 2012 Congestion Management Summary, WILMAPCO (Wilmington DE MPO), 2012
- 2015 Congestion Management Process, North Front Range MPO, 2015
- Appendix F: Related Plans: Congestion Management Process, French Broad River MPO (Asheville NC MPO)
- Appendix O: Congestion Management Process for the Stanislaus County Region, Stanislaus Council of Governments
- Congestion Management Process 2017 Monitoring Report, Southwest Washington Regional Transportation Council, 2017
- Congestion Management Process Innovations: A Menu of Options, Prepared for New York State Association of Metropolitan Planning Organizations, ICF Consulting, 2006
- Congestion Management Process, Congestion Monitoring and Strategy Evaluation, Ozarks Transportation Organization (Springfield MO MPO), 2017
- Congestion Management Process, CORE (Coastal Region MPO – Savannah GA MPO) 2017
- Congestion Management Process, Spokane Regional Transportation Council (Spokane WA MPO), 2014
- Fresno County Congestion Management Process Update, Council of Fresno County Governments, 2017

Other

- Social Equity Impacts of Congestion Management Strategies (Shaheen, S. et al 2019) https://escholarship.org/uc/item/9z9618mn