Mountainland Association of Governments
Congestion Management Process

Planning Process Integration

Technical
Memorandum
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MAG Congestion Management Process Planning Process Integration

Introduction

The Congestion Management Process (CMP) for the Mountainland Association of Governments (MAG) is intended to improve the region's congestion management, air quality conformity, and transportation planning analysis capabilities. The CMP is intended to provide MAG with a process to supplement ongoing regional transportation planning, programming, and prioritization activities. Aspects of this program are to include:

- A geographic information system (GIS) database linked to MAG's regional travel demand model to better manage transportation data and to support regional decision making;
- A project/strategy toolbox to aid MAG and local jurisdictions identify ways to enhance mobility in the region without necessarily adding roadway capacity; and
- A set of integrated and automated analysis tools tied to the regional travel demand model to evaluate the potential effectiveness of proposed projects or strategies at achieving their desired objectives.

The CMP is not intended to replace existing processes; rather it will work with and enhance those processes. Congestion and mobility will continue to be one of a number of factors considered in project selection and programming for the region.

CMP Major Tasks

The major tasks of the Congestion Management Process are:

- Identify and rank congestion *problem* areas on freeways, major and minor arterials, and associated intersections.
- Identify congestion *causes* through initial screening tools
  - Field observations
  - Regional model outputs
  - Feedback from the Mountainland Technical Advisory Committee
- Identify possible *solutions* for each corridor
  - Preliminary engineering field surveys
  - Consultations between MAG staff and the technical advisory committee
  - Recommendations from any related planning studies

- Model impacts/benefits of each solution on each corridor
    - Micro-simulation of suggested solutions
    - Rank by benefits and cost effectiveness of each solution

- Model impacts of selected solutions on regional system as a whole.
    - Simulate solutions on Regional Transportation Model

- Communicate the identified problems to and consult with potential project sponsors on selection of possible solutions and implementation strategies.

- Evaluate effectiveness of chosen solutions after implementation
    - Measure the before and after peak-hour levels of service for each project.

CMP Tools

The CMP will basically provide a set of tools to identify and evaluate potential improvement projects within the framework of the transportation planning process in the Utah Valley Area. MAG is working to develop several tools and guidelines for performance measures that could ultimately be incorporated into the planning process, thereby implementing the CMP. These tools are summarized briefly below.

GIS-Based Central Database Process for Regional Transportation Planning

The core of the CMP database is a new Geographic Information Process (GIS)-based central database system (CMP GIS) which will store, retrieve, and evaluate transportation congestion-related information. The CMP GIS will store and display base transportation network attributes including roadway capacities, free-flow speeds, observed traffic counts, truck routes, and transit routes and systems. It also will store and display future programmed and funded transportation projects identified in the Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP) planning processes.

The CMP GIS will be linked to the MAG Regional Travel Model (MAG Model), allowing the CMP GIS to store and display base and future year daily travel demand results from the MAG Model. Travel demand characteristics linked to the CMP GIS include network travel demand and travel speeds by facility and mode (transit, car, high occupancy vehicle), and trip matrices by mode represented by transportation analysis zone (TAZ). This feature also includes a direct link to the inputs (network characteristics, socioeconomic data) and outputs (trip assignments of volumes and travel speeds) of the MAG Model. Additional data required for CMP performance evaluations are also stored and displayed in the system including travel time surveys and traffic counts collected as part of MAG's ongoing data collection efforts.

The CMP performance measures will be used to identify transportation system congestion in the current project selection process of the TIP. Maps and tables showing the locations and magnitude of congestion were submitted to local jurisdictions to supplement the TIP project selection process. The CMP GIS will also be used as the basis for storing and displaying transportation data, proposed project evaluation and impact results, and alternative project and strategy testing in support of the RTP process on sub-area analysis performed by MAG.

Integrated Post-Processing Analysis Tools for Regional Transportation Planning

The CMP GIS will be linked to several post-processing analysis tools designed to compute performance measures, to identify the magnitude of congestion on the transportation system, and to test, screen, and evaluate congestion-relief projects and strategies.

Intelligent Transportation Process (ITS) monitoring data will be linked with the MAG Model and CMP GIS to assess the potential congestion-relief associated with ITS and TSM operational strategies. The Transportation Demand Management Evaluation Model (TDM Model) was also linked with the MAG Model and CMP GIS to assess the potential congestion-relief impacts of trip reduction, rideshare, transit, telecommuting, and alternative work schedule strategies on the transportation system.

The CMP GIS, MAG Model, and post-processing analysis tools integration process was initially designed to address congestion management needs for the region. This process was also designed to support project and strategy testing and screening for the TIP, RTP, and corridor and sub-area-specific transportation improvement and needs studies within the region. Traffic conditions of alternative future transportation plans or individual projects can also be fed back into the CMP GIS and MAG Model to identify the impacts of the strategies for a variety of transportation planning activities. The processed data can also be provided to planning staff, decision-makers, and the general public to assist in understanding the impacts of alternative programs.

CMP Toolbox

A toolbox of potential project types and strategies that might be applied in the Utah Valley area has been proposed to address various congestion and mobility issues. The potential projects and strategies will also be linked to the CMP post-processing analysis tools that could be used to evaluate the effectiveness of each project or strategy in a given situation.

Integration of the CMP with the Regional Transportation Plan

At its core, the CMP provides a structured way for MAG to explore all reasonable alternatives to roadway capacity expansions. The components of the CMP will work within the context of the existing MAG planning and programming process. Figure 1 shows the existing planning process, Figure 2 illustrates the connection of the CMP will work to the existing process.

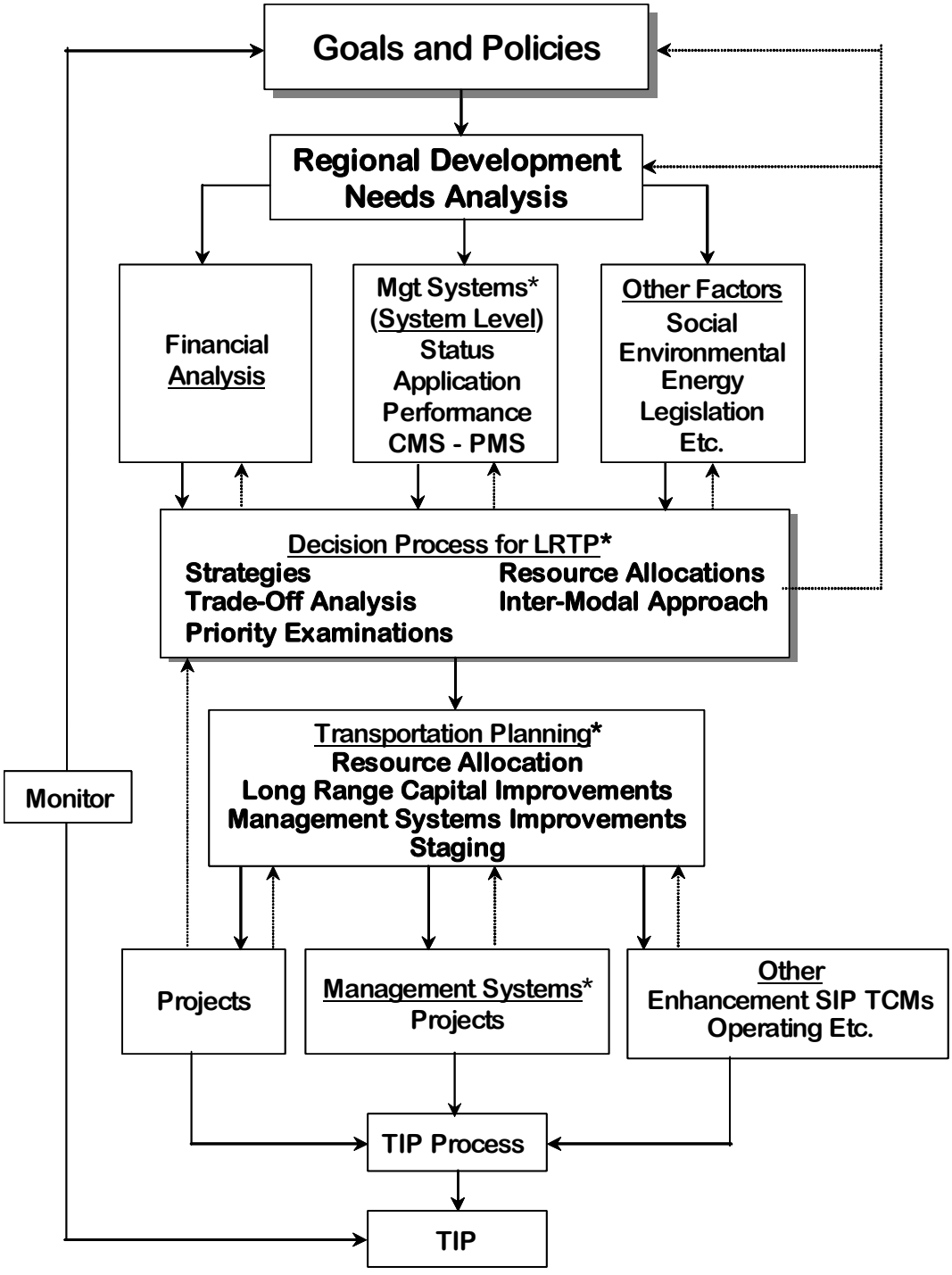
Currently, project selection is a bottom-up approach. Cities and agencies in MAG's planning boundary submit projects to a multi-jurisdictional technical committee for review and technical analysis. Recommended projects are then passed through the Regional Planning Committee, and the draft plan is generated. Then MAG's Regional Planning Committee approves taking the plan for public review and comment and then takes final action to approve the Regional Transportation Plan.

With the CMP in place, there would be several enhancements to this process, described below.

Select Locations for In-Depth Transportation Analysis

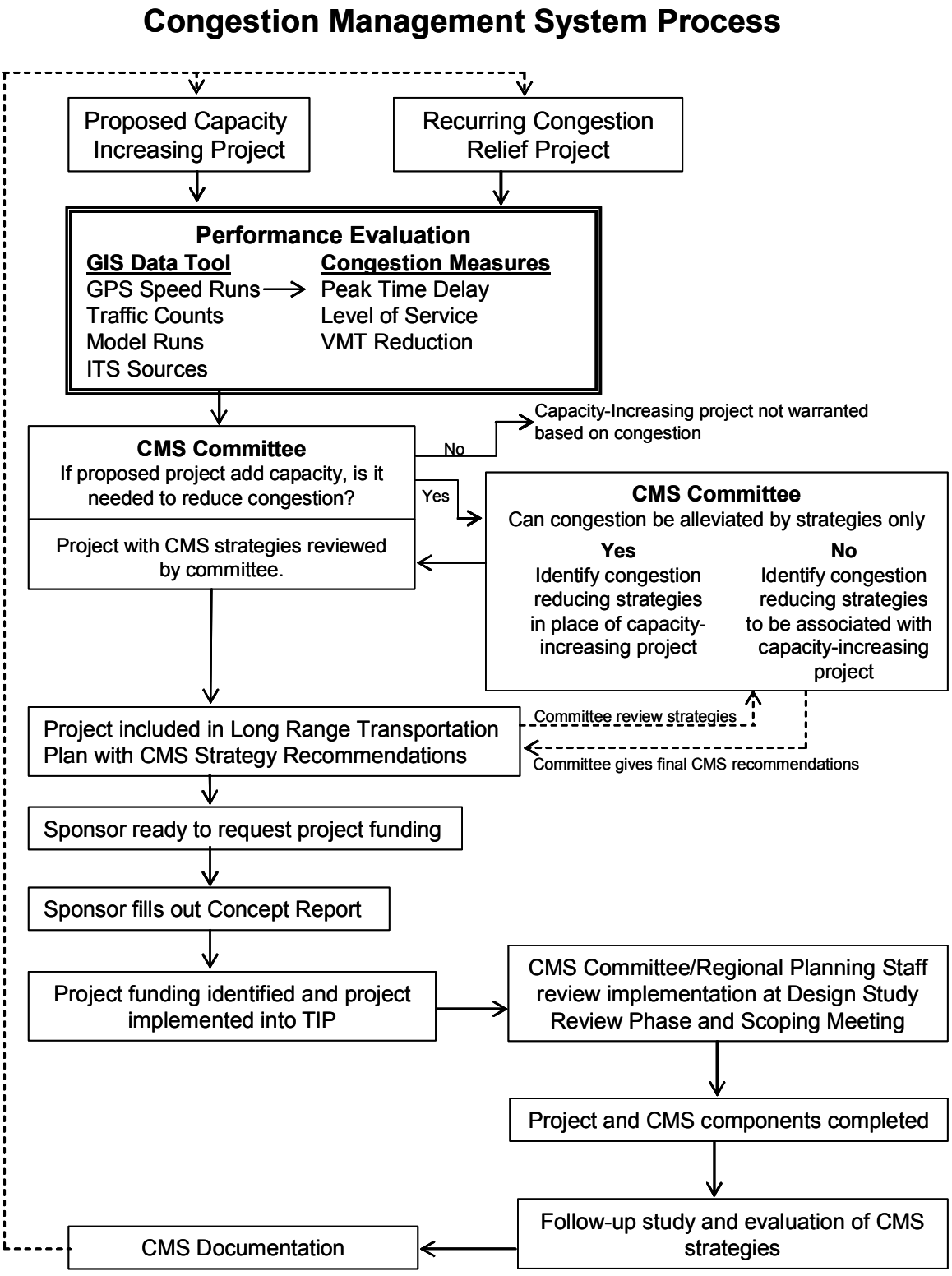
With the CMP GIS-database tool, the region will have the capability to monitor the condition of area transportation facilities over time. It will also have the ability to identify corridors or areas that are, or are forecast to become deficient. The CMP process can be used to identify problem areas that may not have previously been targeted for study. Examples could include using the CMP process to identify high-priority corridors in the region or to assess sub-area congestion and potential transportation improvements. Once identified, these locations would then be subjected to more detailed planning and engineering analysis by one or more local jurisdictions or agencies.

Figure 1. Overview of the Existing RTP Development Process



* Includes CMS
LRTP Long Range Transportation Plan
TIP Transportation Improvement Program

Figure 2. CMP Integration with MAG Planning Process



These corridor/sub-area studies would be done following the guidelines of the CMP. They would go through the checklist of potential projects and strategies provided in the CMP toolbox to identify ideas that make sense to pursue in the study area. Once potential projects or strategies are identified, they can be analyzed (potentially by MAG staff) as to their potential effectiveness. The local jurisdiction would be responsible for preparing a report analyzing potential solutions as part of their funding concept report for the corridor or sub-area that reflects how the CMP will be used. The resultant project submittals to the RTP process would then be reviewed by committees using the existing techniques.

Review of Bottom-Up Project Submittals

The project-development flow described above is one that is top-down. That is, the region identifies areas of concern, then the localities have the option of pursuing projects or strategies that respond to those concerns.

It will also be possible to maintain the existing bottom-up approach, while integrating CMP analysis elements. Under the CMP-modified planning process, localities which generate project submittals to the RTP process would first need to take a step back and consider alternative strategies that might come from the CMP toolbox. Then, once reasonable strategies are developed, they would be able to evaluate those strategies using the CMP post-processing tools. Again, MAG staff could do the analysis using the post-processing tools.

Monitoring the Effectiveness of Implemented Strategies

The CMP performance measures are intended to be used on an ongoing basis to identify locations where congestion-mitigation is needed and to help assess future transportation needs. For example, the travel time performance measure was implemented in the CMP primarily because it was supported by ongoing transportation system travel time GPS runs collected by MAG on a regular basis.

Since elements of the congestion data collected in the region are related directly to the performance computations, the CMP process can be used to identify the impacts of specific projects and strategies. For example, travel time GPS surveys collected by roadway facility types within the region can be collected and used to identify the “before” and “after” impacts of potential project or strategy implementation. The new travel time data can be used directly in the performance measure computations to identify the project's impact on congestion reduction. This data can also be used to monitor the latest levels of congestion on a corridor or system directly in the performance computations. It can also be used to monitor strategy effectiveness including a mechanism for tracking projects, so that congestion data can be related to implemented projects.

The CMP and Project Selection

Project selection happens at two points: in the RTP and the TIP process. The CMP procedures discussed above will work equally well for both the RTP and the TIP. If CMP screening and analysis is done for a project to become part of the RTP, then that same analysis can be used to help score a project for inclusion in the TIP.

Early on in this CMP development MAG staff identified the need for methods to better prioritize the region’s competing transportation needs, and translate these priorities into project

recommendations. Prioritization of projects needs to consider criteria beyond those that can be reflected in the congestion management system. Evaluation criteria might include safety benefits, economic health, environmental equity, geographic equity, and implementability measures for roadway projects and other measures for transit and ITS projects. A scheme devised to weigh the importance of each measure to the region will be developed working with the local jurisdictions to better define the project selection process.

Table 1 shows an example of how this process might work with weighting factors given to each of the criteria. The specific criteria and weighting factors would need to be worked out together with the local jurisdictions, and approved by MAG's Regional Planning Committee. In the prioritization framework shown, congestion relief was considered the most critical element for project selection while implementability was viewed as the least critical. In this case, congestion relief was primarily assessed through travel time performance measures and was the critical element generated through congestion management planning.

Table 1. Example of Potential Highway Project Prioritization Evaluation

Objective	Evaluation Criteria	Addresses
Congestion Relief (25 points)	• Bottleneck removal • Travel time • Person throughput • Connectivity	• Will the project eliminate current or future bottlenecks • Does the project decrease travel time or delay? • Does this project increase the roadway capacity? • Does this project improve connections to regional intermodal or emergency facilities?
Safety (20 points)	• Fatality risk • Weave/merge conflicts • Bicycle/pedestrian impacts • Truck Operations	• Does the project reduce accident risk? • Does the project reduce weave/merge conflicts? • Will the project not adversely affect the existing environment for biking and walking? • Do trucks compose a high percentage of traffic volume, potentially impacting other drivers?
Economic Health (15 points)	• Access to jobs • Goods movement	• Does this project serve one of the largest travel markets • Is this project located on a route heavily used by trucks and will benefit truck movement?
Environmental Equity (15 points)	• Low-income mobility • Neighborhood impacts • Promote alternative modes	• Does this project increase mobility and accessibility for residents of low-income neighborhoods? • Are the effects of constructing this project disproportionately felt by low-income areas? • Does this project promote use of transit?
Geographic Equity (15 points)	• Agency Rank	• What is the local jurisdictions priority for the project?
Implementability (10 points)	• Project readiness • Local funding	• Are plans or documentation complete for the project? • Is there a local match for the balance of the project cost?

Source: Cambridge Systematics, May 2001.