CHAPTER 9—CONGESTION MANAGEMENT PROCESS

Introduction

Traffic congestion, which has become one of the biggest concerns for travelers in recent years, causes billions of dollars of loss in productivity, fuel wasted in congested traffic conditions, increased harmful vehicle exhaust emissions, accidents and stress-related health problems.

The RTC is the lead agency in the region that has been aggressively undertaking and implementing transportation programs that reduce congestion on our transportation system. The current authorization law for federal surface transportation funding, the Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU), requires regions with more than 200,000 population, known as Transportation Management Areas (TMAs), to develop and maintain a Congestion Management Process (CMP) and use it in the transportation planning and decision making process. While previous laws referred to this set of activities as a congestion management system (CMS), SAFETEA-LU renamed it *Congestion Management Process* (CMP), reflecting that the goal of the law is to use a process that is an integral component of metropolitan transportation planning.

The CMP is intended to address congestion through a process that provides for effective management and operations based on cooperatively developed travel demand reduction and operational management strategies. The CMP establishes a rigorous method of identifying and evaluating transportation improvement strategies including both operations and capital projects. The congestion management process (CMP) is a way of systematically considering congestion-related issues using a set of technical tools and basing evaluations on a discrete set of locally determined performance measures. A CMP provides for the systematic review of performance of multimodal transportation systems in larger metropolitan areas and identification of strategies to address congestion through the use of "management" strategies focused on both the use and operation of facilities and services.

The regulation defines congestion as “the level at which transportation system performance is no longer acceptable due to traffic interference.” The CMP must include a systematic process for managing congestion that provides information on transportation system performance and alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. Serious consideration must be given to implementation of strategies that provide the most effective use of existing and future transportation facilities.

This includes evaluation of strategy applications that reduce single-occupancy vehicle (SOV) travel and improve existing transportation system efficiency. Further, projects in the Regional Transportation Improvement Program (RTIP) that create new capacity for

SOVs in air quality non-attainment areas can be approved only if they are derived from an approved Congestion Management Process.

Purpose

The purpose of the CMP is to provide a framework for cost-effective decision making that emphasizes enhanced service at reduced public and private life-cycle cost. The principal product of this framework is a balanced transportation system that relates population growth, traffic growth and land-use decisions to transportation system performance standards and improved air quality. RTC's Congestion Management Process helps to:

- Develop alternative strategies to mitigate congestion
- Determine the cause of congestion
- Identify congested locations
- Evaluate the potential of different strategies
- Evaluate the impacts of previously implemented strategies
- Propose alternative strategies that best address the causes and impacts of congestion

Washoe County CMP

Demand for transportation facilities and services is increasing at a high rate in Washoe County as new development expands into outlying areas. Given limited resources and an uncertain future about federal and environmental regulations, it is unlikely that this demand can be accommodated without unacceptable transportation system performance or alternative strategies for alleviating congestion.

The RTC CMP is designed to address existing and future congestion and to meet the requirements of SAFETEA-LU. The CMP synchronizes a wide array of existing plans, programs and policies that the RTC has developed, implemented and refined over several years to maximize their benefits while reducing cost. RTC will continue to expand data collection efforts, identify congested parts of the transportation network and set priorities by means of a joint effort with appropriate local agencies and the Nevada Department of Transportation (NDOT). The CMP will also be used to better explain the impact of land-use decisions on the transportation system to local land-use decision makers.

Objectives relating to congestion should have the following "SMART" characteristics. These characteristics are reflected in the Street and Highway Element Objectives contained in Chapter 3 of this document.

- **Specific—**It provides sufficient specificity to guide formulation of viable approaches to achieving the objective without dictating the approach.

- **Measurable—**It includes quantitative measurements indicating how many or how much should be accomplished. Tracking progress against the objective enables an assessment of effectiveness of actions.

- **Achievable—**Objectives should be realistic and within the reach of the various participants in the CMP. Objectives should not represent a "wish list," but should take into consideration projections and trends used elsewhere in the metropolitan transportation planning process.

- **Realistic—**The objective can reasonably be accomplished within the limitations of resources and other demands. Still, the objective may be a "stretch" and require substantial coordination, collaboration and investment to achieve. Since a judgment on how realistic the objective is cannot be fully evaluated until after strategies and approaches are defined, the objective may need to be adjusted iteratively.

- **Time-bound—**The objective identifies a timeframe within which it will be achieved, e.g., "by the year 2030".

Required Elements of a Congestion Management Process

The Code of Federal Regulations (23 CFR Part 500 Sec.109) states that a congestion management process must include:

1. Methods to monitor and evaluate the performance of the multimodal transportation system, identify the causes of congestion, identify and evaluate alternative actions, provide information supporting the implementation of actions and evaluate the efficiency and effectiveness of implemented actions.

2. Definitions of the parameters for measuring the extent of congestion and for supporting the evaluation of the effectiveness of congestion reduction strategies for the movement of people and goods.

3. Establishment of a program for data collection and system performance monitoring to define the extent and duration of congestion, to help determine the causes of congestion and to evaluate the efficiency and effectiveness of implemented actions.

4. Identification and evaluation of the anticipated performance and expected benefits of appropriate traditional and nontraditional congestion management strategies.

5. Identification of an implementation schedule, implementation responsibilities and possible funding sources for each strategy.

6. Implementation of a process for periodic assessment of the efficiency and effectiveness of implemented strategies in terms of the area's established performance measures.

CMP System Facilities in Washoe County

Roadways addressed through the CMP in Washoe County include the Regional Road Impact Fee (RRIF) System and the two major freeways—US 395/I-580 and I-80 freeways. As the CMP system is designed to evaluate capacity projects, mirroring the RRIF network is logical.

Currently, Washoe County is in attainment/maintenance for CO (8-hour) and in serious non-attainment for 24-hour NAAQS for PM_{10}. Due to Washoe County's designation as an attainment area for ozone and non-attainment area for carbon monoxide and particulate matter, any roadway projects resulting in a significant increase in capacity for single-occupant vehicles (SOVs) must also be included in an approved CMP. The roadways included in the RTC CMP are shown in **Chapter 3, Table 3-1.**

Methods to Measure Transportation System Performance

The CMP permits use of local parameters for measuring facility performance and defining acceptable performance levels. Local performance measures for non-recurring congestion caused by incidents like construction, accidents and weather have not been identified in this CMP. The RTC CMP applies two standard measures of effectiveness to typical operation of selected roads and intersections:

1. Level of Service (LOS) - segments
2. LOS/Delay - intersections

For roadway segments, level of service (LOS) is generally quantified from a planning level perspective. The LOS ranges are identified in **Table 3-4**. The table shows at each LOS range the maximum number of vehicles that can be accommodated by a roadway.

Policy Level of Service Standards and Levels of Acceptable Performance

The policy LOS represents the minimum acceptable performance standards on a particular roadway facility. As an element of the RTP, the CMP incorporates the policy LOS for the Regional Road System (RRS) identified in the Street and Highway Element. The Cities of Sparks and Reno and Washoe County have adopted the policy LOS for the Regional Road System as part of the RRIF. The key factors in the recommendation of the policy level of service consider the following:

1. The individual characteristics of the community, its goals, objectives and needs.

2. The ability to provide the facilities that are determined necessary to maintain the policy level of service for current and future traffic volumes.

3. The ability to fund the facilities that are determined necessary to maintain the policy level of service for current and future traffic volumes.

The adopted policy levels of service for the regional road system are identified in the **Table 3-3.** The average daily traffic (ADT) numbers in **Table 3-4** will determine the capacity needs and LOS estimates for future year scenarios. These should be considered approximations as other variables such as on-street parking, absence of medians, continuous left-turn lanes or other management practices affects potential vehicle conflicts and available capacity. RTC has included these considerations as a result of extensive field checks of the Regional Road System (RRS) to provide the closest estimation of existing and future LOS problems.

Data Collection and System Monitoring

A data collection program is an integral and essential part of the CMP, which is used in monitoring and evaluating transportation system performance in the region to identify recurring congestion, to locate bottleneck locations, to help determine the causes of congestion and to evaluate the efficiency and effectiveness of implemented actions.

RTC conducts a region-wide data collection program on a yearly basis that includes the most critical sections of the CMP roadway system. The RTC staff also coordinates with local agencies, including the Nevada Department of Transportation (NDOT) and local traffic professionals, to obtain any traffic data that they have collected. The purpose of the coordination efforts is to share the most recent traffic count data from the various public agencies and consulting firms. This process is designed to assist in evaluations under the CMP program. Specific responsibilities, products and scheduling for collection of traffic count data are jointly defined and formalized.

All projections of future traffic are done using the RTC's traffic forecasting model. Forecasting future land-use is critical to projecting future traffic congestion since the amount and location of development determines the volume of traffic on roadways. The land-use data is also a critical component of air quality analysis requirements.

RTC effectively uses the traffic count data to monitor, evaluate and compare system performance including intersections, regional roads and the freeway system. RTC evaluates system performance using various measures including, but not limited to, delay, volume to capacity ratio (V/C ratio), travel time, accident reduction and citizen's reports and feedback. The data is used to measure system performance before and after implementing the programs to evaluate the effectiveness of the programs and identify sections that need further improvements to meet the standards established in the RTP. Regional roads, intersections and the freeway system are analyzed under

before and after scenarios to assess projected system performance under various alternate scenarios.

Project Prioritization and Selection

The RTC uses a sophisticated and highly technical benefit cost analysis (BCA) prioritization process (see **Appendix B**) that is based on inputs from various sources including traffic count data and the traffic forecasting model, to identify, prioritize and select intersections and roadway segments in the region. This is a very detailed process that incorporates traffic volumes, delay, level of service, type and impact of surrounding development type and the cost of various components of construction. The project prioritization process was developed in collaboration with the local agencies and a technical review committee. RTC uses this process to prioritize and select projects for funding that will result in the highest benefit/cost ratio. Projects are selected for implementation based on the ranking, with the top ranked projects selected first and. as additional funding becomes available, the additional projects on the list are selected for implementation.

The goal of this BCA ranking is a process that prioritizes projects so that available funding is spent on building those projects having the greatest benefit for the community at the time they are needed. This is an ongoing process and will be revisited periodically to include other projects.

To insure that available resources are applied to those projects having the greatest congestion relief benefits for the region, the RTC developed the list of 20-year relative benefit cost analysis (BCA) ranking of spot intersection/signalization and capacity projects. This effort generally consists of the following steps:

1. Benefit/cost analysis to determine an initial priority ranking
2. Consideration of “other factors” to develop final priority recommendations
3. Assignment of projects to their “best fit” funding categories
4. Technical Advisory Committee (TAC) review and recommendation
5. Presentation and recommendation to the RTC Board for consideration

Evaluation of Strategies

Alternatives that reduce SOV travel and improve existing transportation system efficiency are considered before addition of general purpose lanes. Where the addition of SOV capacity is determined to be an appropriate strategy, explicit consideration is given to incorporate appropriate features into the SOV project to facilitate future transportation demand management (TDM) and operational improvement strategies such as Transportation Systems Management (TSM) strategies that will maintain the functional integrity of those lanes.

Transportation Management Policies. The Transportation Management policies address lower cost strategies to make more efficient use of the transportation infrastructure. With a goal of the RTP to provide for and sustain a mix of transportation modes that can meet the continuing needs for personal mobility and for the movement of goods consistent with regional goals and values, the implementation of a system of transportation control measures (TCMs) that offer efficient use of existing and planned facilities is essential. Transportation management policies, including TSM and TDM, are identified in Chapter 2.

Efficiency and Effectiveness of Policies. The Street and Highway Element is intended to provide an analysis of current and future demand, critical planning issues, financial resources and provide an action plan for the development of the street and highway system in Washoe County. The Street and Highway Element also provides effectiveness and efficiency policies that provide direction in developing some strategies to be evaluated.

Required Evaluation. All roadway capacity project proposals, regardless of funding source, identified in the RTP, RTIP and Regional Road Impact Fee Capital Improvements Program (RRIF CIP) will be evaluated for consistency with the strategies identified below. A CMP project documentation form is included at the end of this section.

1. Equipment Update: An inventory of existing traffic control devices is necessary to determine if new, more modern equipment should replace them. Planning a comprehensive set of actions to improve traffic flow is then possible.

2. Signal Progression and Signal Timing Plan Improvements: Traffic signal cycle length, phasing and timing are the major elements influencing the number of vehicles that can pass through an intersection in a given period. Traffic signals on CMP roadways will be interconnected and timed to facilitate regional trips.

3. Interconnected Signals: Specific improvements could include one or more of the following: interconnected, pre-timed signals; traffic-actuated signals; interconnected, actively managed timing plans; and master controls.

4. Arterial Intersection Signal Spacing: The spacing of traffic signals on the regional road system shall follow the standards set out in **Table 3-2**.

5. Arterial Driveway Spacing: The spacing of driveways on the regional road system shall follow the standards set out in **Table 3-2**. Direct access on all major and minor arterials shall be minimized.

6. Medians: The installation of medians on the regional road system shall follow the standards set out in **Table 3-2**.

7. On-Street Parking: On-street parking shall not be allowed on new major and minor arterials. Elimination of existing on-street parking shall be considered a priority for major and minor arterials operating at or below the policy level of service.

8. New Development Approvals: The local jurisdiction shall require dedication of right-of-way or setbacks adequate to implement street and highway improvements listed in the Street and Highway Element of the RTP or in the Regional Road Impact Fee Capital Improvements Program (RRIF CIP).

9. Street Sections: Existing or proposed street sections shall reflect those identified as RTC Typical Right-of-Way Sections.

10. Intersection Improvements: Intersection improvements shall be used to facilitate the flow of traffic on the roadway.

    - They should give the heaviest and fastest flows preference in intersection design to reduce hazard and delay.

    - Reduce excessive intersection area that causes driver confusion and inefficient operations. They should employ channelization at intersections that conflict.

    - Separate lanes should be provided at intersections where there are appreciable volumes of traffic traveling at different speeds.

    - The needs of pedestrians and bicyclists should be considered.

11. Urban Interchanges: Where feasible, urban interchanges will be considered to increase efficiency of high access facilities, such as McCarran Boulevard and other regional roads. A proposed interchange at the Meadowood Mall will help reduce traffic congestion in the vicinity of South McCarran Boulevard and Meadowood Mall.

12. Reversible Lanes: Where feasible, consideration shall be given to designation of one or more reversible lanes for peak-direction of traffic each peak-hour providing more efficient peak-hour/peak-direction capacity of the roadway.

13. High-Occupancy Vehicle (HOV) Lanes: Consideration shall be given to converting existing or future general-purpose lanes to HOV use, where feasible.

14. Freeway Ramp Metering: The Nevada Department of Transportation is planning to install two ramp meters in the Reno-Sparks metropolitan area to control the flow of traffic from the most congested ramps onto the freeway system. It will improve peak-period operational efficiency and safety.

15. Availability and Capacity of Public Transit: Fixed-route service should be expanded, if feasible and cost-effective, to include outlying areas with an average

density of at least seven units per gross acre. Maximum passenger loads should never exceed the safe or legal limit.

16. Accessibility to Existing Public Transit: RTC will work with local government agencies, private developers and property owners to ensure proper location and design for new and existing bus stops and passenger amenities.

17. Park-and-Ride Lots: Park-and-ride facilities in outlying areas will be developed and serviced by commuter express bus service, where warranted and feasible, as a first step towards full implementation of fixed-route service.

18. Future Facilitation of Strategies: Where the addition of general purpose lanes is determined to be an appropriate strategy, explicit consideration is to be given to facilitate the above or other appropriate transportation demand or operational improvement strategies that will maintain the functional integrity of those lanes.

Implementation of the Congestion Management Process

Congestion management process is included at all stages of the planning, programming and project implementation process. RTC's treatment of congestion management at each stage of the process is described below.

Needs Assessment: Identification of overall system performance and congestion management needs is performed at the regional level. CMP assessment is conducted in this context as part of development of all capacity projects to be included in the RTP, RTIP and RRIF CIP.

Prioritization of Street and Highway Improvements: CMP requires prioritization of projects in the RTIP. This requirement is consistent with existing RTC procedures to conduct a priority analysis of street and highway projects. The BCA was discussed earlier in this chapter.

Transportation Demand and System Management Analysis: The funding categories provided by SAFETEA-LU have expanded the scope of the projects possible including transportation demand and system management programs and projects. While the priority analysis of these categories of projects was possible, e.g., delay reduction for intersection improvements, other improvements are much more difficult to analyze in the same manner.

Traffic Signal Optimization and Coordination Program: Signal coordination and optimization programs that increase the flow of traffic through a group of signaled intersections are essential to minimizing system delay and reducing congestion in the region. The Regional Transportation Commission, in cooperation with the local agencies, has undertaken a region-wide traffic signal coordination and optimization

program to improve signal operations at the selected signalized intersections in the region. CMAQ funds, state funds and local funds are used to undertake this upgrade. In 2005-2006, RTC implemented coordinated signal timing plans at ⅓ of the intersections in the region and will continue to upgrade the remaining signals on a yearly basis.

Evaluating Before and After Improvements: The Regional Transportation Commission monitors system congestion and performs before and after analyses of travel time, delay, speed, emissions and fuel consumption to evaluate and quantify the results of the projects. Detailed information on the before and after improvement analyses is included in the CMP project documentation form.

Incident Management: Incident management is critical to reducing regional congestion levels. Investments in traffic management, particularly related to construction and incidents, should also be seen as investments in the safety of the highway system. Complete incident management systems include traffic monitoring and control technologies that facilitate maintenance of traffic flows as well as the staffs of those transportation, police, fire and medical agencies that maintain traffic mobility or safety. Systems should involve the following activities or functions:

- monitoring traffic and weather conditions
- controlling traffic
- communicating and coordinating among agencies
- responding appropriately to incidents
- informing travelers of conditions

A Freeway Service Patrol is currently operating on the region's freeway system to provide towing services to disabled vehicles on the freeway system, which helps clear the incident quickly and reduces the potential for of an accident and reduces delays.

Intelligent Transportation Regional Architecture/Integration Plan. The Nevada Department of Transportation has developed a Regional ITS Architecture for the region to help the local agencies implement coordinated ITS programs to alleviate congestion levels. This plan is meant to strategically deploy ITS technologies in this region, outline a regional ITS architecture, set ITS standards/architecture and integrate all existing and committed ITS projects throughout the region. Furthermore, it will link the freeway system, transit services, arterial streets, traveler information and regional traffic signal systems. This Plan is required if the region wants to pursue any future ITS funding from the federal government. Participating agencies include RTC, Nevada Department of Transportation (NDOT), City of Reno, City of Sparks and Washoe County.

Park-and-Ride Facilities: Specific outlying areas have been targeted for development of park-and-ride facilities. These are currently pursued as conditions of approval for new development as recommended to local jurisdictions by RTC staff in the project review program. RTC commits funding through the RTIP to provide appropriate signage for these joint-use parking facilities.

Modal Function: Consideration of transit options as an alternative to highway expansion is severely constrained when focused upon a single corridor. In Washoe County, existing transit is structured so that transit options cannot be considered alternatives by themselves but, rather, complementary actions beside highway work. The only planning context in which to explore significantly changed roles for transportation modes is in the regional context. Elements of the RTP explore appropriate long-term roles and functions for transit, bicycle and pedestrian travel.

Project Review: RTC provides comments on the anticipated project impacts associated with applications for land development. CMP strategies are evaluated for inclusion as recommendations to mitigate the traffic impacts of new development including required ETR programs for sites with 100 or more employees and shared-use park-and-ride facilities. In addition, RTC staff comments on proposed changes to local government development codes that define the required transportation infrastructure on or next to a development site. One important product of the project review task is the identification of development impacts to long-range transportation improvements contained in the RTP. In particular, the project review process has identified right-of-way needs and allowed for corridor protection through building setbacks, project redesign and advance right-of-way acquisition, when appropriate.

Transportation Community Linkages: The RTP contains transportation planning policies and recommendations that address the impact of land-use/development decisions including the tradeoff between policy level of service and community impacts associated with roadway widenings, the impact of land-use decisions on the ability to provide transit services and the impact of transportation system improvements on environmental quality.

System Monitoring

The system will be revisited periodically to evaluate the effectiveness of the CMP make improvements and necessary changes.

CONGESTION MANAGEMENT PROCESS

PROJECT DOCUMENTATION FORM

Roadway Name: _____

From: _____ To: _____

Sponsoring Agency: _____

Contact Person: _____ Phone: _____

Project Description: _____

_____

_____

Total Project Cost: _____ Total Length: _____

Primary reason(s) project is needed: _____

_____

_____

What is likely to occur if project is not implemented? _____

_____

_____

DATA WITHOUT PROJECT

Policy LOS for roadway: _____ Maximum service volume at policy LOS: _____

Capacity of existing roadway without project: _____

Volume without project (ADJUST TO OPENING YEAR. ATTACH DIAGRAM WITH ADTS IF APPROPRIATE.): _____

V/C ratio without project: _____ Resulting Level of Service: _____

If the roadway does not meet the policy LOS, then what are the causes of the congestion?

DATA WITH-PROJECT

Anticipated volume on opening day: (ATTACH DIAGRAM SHOWING ADTS IF APPROPRIATE.)_____

Capacity of roadway after project: _____

V/C ratio with project: _____ Resulting Level of Service: _____

Change in the volume/capacity ratio: _____

Strategy Evaluation and Implementation

All reasonable alternatives that reduce SOV travel and improve system efficiency need to be analyzed prior to addition of general purpose lanes. 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 CMP shall identify all reasonable strategies to manage the SOV facility effectively (or to facilitate its management in the future). All reasonable travel demand reduction and operational management strategies shall be incorporated into the SOV project or committed to by the State and the MPO for implementation. 23 CFR Chapter I, Sec. 500.109.

Consistent with the above direction, identify all reasonable strategies from the list, below, or other strategies to be considered with the project proposal.

TCM Strategies:

1. Equipment Update (Place "X" in spaces for lists attached.):

   Inventory of existing traffic control devices _____
   Inventory of traffic control devices to be functioning on opening day _____
   Inventory of future traffic control devices facilitated by the project _____

	Without Project	**With Project**
2. Timing Plan Improvements: V/C Ratio of implemented strategy:	_____	_____
3. Interconnected Signals: V/C Ratio of implemented strategy:	_____	_____
4. RTP Standard for Arterial Intersection Spacing: V/C Ratio of implemented strategy:	_____	_____
5. RTP Standard for Arterial Driveway Spacing: V/C Ratio of implemented strategy:	_____	_____
6. Installation of Raised Medians: V/C Ratio of implemented strategy:	_____	_____
7. Elimination of On-Street Parking: V/C Ratio of implemented strategy:	_____	_____
8. Intersection Improvements (Attach list): V/C Ratio of implemented strategy:	_____	_____

	Without Project	With Project
9. Reversible Lanes: V/C Ratio of implemented strategy:	_____	_____
10. High Occupancy Vehicle (HOV) Lanes: V/C Ratio of implemented strategy:	_____	_____
11. New Development Approvals: Dedication or setbacks required from development proposals for planned improvements in corridor? [yes or no]	_____	_____
12. Street Sections: Sections consistent with RRIF CIP standards? [yes or no]	_____	_____
13. Ramp Metering: V/C Ratio of implemented strategy:	_____	_____

TDM Strategies

14. Availability of Public Transit: Citifare service provided in the corridor?	_____	_____
15. Capacity of Existing Public Transit: What is the load factor of existing/future service?	_____	_____
16. Accessibility to Existing Public Transit Service: Maximum spacing between passenger stops:	_____	_____
17. Availability of Park and Ride/Car pool Lots in Corridor: Number of parking spaces committed in corridor	_____	_____
18. Effect of Reasonable Strategies: Net change to V/C Ratio of all implemented strategies:	_____	_____

19. Future Facilitation of Strategies:
Identify all reasonable travel demand reduction and operational management strategies to be incorporated into the SOV project or committed to by the sponsoring agency for implementation. Add additional sheets, if necessary.

STRATEGY	IMPLEMENTING AGENCY
_____	_____
_____	_____
_____	_____
_____	_____