INTRODUCTION

During the past several years, employment has grown significantly in the City of Boulder. Much of this growth has occurred in the Foothills Parkway (SH 157) corridor, an area bounded approximately by the Boulder-Longmont Diagonal (SH 119) on the north, South Boulder Creek on the east, the Denver-Boulder Turnpike (US 36) on the south, and 30th Street on the west.

Major employers and office parks in the corridor include US WEST Advanced Technologies, Ball Aerospace, Flatiron Park, Syntex Chemicals, the National Oceanic and Atmospheric Administration (NOAA), Exabyte, Amgen, Pearl Street East, and Center Green.

Concurrently, much of the residential growth in Boulder County has occurred outside the City of Boulder. This has created a situation where many of the employees in the Foothills Parkway corridor live outside the City.

The two major roadways linking the City of Boulder with the rest of Boulder County are US 36 and SH 119. Foothills Parkway is the major roadway connecting US 36 and SH 119, in addition to providing access to the employment locations in the Foothills Parkway corridor.

Employment locations in the Foothills Parkway corridor are dispersed and provide ample free parking, helping to make the single-occupant vehicle (SOV) currently the most attractive and logical travel choice for most employees.

Increases in auto traffic on Foothills Parkway have created congestion during peak periods at intersections throughout the corridor. Increases in congestion create increased regional and localized air pollution emissions, increasing driver frustration, accident potential, and delay.

In response to the peak period congestion along Foothills Parkway, the City of Boulder initiated the Foothills Parkway Congestion Management Plan (FPCMP) project. The purpose of the plan is to achieve local and regional goals/objectives for the corridor and be consistent with state and regional transportation policies and plans.

Commitments for implementation of the recommended congestion management strategies will test the resolve of the community in truly addressing the corridor's multiple yet integrated roles in serving regional and local transportation and community needs.

CANDIDATE STRATEGIES

A comprehensive list of candidate congestion management strategies, applicable to the Foothills Parkway corridor, was developed. The strategies include alternate mode capital and operation improvements, transportation demand management (TDM) strategies, roadway capital and operating strategies, and urban design concepts related to site design, land use and ordinances.

The TDM strategies identify both incentive- and disincentive-based programs that could be implemented at an employer or neighborhood level, as well as other travel behavior modification strategies. Other strategies that could be implemented on a regional level, that would also impact Foothills corridor trip-making patterns, have been identified.

Roadway capital and operating strategies include the potential for new interchanges along the Parkway, widening of the Parkway, other new roads in the vicinity of Foothills Parkway, and roadway operational modifications.

figure a-1. Foothills Parkway Congestion Management Plan Alternatives Evaluation Summary

	Alternative I	Alternative II	Alternative III	Alternative IV
1. Maintain SOV at LOS E or better	●	◒	◒	◒
2. Maintain non-SOV at LOS D or better	●	◒	◒	○
3. Improve safety & efficiency of all modes	●	○	◒	◒
4. Reduce noise impacts	◒	●	◒	○
5. Improve air quality	●	●	◒	○
6. Enhance overall mobility	●	○	◒	○
7. Reduce neighborhood traffic diversions	●	○	◒	○
8. Maintain commercial and residential accessibility	●	○	◒	○
9. Be responsive to fiscal constraints	○	●	◒	●

High level of compliance with project objective ○

Limited compliance with project objective ◒

Does not meet project objective ●

ALTERNATIVES

Based on the review of the refined congestion management strategies by the project Steering Committee, meetings with City planners and engineers, and input from the public, packages of congestion management strategies have been developed for traffic forecast development and alternatives analysis. These alternatives are summarized below:

I. Base Case

This alternative is based on the TMP Update Scenario A land use and mode share assumptions. This scenario includes population and employment growth within the city limits assuming no further annexations, and a continuation of current travel trends that assume a 15 percent increase in trip-making over the next 20 years. No roadway network changes would be included within the project study area.

II. Interchange Alternative

The interchange alternative assumes the same land use and mode share assumptions of the base alternative, but with road network modifications along the Foothills Parkway. These road network modifications include the construction of interchanges at the existing at-grade intersections.

This strategy would increase the trip carrying capacity of Foothills Parkway without increasing the number of through lanes by construction of interchanges at each of the major cross-streets which are currently at-grade. This allows through traffic to flow without delays or stops at the intersections.

Alternative interchange types were investigated for each intersection and a preferred type was selected for each location. These major cross-streets are Baseline Road, Colorado Avenue, Arapahoe Avenue and Valmont Road. Interchanges currently exist at Pearl Parkway and South Boulder Road.

III. Voluntary, Incentive-Based Demand Management and Mode Shift Alternative

This alternative assumes a minimum level of transportation demand management (TDM) and alternate mode shift strategies, including an employer-based TDM program, a neighborhood-based TDM program, alternate mode strategies, and urban design strategies.

IV. Mandatory, Incentive and Disincentive-Based Demand Management and Mode Shift Alternative

This alternative includes transportation demand management and alternate mode strategies of a greater magnitude than Alternative III, with some mandatory TDM programs and an expanded alternate mode implementation program to accommodate the increased alternate mode travel demands.

PROJECT OBJECTIVES

To assess the relative merits of each alternative, a comparative evaluation of the project alternatives was conducted and is summarized in Figure a-1. This summary of the comparative evaluation indicates how well each alternative complies with the project objectives. The project objectives were defined through input from the project team, steering committee and general public. The project objectives are listed below.

- Maintain SOV travel at LOS E or better
- Maintain non-SOV travel at LOS D or better
- Improve safety/efficiency of all travel modes
- Reduce noise impacts
- Improve air quality
- Enhance overall mobility
- Reduce neighborhood traffic diversions
- Maintain commercial and residential accessibility
- Be responsive to fiscal constraints

The information provided in Figure a-1 is presented in a "consumer report" format. The more the circle is shaded-in, the less the alternative complies with the project objective.

The following information summarizes overall project objective compliance for each alternative. In addition, public reaction (from those in attendance at the Foothills Parkway public meetings) regarding each alternative is provided. Finally, this material addresses how each alternative complies with both the current TMP (1989) and the direction of the TMP Update.

Alternative I - Base Case

A continuation of today's travel patterns and behavior will result in non-compliance with the majority of the project objectives. This alternative would result in increased traffic volume and congestion along Foothills Parkway and cross-streets until system failure is experienced.

Only one objective, reduced noise impacts, indicates limited compliance due to less traffic volume and lower operating speeds than Alternative II (Interchanges).

Maintaining the status quo highway and transit service of the corridor would have the lowest financial requirements of the alternatives considered.

This alternative has received the greatest support from those who attended public meetings for the study. With regard to the current TMP, a continuation of today's travel patterns does not comply with the mode shift goal established by the City in 1989. Similarly, this status quo alternative is not consistent with the increased mode shift goal of the TMP Update.

Alternative II - Interchanges

As shown in Figure a-2, the Interchange Alternative scored relatively well in this comparative evaluation. The increase in roadway capacity associated with grade-separated interchanges would improve overall LOS for all vehicles and improve the safety conditions of the Parkway and cross-streets. These significant improvements to Foothills Parkway would also enhance the overall mobility in the corridor, as well as reduce neighborhood traffic diversions and maintain access for commercial and residential areas.

The interchanges would also enhance mobility for the increasing east/west travel associated with the high growth residential areas east and south of Boulder. However, the implementation of grade-separated interchanges would provide no differential travel time benefit for non-SOV travel, and would increase traffic volume and operating speeds, two factors that will create a negative noise impact. Because the interchanges would attract more trips to the corridor, volume will approach the capacity of the road, resulting in congested traffic conditions.

With regard to air quality, this alternative will improve the localized conditions at the intersections but will add to the air quality problems in the Boulder Valley due to the overall increase in VMT. This alternative would have the greatest capital improvement cost of the alternatives considered.

This alternative has received the least support from those who attended public meetings for the study. Since there is no incentive for mode shift, the Interchange Alternative does not conform with the direction of the TMP Update. However, the current TMP does identify new interchanges for Foothills Parkway.

Alternative III - Voluntary, Incentive-Based Demand Management and Mode Shift

The travel behavior changes associated with this alternative achieve limited compliance with all project objectives. Voluntary, incentive-based measures will begin to shift single-occupant-vehicle travel to alternative

modes. However, this shift will not be substantial and therefore this alternative will achieve only marginal success with respect to the various project objectives.

These voluntary demand management measures received general support by those who attended public meetings for this study. The potential mode shift associated with this alternative is consistent with the goals and objectives established by the City of Boulder in the 1989 TMP. However, these voluntary measures alone would not achieve the mode shift direction of the TMP Update.

Alternative IV - Mandatory, Incentive and Disincentive-Based Demand Management and Mode Shift

The evaluation of Alternative IV indicates that the implementation of mandatory, incentive and disincentive-based measures would result in the highest overall compliance with project objectives. These mandatory measures would have a substantial impact on the behavior of Foothills Parkway travelers.

In addition, this alternative will not involve an increase in roadway capacity, but rather, alternate mode enhancements that provide a desirable differential benefit for non-SOV travel. The combination of these two effects would create a corridor environment that would help to achieve desired traffic congestion levels and improve noise and air quality conditions, while enhancing mobility, reducing neighborhood diversions and maintaining access. This alternative would have minimal positive effect on the safety conditions of Foothills Parkway and cross-streets.

Although initial capital costs would be moderate, yearly program maintenance costs would be highest of the alternatives.

Mandatory demand management measures received only limited support by those who attended public meetings for the study. These mandatory demand management measures would begin to establish a mode shift character for the City of Boulder that conforms with the direction of the TMP Update.

IMPLEMENTATION PROGRAM SUMMARY

A brief overview of the general implementation steps relative to the four CMS alternatives is summarized below:

Alternative I -- Base Case

Implementation of the Base Case scenario would simply involve continuation of current road maintenance activities within the existing and projected revenue stream.

Alternative II -- Interchanges

Improvements of this magnitude are generally funded with assistance from state and federal sources. New interchanges on the Foothills Parkway are not shown in the 2015 Regional Transportation Plan (RTP), and are thus ineligible for Transportation Improvement Program (TIP)-related funding.

The Denver Regional Council of Governments (DRCOG) is currently in the process of updating the RTP to the year 2020. The recommendations of the Foothills Parkway Congestion Management Plan could be used as input through Boulder's representative to the Transportation Advisory Committee (TAC).

If interchanges along the Parkway were to be included in the 2020 RTP, they could be submitted to the TIP process beginning in 1998 for the 1999-2004 TIP (the TIP is a six-year program updated every two years). Current DRCOG perception, however, is that funding for additional SOV capacity projects in the region beyond those identified in the 2015 RTP will be limited.

Regardless of the funding scenario, approval from the Colorado Department of Transportation (CDOT) will be required for interchange construction.

CDOT's interchange approval process requires the following documents be completed:

- System and Project Level Feasibility Studies
- Interchange Management Plan
- Environmental Assessment (or EIS, if required)
- Interchange Financing Plan
- Preliminary and Final Design

Once these activities were completed and approved, construction contracts could be granted.

Alternative III -- Voluntary, Incentive-Based Demand Management and Mode Shift

There are opportunities for the federal funding of congestion management-type activities programmed through DRCOG. The specific criteria to be used to evaluate congestion management type projects has not yet been developed for the TIP cycle, but is likely to be somewhat similar to that used for the last TIP. Projects along the Foothills Parkway would compete for funding with other similar projects submitted by agencies throughout the region. Local funding and implementation would be through an expansion of existing programs of GO Boulder.

Alternative IV -- Mandatory, Disincentive-Based Demand Management and Mode Shift

Similar to Alternative III, there are opportunities for federal funding of the congestion management-type activities of this alternative. In addition to potential federal and local/state funds, some of the mandatory programs identified in this alternative have the potential to generate improvement program funds through user fees. These can best be more fully explored on a city-wide basis in conjunction with the City's Congestion Relief project. Implementation of these mandatory programs at a corridor level only would create a potential economic disadvantage to Foothills Parkway commercial and residential communities.

ANALYSIS AND RECOMMENDATIONS

Based on the analysis of the full range of Congestion Management strategies applicable to Foothills Parkway, the following course of action is recommended at this time:

- Pursue implementation of the voluntary incentive-based TDM and alternate mode strategies of Alternative III through an expansion of GO Boulder's activities to specifically focus programs to Foothills Parkway employers and residential neighborhoods.

- Support consideration of mandatory incentive- and disincentive-based TDM and alternate mode strategies appropriate to the Foothills Parkway in conjunction with the City's Congestion Relief project.

- Maintain existing right-of-way along the corridor for highway expansion and interchange construction, that may be reconsidered in future years, beyond the 20-year planning horizon of this study. Possible future expansion could include HOV lanes, particularly if HOV lanes are extended along US 36 from Denver to Boulder. In addition, sufficient right-of-way exists at Arapahoe Avenue for a possible future interchange that may be found to be of long-term benefit for accommodating the increasing east/west travel patterns. (This should be the subject of a future City/County study of the Arapahoe Avenue corridor.)

figure a-2. Implementation Costs By Alternative

project alternative:	*Implementation Cost*
Alternative I	• Continuation of current level of road maintenance activities within existing and projected revenue stream. • No new construction. • Annual Maintenance cost: $0.4 M
Alternative II	• Summary of capital costs: - Baseline Interchange: $ 8.9 M - Colorado Interchange: $ 6.7 M - Arapahoe Interchange: $ 12.5 M - Valmont Interchange: $ 10.7 M Total Capital cost: $ 38.8 M • Annual maintenance cost: $ 1.1 M • Annualized capital plus maintenance cost: $ 4.0 M
Alternative III	• Summary of capital costs: - Bicycle facilities: $ 7.4 M - Intermodal facilities: $ 0.1 M - Pedestrian facilities: $ 2.1 M Total Capital cost: $ 9.6 M • Annual program / maintenance cost: $ 1.2 M • Annualized capital plus maintenance cost: $ 1.8 M
Alternative IV	• Summary of capital costs: - Bicycle facilities: $ 7.4 M - Intermodal facilities: $1.0 M - Pedestrian facilities: $ 2.1 M Total Capital cost: $ 10.5 M • Annual program / maintenance cost: $ 7.8 M • Annualized capital plus maintenance cost: $ 8.3 M