I-25 Improvements Through the Colorado Springs Urbanized Area

Environmental Assessment

Appendix 1, Transportation Resources

Interstate 25 Corridor-El Paso County, Colorado Mode Feasibility Alternatives Analysis

Traffic Analysis Technical Memorandum

INTERSTATE 25 CORRIDOR-EL PASO COUNTY, COLORADO
MODE FEASIBILITY ALTERNATIVES ANALYSIS

ABSTRACT

This I-25 Mode Feasibility Alternatives Analysis was prepared for the Colorado Department of Transportation (CDOT) for the purpose of determining how best to address existing and future traffic mobility needs in the Interstate 25 corridor within El Paso County. This alternatives analysis is part of an Environmental Assessment for I-25 corridor capacity improvements. Detailed environmental analyses sufficient to address the National Environmental Policy Act (NEPA) requirements will be conducted during 2001-2002. The I-25 Environmental Assessment (EA) is being conducted in cooperation with the Pikes Peak Area Council of Governments (PPACG), which is the regional planning agency representing the local governments in the study area.

Prepared for
Colorado Department of Transportation
Region 2

Special thanks to all citizens and cooperating agencies who participated in the development of the Mode Feasibility Alternatives Analysis. If you have any questions regarding this report, contact the persons identified below:

Doug Eberhart
Project Manager
Wilson & Company
455 E. Pikes Peak, Suite 200
Colorado Springs, CO 80903
(719) 520-5800
(719) 520-0108 FAX
doug.eberhart@co.wilsonco.com

James Flohr
Resident Engineer
CDOT, Region 2
16 E. Arvada
Colorado Springs, CO 80906
(719) 634-2323
(719) 632-2172 FAX
james.flohr@dot.state.co.us

The Wilson & Company Consultant Team included:

* **Ballofet and Associates, Fort Collins, CO**
* **CH2MHill, Colorado Springs, CO**
* **TranSystems Corporation, Colorado Springs, CO**

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Prepared for:

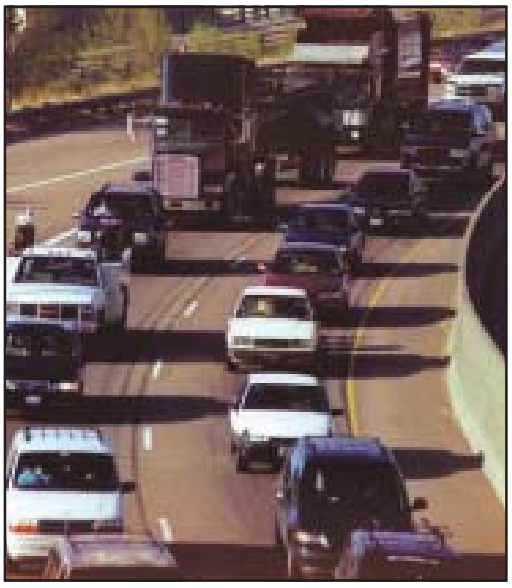
COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2

Executive Summary

The I-25 Mode Feasibility Alternatives Analysis was prepared for the Colorado Department of Transportation (CDOT), for the purpose of determining how best to move people and goods in the Interstate 25 (I-25) corridor through the Pikes Peak region, encompassing Colorado Springs and neighboring communities in El Paso County. I-25 is the region's only freeway and its principal carrier of north-south traffic *(see* **Figure ES-1**).

This alternatives analysis is part of an Environmental Assessment (EA) being conducted for I-25 corridor capacity improvements. The I-25 Environmental Assessment, being prepared during 2001-2002, will address in detail a wide range of environmental issues related to the potential capacity improvements.

The I-25 Environmental Assessment is being prepared in cooperation with the Pikes Peak Area Council of Governments (PPACG), which is the regional planning agency representing the local governments in the study area.



Weekday rush-hour congestion on I-25 is routine.

Need for Action

Eighty-five percent of the respondents to a 1997 public opinion poll indicated that north-south travel is a current or emerging transportation problem in the Pikes Peak region. Much of the public concern stems from congestion on Interstate 25, the region's most heavily traveled roadway.

During morning and afternoon rush hours, weekday commuters routinely experience delays due to I-25 congestion through the center of the Colorado Springs metro area.

Questions addressed in the Mode Feasibility Alternatives Analysis:

- What capacity improvements would best meet north-south transportation needs in the corridor?
- Are there any environmental issues that would rule out transportation improvements in the corridor?

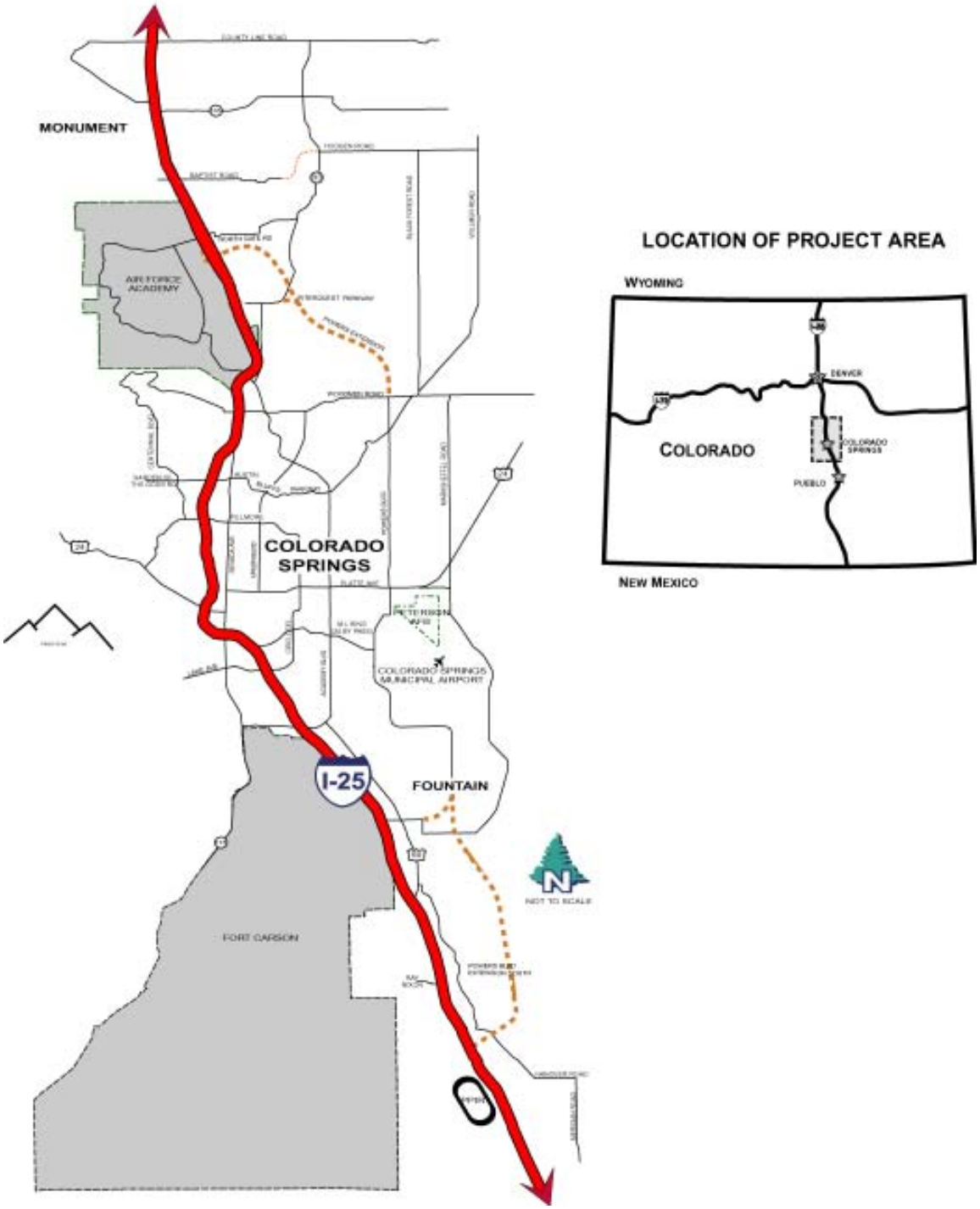
Unless action is taken, the problem will worsen significantly as the region's population increases. El Paso County's population is projected to increase by more than 30% between 2000 and 2020.

Contributing to the heavy use of I-25 is the lack of transportation alternatives. There are few viable alternate routes, and they too are congested. Also, there is only limited use of public transit, carpooling, and other alternatives to solo driving in the corridor.

For many years, the impending need for increased transportation capacity in the I-25 corridor has been identified in the region's long-range transportation plans. In the late 1990s, Colorado's robust economy accelerated the need for increased movement of people and goods, while also generating tax revenues for transportation improvements.

Before capacity can be provided, the region needs an up-to-date action plan that indicates how best to serve the corridor's north-south trips in an environmentally sensitive manner. The

Figure ES-1
INTERSTATE 25 CORRIDOR MAP



2020 Regional Transportation Plan for the Colorado Springs Urbanized Area, adopted by the PPACG in 1998, calls for a transportation and environmental assessment to "define the capacity improvements to the I-25 Corridor through the Region." In response, the Colorado Department of Transportation initiated the I-25 Environmental Assessment.

MODE FEASIBILITY ALTERNATIVES ANALYSIS

The I-25 Environmental Assessment began with the preparation of the Mode Feasibility Alternatives Analysis. This report examines various transportation "modes" (e.g. I-25 expansion, carpool lanes, bus transit, rail transit, and alternate routes) to determine their expected ability to meet travel demand in the corridor.

In addition to determining what proposed capacity improvements would meet transportation needs, it is necessary to ensure that they would be acceptable from an environmental standpoint. The Mode Feasibility Alternatives Analysis includes an initial review of environmental issues in the corridor. As the next step in the EA process, a detailed environmental analysis will be performed, based on the specific designs for the proposed capacity improvements.

Together, the inter-related mode feasibility and environmental analyses will be used to prepare an Environmental Assessment document. The EA must meet all applicable Federal requirements pursuant to the 1969 National Environmental Policy Act (NEPA). Completion of the NEPA process, expected in late 2001, is required before any capacity improvements can begin.

The Mode Feasibility Alternatives Analysis began in 1999. The analysis included:

- identification and screening of initial alternatives
- concept development for alternatives
- evaluation of alternatives
- development of a proposed improvements strategy

These steps and their results are summarized on the following pages.

IDENTIFICATION AND SCREENING OF INITIAL ALTERNATIVES

As shown in **Table ES-1**, the alternatives analysis began with development of an initial list of 18 capacity alternatives including roadway and transit options, as well as a No-Action scenario. Also considered were strategies to use the existing transportation system more efficiently, without adding capacity.

Screening criteria were developed to identify alternatives that would not be feasible for the corridor, based on the mode's typical operating characteristics. Based on these criteria, it was determined that eight of the initial alternatives did not merit further consideration as I-25 corridor

Table ES-1
LIST OF INITIAL ALTERNATIVES

I-25 Roadway Improvements
• Widen I-25 (add general purpose lanes)
• Add bus/carpool lanes on I-25
• Add bus/carpool/toll lanes on I-25
• Add a reversible commuter lane on I-25
• Add a commercial vehicle lane(s) on I-25
New Eastern Bypass Route
• Powers Boulevard as a Freeway
• Marksheffel Road Corridor
• Front Range Toll Road
Transit Alternatives
• Regional express bus service
• Light rail system on new track
• Commuter rail on existing freight track
• Commuter rail on double freight track
• Commuter rail on new track
• Electric trolley
• Magnetic levitation ("Mag-lev") transit
• Personal Rapid Transit (PRT)
• Monorail
• Automated Guideway Transit (People Mover)

capacity improvements. The eight alternatives were deemed infeasible due to excessive capital cost, insufficient operating speed, or inability to carry a sufficient number of peak-hour trips to provide meaningful congestion relief. These eliminated alternatives are listed below in **Table ES-2**.

To provide a basis for comparison, the No-Action scenario was not eliminated from further consideration, despite the fact that it fails to provide additional capacity.

CONCEPT DEVELOPMENT FOR ALTERNATIVES

The initial screening process left a list of ten capacity alternatives (plus the No-Action scenario) to be evaluated for potential use in the I-25 corridor. Public meetings were held at four locations in June 1999 to obtain citizen input on the initial list of alternatives, screening analysis, and criteria proposed for use in further evaluation. Subsequently, the following alternatives were evaluated in further detail:

- Adding general-purpose lanes to I-25 — one or two new lanes each direction.
- Adding high-occupancy vehicle (HOV) lanes – one new lane each direction.
- Adding HOV/toll lanes — solo drivers pay to use.
- Upgrading Powers Boulevard to a full freeway.
- New freeway as eastern bypass — e.g. Marksheffel or Banning-Lewis.
- Adding a single, reversible carpool lane.
- Front Range Toll Road — privately financed, 20 miles east of I-25.
- Express bus service on new I-25 HOV lanes.
- Light rail transit serving the I-25 corridor.
- Commuter rail transit serving the I-25 corridor.

To evaluate these alternatives, it was necessary to conceptualize where and how each would be implemented to serve north-south travel demand in the corridor. The goal of the consultant team was to design each concept for optimal performance, i.e. to serve as many trips as possible in a cost-effective manner.

For example, the investigation performed to develop a light rail alternative examined potential alignments, station locations, vehicle technology, operating speed, and typical costs. The result was a hypothetical system extending 30 miles between Monument and Fountain, including 16 stations served with feeder bus service connecting to nearby neighborhoods and activity centers. The system is depicted in **Figure ES-2** *(see page ES-5)*.

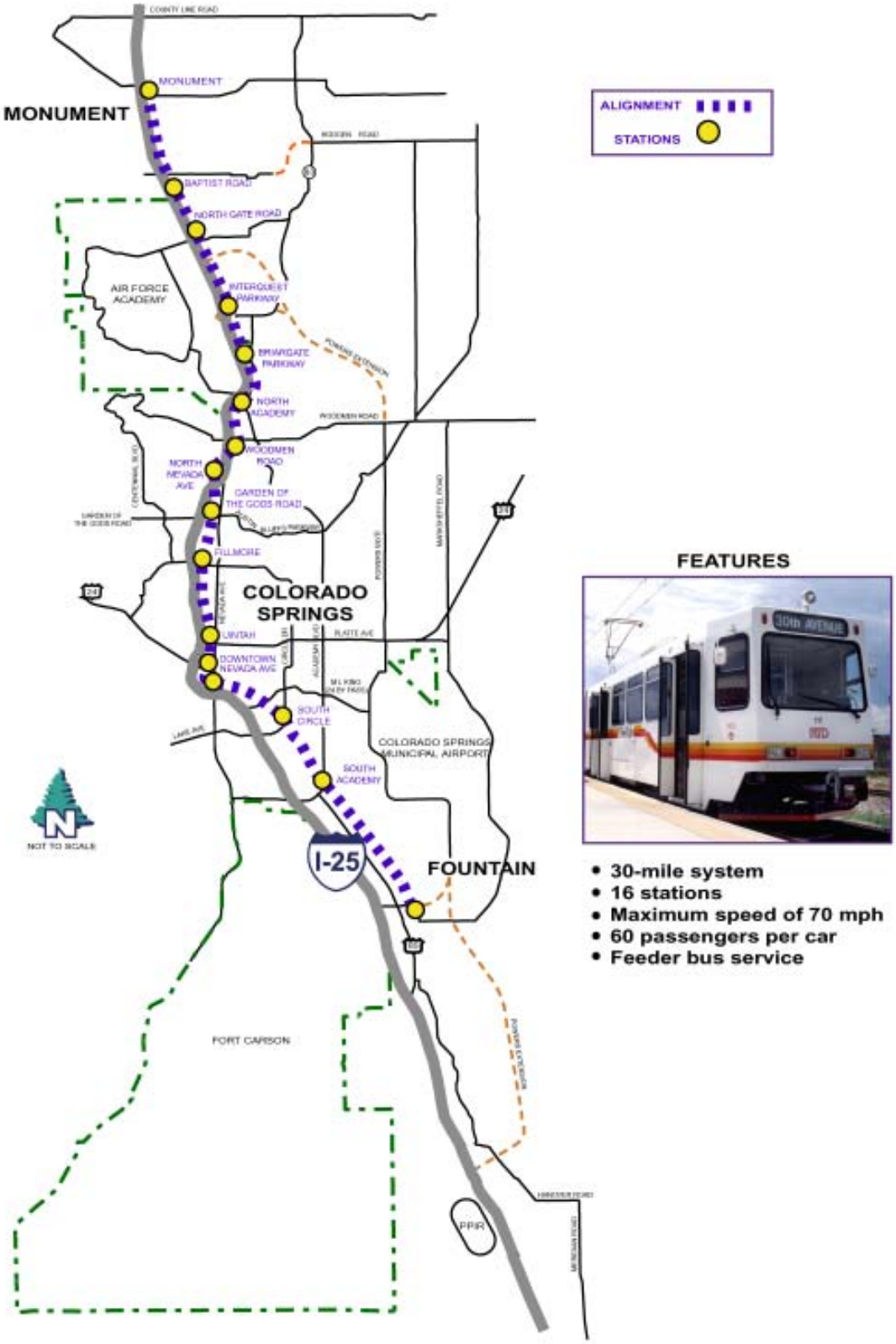
EVALUATION OF ALTERNATIVES

The alternatives listed above were analyzed with PPACG's regional travel forecasting model, using adopted population and employment forecasts as inputs. All other transportation facility and service improvements in the PPACG 2020 Transportation Plan – except I-25 capacity improvements – were assumed to be imple-

Table ES-2
INITIAL ALTERNATIVES ELIMINATED IN THE SCREENING ANALYSIS

Alternative	Reason for elimination
Truck-only lanes	restricted lane would carry too few vehicles
Commuter rail on existing freight tracks	inadequate track capacity
Commuter rail on double freight tracks	too slow due to freight operations
Electric trolley	too slow – intended for frequent stops
Magnetic-levitation transit	too expensive
Personal rapid transit	too expensive
Monorail system	too expensive
Automated-guideway transit	too expensive

Figure ES-2
LIGHT RAIL ALTERNATIVE*



* Evaluated, but not recommended, in this study

mented with each alternative (including the I-25 No-Action scenario). Data from other metropolitan areas were examined to confirm the reasonableness of the resulting forecasts.

Daily trips served, travel time savings, and capital costs were used as evaluation criteria. **Table ES-3** *(see page ES-7)* presents the evaluation results. The No-Action scenario was used as the baseline for comparing the impacts of the capacity alternatives. The No-Action scenario assumes completion of programmed I-25 safety projects, as well as implementation of all other aspects of the PPACG Long-Range Transportation Plan for 2020, but with no capacity improvements to I-25. The travel time savings estimates shown in **Table ES-3** are compared to one hour as the projected year 2020 travel time for a peak period trip between downtown Colorado Springs and Monument.

In much of the I-25 corridor, the median is available for capacity improvements.

Also included in the table are results for a combined alternative involving six general-purpose lanes plus high-occupancy vehicle lanes on I-25. Apart from the case involving a reversible lane, all HOV lane alternatives assumed that the lanes would be restricted to carpool/bus use only during the morning and afternoon peak hours, but available to solo drivers for at least 18 off-peak hours of the day.

Mobility: As seen in **Table ES-3**, each of the alternatives would be useful in improving corridor mobility. Those providing additional roadway capacity were found to serve the most additional daily trips. For example, widening I-25 to eight through-lanes (four each direction) would accommodate 49,000 more daily trips than the No-Action scenario. Providing six through-lanes plus HOV lanes would carry 43,000 trips. Widening to six through-lanes would carry 25,000 additional trips per day, or somewhat less if the new lanes were reserved for carpools during rush hours. Eastern bypass routes would carry at most 16,500 daily trips. The light rail and commuter rail alternatives would carry 3,000 and 2,000 daily trips, respectively.

Travel Time Impacts: A direct benefit of improving mobility in the corridor is improvement in typical travel time. Under the No-Action scenario, the travel time for a peak-hour automobile trip from central Colorado Springs to Monument would increase from 36 minutes today to 56 minutes in the year 2020. Compared to this baseline, the greatest available time savings would be 23 minutes, achieved by widening I-25 to eight though-lanes. A savings of 21 minutes would result from providing six through-lanes plus lanes reserved for carpools and buses. Widening to six lanes would save ten minutes. All other alternatives (e.g., alternate routes and transit options) would yield a time savings of three minutes or less.

Capital Costs: The expected capital costs of the alternatives include expenses such as right-of-way, con-struction, transit vehicle acquisition, transit stations, and transit maintenance facilities. The alternatives ranged in cost from $230 million for a reversible HOV lane to $540 million to construct the El Paso County segment of a 200-mile Front Range Toll Road. The least expensive transit option would be a commuter rail system with feeder bus service, costing $270 million. These capital costs do not include ongoing annual expenses for system operation and maintenance.

In the analysis for year 2020 conditions, corridor mobility would be improved most by providing capacity on I-25 itself – not by providing transit or a bypass located six to twenty miles to the east. Under the transit or eastern bypass alternatives, the existing four-lane I-25 freeway would still be filled to capacity.

Table ES-3
YEAR 2020 COMPARATIVE PERFORMANCE OF CAPACITY ALTERNATIVES

Alternative	Additional Trips Served Daily[1]	Travel Time Savings (minutes) for I-25 Motorists[2]	Capital Cost $ Millions[3]
No-Action scenario[4]	none	none	none
I-25: widen to 8 lanes	49,000	23	$422
I-25: 6 lanes plus HOV lanes[5]	43,000	21	$435
I-25: widen to 6 lanes	25,000	10	$242
I-25: 4 lanes plus HOV/toll lanes	19,800	3	$278
I-25: 4 lanes plus HOV lanes	18,500	3	$255
I-25: add reversible HOV lane	7,800	3	$230
Upgrade Powers to full freeway	16,000	2	$500
New Eastern Bypass (Marksheffel or Banning-Lewis as a freeway)	14,000	2	$310
Front Range Toll Road (20 miles east of I-25)	16,500	2	$540[6]
HOV lanes plus express bus system	22,000	3	$425
Light rail transit with feeder bus	3,000	none	$380
Commuter rail transit with feeder bus	2,000	none	$270

Note 1: Trips are in addition to the 121,000 per day projected in the No-Action scenario, passing a screenline just north of downtown.

Note 2: For peak-period trip between Downtown Colorado Springs and Monument (No-Action trip time: 56 minutes).

Note 3: Costs over and above No-Action scenario.

Note 4: No-Action scenario includes PPACG 2020 Plan system lessI-25 capacity improvements.

Note 5: This alternative developed after September 1999 public meetings.

Note 6: Privately financed 200-mile road. Cost shown is only for the portion within El Paso County.

The analysis indicates that widening I-25 to six through-lanes (one new lane in each direction) would not be sufficient to meet corridor transportation demand in the year 2020. The projected 46-minute travel time (for a peak-period trip from downtown Colorado Springs to Monument) under this alternative represents a slight degradation — not improvement — compared to today's congested conditions. During peak commuting periods today, I-25 is already operating at full capacity. Widening to six lanes in the near future would address existing and near-term transportation demand, but would not be sufficient to accommodate longer term needs.

It was determined that six-lane capacity is needed to meet near-term demand, but eight-lane capacity is not needed immediately.

Multi-modal Package Concept: The conceptual alternatives and their projected performance results were presented at public meetings in September 1999 for information and to solicit citizen input. Attendees generally expressed support for widening I-25, HOV lanes, Powers/eastern bypass options, and rail transit. No strong support was voiced for bus service and HOV/toll lanes.

Having analyzed alternatives individually, the consultant team then began development of a multi-mode, multi-phase package designed to maximize flexibility and respond to travel demand changes over time. Attention focused on the options of providing eight lanes on I-25, versus six lanes plus HOV lanes (one northbound, one southbound). In either package, Powers Boulevard would be extended northward and southward to I-25, and at-grade Powers intersections would be reconstructed as grade-separated interchanges in order of priority, to the extent possible with currently committed funding.

It was determined that six-lane capacity is needed to meet near-term demand, but eight-lane capacity is not needed immediately. Thus, the initial phase for I-25 corridor improvements should be widening to six lanes, in a manner compatible with future capacity provision. Cost, design, and environmental considerations suggest that the ultimate configuration should be designed from the start, but only constructed to an interim facility in the short term. Properly designed and implemented, there should be minimal need to modify any initial improve-ments when later constructing the ultimate configuration.

Inclusion of park-and-ride lots at appropriate sites in the corridor would help to maintain multi-modal flexibility. Until transit service is available in these locations, these facilities would

Woodmen Road park-and-ride lot.

be used as park-and-pool lots by carpoolers. Later, the lots could receive bus service and become transit-oriented park-and-ride lots. The lots should be located strategically to enable their evolution to rail transit stations in the event that the community decides to pursue rail transit in the future.

Information regarding the multi-phase multi-modal package concept was provided at a series of public meetings held in April 2000. Some citizens suggested that the ultimate capacity improvements be implemented in one step, to avoid any unnecessary reconstruction and to minimize costs. However, as noted above, eight-lane capacity is not needed to meet near-term demand. Also, due to interchange modi-fication issues and anticipated funding schedules, a phased approach can provide additional capacity more expeditiously than construction of ultimate capacity in a single construction phase.

For the longer-term (2020), a six-lane I-25 freeway through central Colorado Springs would be congested, unable to meet the transportation needs of the corridor. As noted above, the final concept packages developed for consideration address the demand by adding a seventh and eighth through-lane, either as general-purpose lanes or as lanes restricted to carpool/bus use during peak periods. It is possible to keep both options open for the future if the interim capacity improvement (six lanes through central Colorado Springs) is designed accordingly.

HOV Considerations: For potential application on I-25 through central Colorado Springs, it was assumed that high-occupancy vehicle (HOV) lanes would be reserved for carpool and bus use only during peak commuting periods, but open to all vehicles for all other hours of the day. For example, if operated in HOV mode for three hours on weekday mornings and three hours on weekday afternoons, the lanes would be equivalent to ordinary general-purpose lanes during the remaining 18 hours each weekday, and for all hours of the weekend. The two alternatives would be generally similar, differing slightly in terms of overall motorist benefits, construction costs, and environmental impacts.

One feature recommended for the design of I-25 HOV lanes is a painted safety buffer separating the reserved lanes from the adjacent general-purpose lanes. A paint-striped buffer area between the HOV lane and the adjacent general-purpose lane helps to heighten motorists' awareness of the HOV lane, and provides an enhanced safety margin for motorists transitioning between these lanes. The painted buffer allows free flow into and out of the HOV lanes at any time and place, for the maximum convenience of carpoolers. In addition, it minimizes complications in offering the HOV lanes for general traffic use in non-peak hours.

At the request of the Pikes Peak Area Council of Governments (PPACG), the I-25 Environmental Assessment will further explore the potential for the lanes provided in Phase I to be operated as carpool lanes. Additionally, PPACG desires acceleration of intergovernmental partnerships for provision of I-25 corridor express bus transit and park-and-ride lots.

PROPOSED IMPROVEMENT STRATEGY

Based upon the entirety of this alternatives analysis, as summarized above and more fully detailed in this report, it is proposed that the ongoing environmental analysis for the I-25 corridor should focus on a multi-phase, multi-modal improvement strategy. This strategy calls for three phases of capacity improvements, intended to meet corridor needs as they evolve over the next two decades. In implementing this strategy, it is important to maintain flexibility by not precluding any future transportation options. **Figure ES-3** *(see page ES-10)* depicts the sequence and location of the major capacity components, which are as follows:

PHASE 1: Widen I-25 to six lanes between South Circle Drive and Briargate Parkway (added lanes could be general purpose or for high-occupancy vehicles).

PHASE 2: Widen I-25 to six lanes from Briargate Parkway to the Monument interchange.

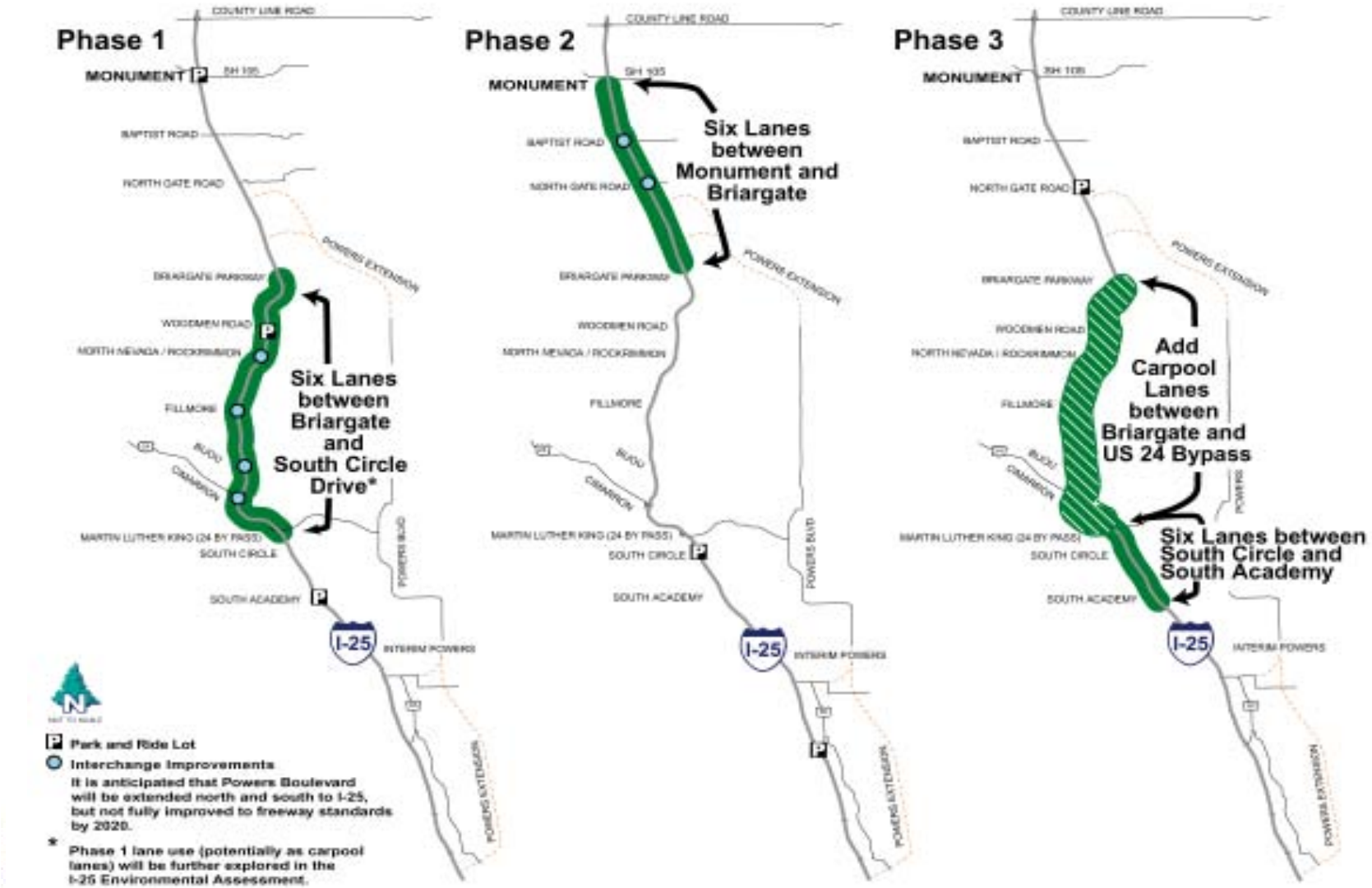
PHASE 3: Add carpool lanes between U.S. 24 Bypass and Briargate Parkway, and widen I-25 to six lanes from U.S. 24 Bypass to South Academy Boulevard.

The overall improvements strategy is more comprehensive than is reflected by the above summary. Park-and-ride lots, freeway ramp metering, and provision for non-motorized modes are also included. In addition, the I-25 corridor will benefit from implementation of currently planned Powers Boulevard improvements. These elements are summarized in **Table ES-4** *(see page ES-11)*.

The recommended corridor improvement strategy assumes continuation and completion of programmed I-25 safety projects, including:

- Realign/reconstruct northbound mainline I-25 lanes between Bijou and Fillmore Streets.

Figure ES-3
PROPOSED I-25 CORRIDOR IMPROVEMENT STRATEGY



MODE FEASIBILITY ALTERNATIVES ANALYSIS
I-25 CORRIDOR, EL PASO COUNTY, COLORADO

WILSON & COMPANY

Table ES-4
PROPOSED ACTION FOR I-25 CORRIDOR CAPACITY IMPROVEMENTS

System Element	Time Frame	Proposed Action
Widen I-25 to 6 General Purpose Lanes	Phase 1 Phase 2 Phase 3	South Circle Drive to Briargate Parkway Briargate Parkway to Monument South Academy Boulevard to US 24 Bypass
Add I-25 High Occupancy Vehicle Lanes	Phase 3*	US 24 Bypass to Briargate Parkway (Restricted use in peak periods; unrestricted use in off-peak hours.)
Park-and-Ride/Carpool Lots	Phase 1 Phase 2 Phase 3	Improve Monument, Woodmen; Add at South Academy Boulevard. Add at South Circle; Add at SH85/87 (Fountain). Add at Northgate Boulevard.
Transit Accommodation	All Phases Phase 3	Locate park-and-ride/carpool lots for maximum flexibility to accommodate future transit options, where feasible. Peak-period HOV lanes would be available for transit use.
Congestion Management	All Phases All Phases All Phases	Design freeway on-ramps to provide for Ramp Metering. Continue implementing Incident Mangement Program. Provide continuous acceleration/deceleration lanes where feasible.
Multi-Use Trails	All Phases	Design all above improvements for maximum compatibility with regional trails system.

Note: The above scenario assumes implementation of all other system improvements called for in the PPACG 2020 Long Range Transportation Plan, including *I-25 safety improvements* and *Powers Boulevard improvements*.

* Potential HOV implementation for Phase I will be further considered in the I-25 Environmental Assessment, as requested by PPACG.

- Reconstruct I-25 interchanges at South Nevada Avenue and South Tejon Street.
- Reconstruct the I-25/Woodmen Road interchange.
- Reconstruct the I-25 interchange at State Highway 105 (Monument).

The recommended corridor improvements strategy also assumes that the currently planned and programmed **Powers Boulevard improvements** will continue as currently scheduled, or be expedited. This includes connecting Powers Boulevard to Interstate 25 both north and south of Colorado Springs, and reconstructing Powers Boulevard intersections at Platte Avenue, Woodmen Road, and other selected arterials as grade-separated inter-changes, in accordance with regional priorities and funding availability.

ENVIRONMENTAL ISSUES

As part of the Mode Feasibility Alternatives Analysis, environmental data were gathered to determine whether or not there would likely be any major issues that would preclude making capacity improvements in the I-25 corridor. The environmental factors that were examined included land use, wetlands, floodplains, water quality, farmland, wildlife habitat, threatened/endangered species, environmental justice (impact on low income and minority areas), parks, air quality, visual impacts, noise impacts, historic resources, and hazardous waste and hazardous materials.

Based on this examination, issues of particular relevance in the I-25 corridor include:

- Wetlands, floodplains and water quality along Monument Creek and Fountain Creek.
- Threatened and endangered species, primarily the Preble's Meadow Jumping Mouse.
- Hazardous waste sites, primarily within central Colorado Springs.
- Air quality conformity throughout the corridor.
- Noise issues.

In November, 2000, the PPACG requested that the noise analysis for the I-25 Environmental Assessment consider pavement alternatives as well as other noise mitigation measures.

Although the above issues will be particularly relevant in the corridor, it is not anticipated that any of them would clearly preclude transportation capacity improvements. Before any clear environmental conclusions can be made, more detailed environmental analysis will be needed to quantify specific impacts and potential mitigation based on the conceptual plans for proposed improvements. All of the issues required to be examined pursuant to the National Environmental Policy Act (NEPA) will be assessed and documented in sufficient detail to satisfy the requirements of the applicable federal and state resource agencies.

Chapter 1

Planning Background

Introduction

The I-25 Mode Alternatives Feasibility Analysis was prepared for the Colorado Department of Transportation (CDOT), for the purpose of determining how best to facilitate the movement of people and goods in the Interstate 25 corridor within El Paso County. Interstate 25, a four-lane highway that opened in 1960, is the only freeway serving the half million residents of fast-growing El Paso County.

Long-range transportation planning for the Colorado Springs Urbanizing Area is performed by the region's designated metropolitan planning organization (MPO), the Pikes Peak Area Council of Governments (PPACG). The PPACG 2020 Regional Transportation Plan, adopted September 9, 1998, identifies planned transportation projects for roadways, transit, transportation demand management, and non-motorized modes.

The PPACG plan also calls for a study of transportation options and their associated environmental impacts in order to define specific capacity improvements needed in the I-25 corridor. The I-25 Environmental Assessment project was undertaken to meet this objective, responding to the regional need identified by local governments. From the outset, close cooperation between CDOT and PPACG has been maintained to ensure that the effort is coordinated with the regional planning process.

The I-25 Environmental Assessment focuses on identifying the environmental impacts of those capacity improvements best suited to the needs of the I-25 corridor. In addition to freeway widening options, the alternatives analysis examined other modes (e.g. rail transit options) and other routes (e.g. eastern bypass options) outside of the I-25 right-of-way.

Need For Action

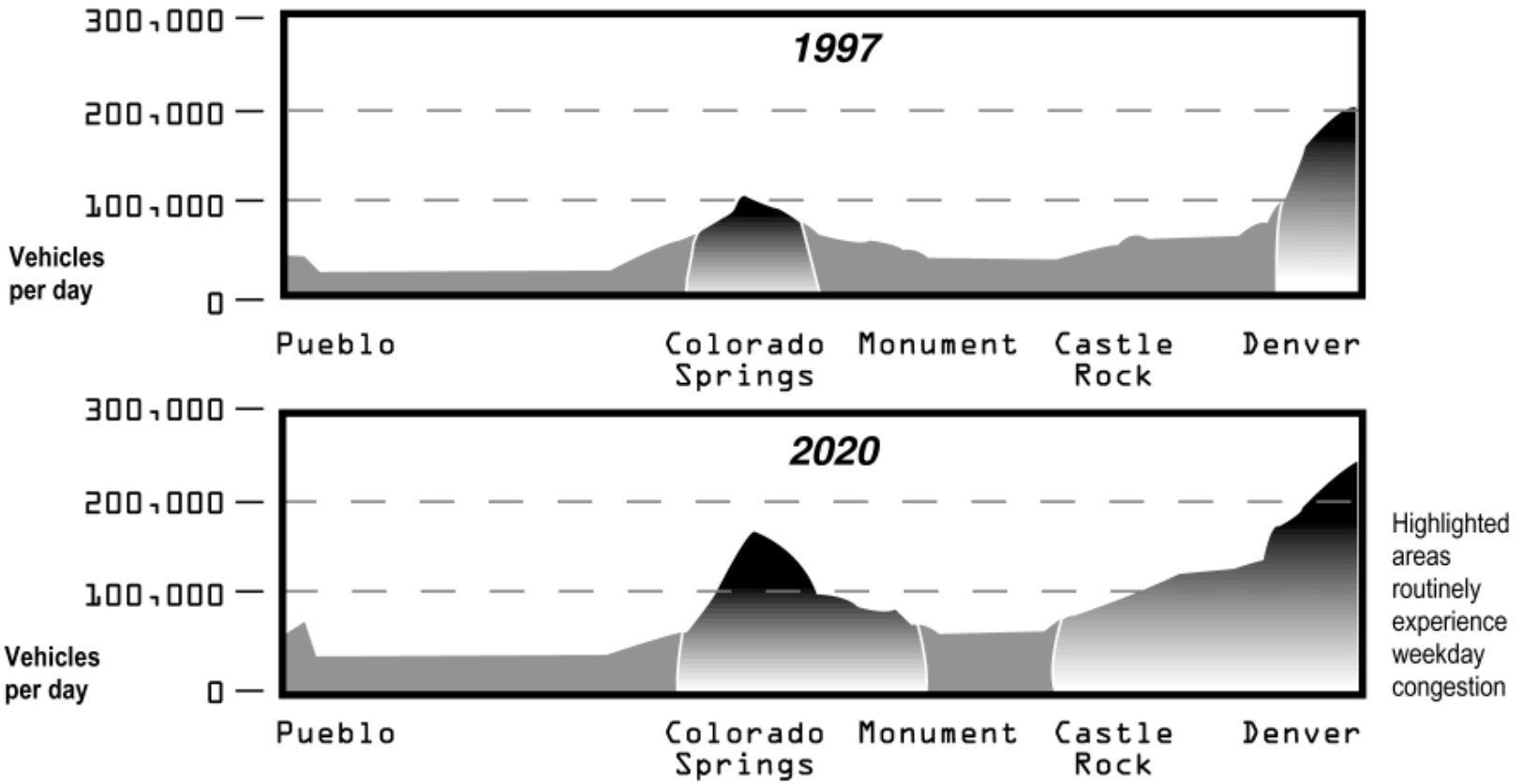
Capacity improvements in the I-25 corridor are needed to improve current north-south mobility and to serve future demand in the rapidly growing Colorado Springs metro area. At its busiest location (just north of the Colorado Springs central business district) Interstate 25 is filled to capacity during the weekday morning and afternoon rush hours. Without additional capacity, it is projected that the I-25 congestion that now lasts four hours daily and extends for nine miles would last ten hours daily and extend for 26 miles. It was estimated that the population of El Paso County reached 500,000 residents in 1999. A population increase of more than 30% is expected by the year 2020.

Without additional capacity, it is projected that the I-25 congestion that now lasts four hours daily and extends for nine miles would last ten hours daily and extend for 26 miles.

Traffic delays on I-25 represent an economic cost to motorists, and a cumulative cost to the region's economy. Continued spreading of peak-period congestion to more hours of the day would make traffic congestion unavoidable for inter-regional and interstate motorists who currently have the flexibility to travel outside of the traditional rush hours.

Providing capacity to address congestion within metro areas is the most promising option for improving traffic flow along Colorado's South Front Range Corridor between Denver and Pueblo, through Colorado Springs, according to a 1998 CDOT study. Congested portions on this corridor are identified in **Figure 1** *(see page 2)*.

Figure 1
SOUTH FRONT RANGE I-25 CONGESTION



Note: The 1998 CDOT South Front Range Corridor Assessment Study concluded that traffic mobility needs for trips in the Denver/Pueblo corridor are best addressed by capacity improvements within the metro areas, not between them.

Congested conditions also amplify the adverse impacts of travel delays and alternate routing that occur due to traffic incidents. The freeway's capacity becomes severely constrained during these events. It has been estimated that a single-lane blockage on the existing four-lane I-25 (two through-lanes each direction) reduces the freeway's directional capacity by 79%. Reported accidents on I-25 in El Paso County totaled 1,365 in 1998, equating to an average of roughly four per day.

Brake lights go on as a disabled vehicle slows I-25 traffic.

I-25 congestion also motivates motorists to seek alternate, less efficient routes on the local street system, spreading adverse traffic impacts into the community. The few north-south roadways that may be considered alternate routes to I-25 are also congested during peak periods. These problems are significant in the year 2000 and will grow worse under the strain of continuing growth and development in the region.

NEED FOR ENVIRONMENTAL ANALYSIS

No major capacity improvements requiring Federal approval can be undertaken without an evaluation of alternatives. Transportation analysis is required to ensure that the selected action would address corridor needs effectively and in an affordable manner. Additionally, assessment of environmental impacts is needed to ensure that a proposed transportation action would comply with all applicable requirements pursuant to the National Environmental Policy Act (NEPA). The I-25 Environmental Assessment is intended to achieve these objectives.

The determination to pursue I-25 capacity improvements through an Environmental Assessment was based on the hierarchy of procedural requirements specified in Federal regulations. For transportation projects to receive Federal approval, final environmental clearance can take one of three forms:

- Environmental Impact Statement *(EIS)*
- Environmental Assessment *(EA)*
- Categorical exclusion (CE)

An Environmental Impact Statement (EIS) is required for an action that would have a significant environmental impact. Examples of EIS-type projects include construction of a new freeway or rail transit line. These projects do have significant environmental impacts, but may be approved if, on balance, taking action is preferable to a No-Action alternative.

A Categorical Exclusion (CE) is granted for a project that is known, on the basis of past projects similar in scope, not to involve significant environmental impacts. Examples include roadway resurfacing, rehabilitation, emergency repairs, modernization and safety improvements, and may also include highway reconstruction and addition of auxiliary lanes.

Finally, an Environmental Assessment is prepared for a transportation project that does not obviously require an EIS, but also is not "minor" enough to qualify for Categorical Exclusion. The purpose of an EA is to determine whether or not the project would have a significant impact on the environment. If the EA finds the impacts to be significant, an EIS is needed; alternatively, an EA may result in a finding of no significant impact (FONSI), thus completing the NEPA process.

INTERSTATE 25 SERVES VARIOUS NEEDS

Interstate 25 is the most heavily traveled roadway in the Pikes Peak Region, carrying close to 110,000 vehicles daily in a county with a population of 500,000 residents. No other north-south route in El Paso County offers comparable continuity and interstate highway design speeds. I-25 naturally carries interstate and inter-regional traffic, but also carries a high volume of regional and local traffic (e.g. trips less than 20 miles in length).

Interstate 25 serves many important functions, and thus can be characterized as being all of the following:

- The major north-south highway for three Rocky Mountain states, extending from Interstate 10 in southern New Mexico, through Colorado, to Interstate 90 in northern Wyoming.
- The north-south spine of Colorado's highway system, providing a continuous 300-mile route.
- The only route which connects all of Colorado's populous Front Range communities, including Fort Collins, Denver, Colorado Springs, and Pueblo.
- The only freeway serving the 500,000 residents of El Paso County, and linking the communities of Colorado Springs, Monument and Fountain.
- The busiest roadway in the City of Colorado Springs The majority of its downtown traffic consists of local trips, not through traffic.

Interstate 25 was built as part of the National Defense Highway System, and today is part of the Strategic Highway System (STRAHNET), the roadway system designated for armed forces use in case of a military emergency. I-25 provides direct access to Fort Carson at exit 132, and to the U.S. Air Force Academy at exits 150 and 156. Additionally, I-25 is a Federally designated route for transporting radioactive materials to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico.

Interstate 25 meets the only major east-west highway in the region, US 24, at I-25 exit 141, providing a route to/from Pikes Peak and mountain communities. At exit 139, the US 24 Bypass route serves traffic to/from the Colorado Springs airport, two Air Force bases, and Colorado's eastern plains.

Interstate 25 is the only freeway serving the 500,000 residents of El Paso County.

Access to I-25 within El Paso County is relatively generous, provided via 27 interchanges, spaced at approximately one-mile intervals in central Colorado Springs and at longer intervals north and south of the City.

I-25 TRAFFIC GROWTH

Long before there was an Interstate 25, US Highway 87 carried north-south traffic through Colorado from New Mexico to Wyoming. Four-laned Nevada Avenue was the main roadway carrying north-south traffic through Colorado Springs. Increased traffic due to Camp Carson (today's Fort Carson) during World War II spurred the push for a better highway through the city.

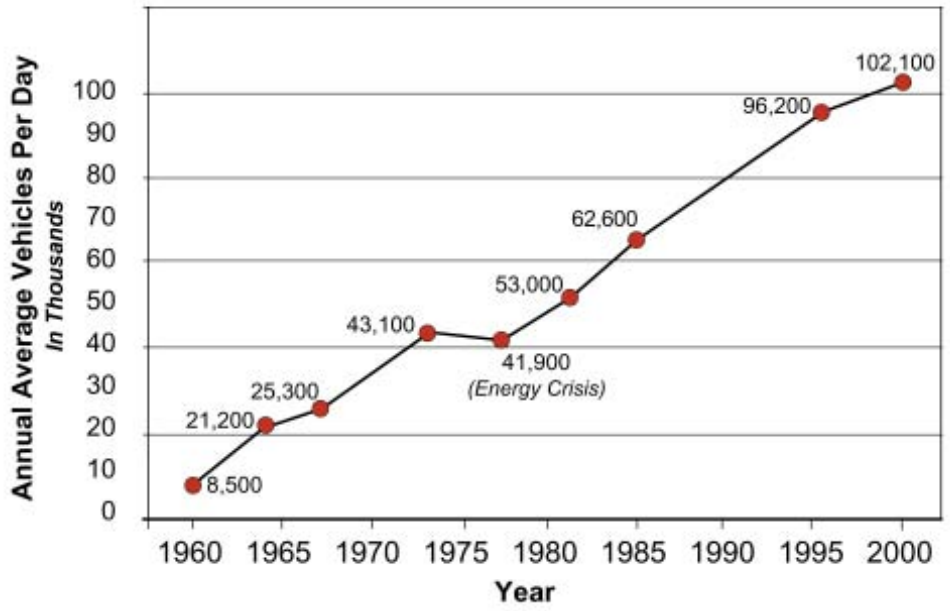
A 1944 study examined three alternative alignments: the Walnut Street Line along Monument Creek, a Shooks Run line in the ATSF railroad corridor, and a Union Avenue line located "at the extreme eastern edge of the city." When funding became available for the Interstate Highway System in the 1950s, the route along Monument Creek was selected and construction of the Monument Valley Freeway commenced.

The 12-mile, $12 million Monument Valley Freeway opened in July 1960, reportedly carrying an estimated 8,500 vehicles per day. At that time, the Colorado Department of Highways (now the Colorado Department of Transportation), projected that I-25 would carry 27,300 vehicles in the year 1975. The actual volume turned out to be 54% higher (roughly 42,000 vehicles per day), and might have been higher if not for soaring gasoline prices due to the OPEC oil embargo.

CDOT traffic estimates for I-25 from 1960 to 1996 are provided in **Figure 2** *(see page 5)*. The figures represent annual average traffic on I-25 north of Uintah Street, historically the region's busiest stretch of freeway.

CDOT comprehensive traffic estimates for 1999/2000 are currently being tabulated. Based on further counts taken since 1996, a recent growth rate of 2% appears to be valid for this area. Assuming a volume increase of 2% annually for three years, the estimated annual average for 1999 would be 102,100 vehicles per day.

Figure 2
HISTORICAL TRAFFIC VOLUMES (1960-1996)
I-25 NORTH OF UINTAH STREET



The annual average volumes reported above include weekends and holidays. By comparison, average weekday traffic is approximately 6% higher. Thus, ***the estimated average weekday traffic for I-25 in central Colorado Springs currently is 108,000 vehicles per day***.

PPACG Regional Transportation Plans

Since the 1970s, every long-range transportation plan developed by the Pikes Peak Area Council of Governments has called for capacity improvements on I-25. The scope and limits of the needed improvements have varied over time, gradually calling for more lanes over a greater portion of the roadway. PPACG's plans have indicated that the greatest need for capacity improvement is between South Academy Boulevard and Briargate Parkway. The segment from Briargate Parkway to State Highway 105 (Monument) also has been targeted for capacity improvement.

The PPACG 2020 Long Range Transportation Plan identifies the need for capacity improvements in the I-25 corridor. The Plan indicates that the scope of the capacity improvements will be defined through the I-25 EA.

Previous Studies Regarding I-25

Table 1 *(see page 6)* briefly summarizes five studies which have examined I-25 safety or capacity needs since 1983. Two of these studies are described in further detail below. In 1992, CDOT's *Corridor Improvement Feasibility Study, I-25 Colorado Springs* recommended the reconstruction of various I-25 interchanges plus reconstruction of I-25 between Bijou and Fillmore Streets to address existing safety problems. Several of the recommended safety projects have been completed (North Academy Boulevard and Circle/Lake interchanges), while others are ready to begin (South Nevada/Tejon and Woodmen interchanges). The Study indicated that although funding for capacity improvements was not then available, capacity improvements would be needed and should be accommodated in the design of the safety projects.

Table 1
PAST STUDIES OF I-25 CORRIDOR THROUGH EL PASO COUNTY, COLORADO

Title	Sponsor, Year	Conclusions
I-25 Safety Assessment Study	Colorado Department of Transportation (CDOT), 1999	Recommended guardrail installation to address emerging problem of median-crossing accidents between North Academy Boulevard and Monument.
South Front Range Corridor Assessment Study	CDOT, 1998	Transportation needs in the 100-mile corridor between Denver and Pueblo would be best addressed through capacity improvement within metro areas, not between them.
I-25 Corridor Improvements Safety Study	CDOT, 1998	Documented specific deficiencies to be addressed in upcoming I-25 corridor safety improvement projects.
Corridor Improvement Feasibility Study, I-25 Colorado Springs	CDOT, 1992	Recommended three-phase plan for I-25: • Safety projects • Congestion management • Capacity improvement
I-25 Corridor Study, Denver to Colorado Springs	CDOT, 1983	Projected highway revenues inadequate to meet corridor capacity needs. Anticipated need for additional capacity on I-25 under the year 2000 "high growth" scenario.

In 1998, CDOT's *South Front Range Corridor Assessment Study* examined the bigger picture of capacity needs for inter-regional travel between Denver, Colorado Springs and Pueblo. The study concluded that for the next several decades, I-25 congestion along Colorado's South Front Range would be more effectively addressed within metropolitan areas rather than by improving capacity between these areas.

OTHER RECENT STUDIES

Table 2 *(see page 8)* lists other recent studies which have conclusions pertinent to the I-25 Mode Feasibility Alternatives Analysis. Transit improvements, park-and-ride lots, alternate routes (Powers Boulevard), and multi-use trails have been recommended in recent years as a part of a multi-modal approach to addressing the region's ever-increasing transportation needs.

Further detail is necessary to clarify the conclusions of the two transit studies listed in the table. Lack of funding is a major hurdle facing prospective transit improvements. Regional bus service awaits future voter approval, after a November 1999 ballot issue was unsuccessful. On the same ballot, voters approved the use of bonding by the state to expedite improvement of strategic corridor roadways, including I-25. No funding mechanism has been established to initiate intercity passenger rail service.

Public support for transit and various alternate modes was gauged in the 1996 PPACG Community Transportation Survey listed in **Table 3.** Area residents were asked to express their degree of support for various transportation improvements, based on the premise that the improvements would be funded with existing tax dollars (no new taxes). Regarding the option to widen I-25 to six lanes, 62% of the respondents indicated strong support. By comparison, 54% strongly supported completion of Powers Boulevard as a north-south bypass; 36% favored Front Range passenger rail service; 31% strongly supported provision of high occupancy vehicle lanes, and 25% supported expanding the regional bus system.

STUDIES NOW UNDERWAY

In a fast-growing area such as El Paso County, it is not surprising that there are numerous transportation-related studies underway concurrently. **Table 3** *(see page 9)* provides a list of some of the major studies currently underway, and how they relate to the I-25 Environmental Assessment. Among these ongoing studies, the City of Colorado Springs Comprehensive Plan Update merits special mention.

The "Comp" Plan Update is nearing completion in 2000, then may be considered for adoption by the City Council. Various scenarios for focusing future land use have been explored. Those which redirect growth from the I-25 corridor to Powers Boulevard or other outlying activities may slightly reduce demand on I-25, in comparison to the otherwise expected year 2020 development pattern. The differences are unlikely to alter the basic conclusions of the I-25 Mode Feasibility Alternatives Analysis.

The Draft Comprehensive Plan contains many policies supportive of alternative mode use, including carpooling, transit and non-motorized travel, as well as mixed land uses that minimize the need for vehicular travel. Desired outcomes, according to the draft, "are less congestion, more livable neighborhoods and more choices in how we move around the City." One transportation strategy suggests, "Develop programs and infrastructure to encourage the use of high occupancy vehicles (HOVs), such as buses, vans and carpools."

CORRIDOR DEVELOPMENT PROCESS

The previous studies of the I-25 corridor have resulted in various roadway improvements that are underway or will soon commence. In addition to the rebuilding of several interchanges, I-25 is being reconstructed between Bijou and Fillmore Streets. The completed project will result in smoothing the original roadway curves, adding auxiliary acceleration/deceleration lanes (one northbound, one southbound), and modernizing several interchanges to meet modern safety

Table 2
OTHER RECENT TRANSPORTATION STUDIES RELEVANT TO THE I-25 CORRIDOR

Subject	Title	Sponsor, Year	Conclusions
Transportation Needs	2020 Regional Transportation Plan	Pikes Peak Area Council of Governments, 1998	Transportation capacity needed in I-25 corridor; specific improvements to be identified by CDOT Environmental Assessment.
Public Opinion	Community Transportation Survey for the Colorado Springs Urbanized Area	PPACG, 1996	North-south mobility ranked as the region's top transportation concern.
Rail Transit	Colorado Passenger Rail Feasibility Study	CDOT, 1997	Passenger rail between Denver and Colorado Springs would serve about 900,000 annual riders (i.e. 2,500 to 3,500 per day) in year 2015.
Bus Transit	Long-Range Transit Plan	PPACG, 1998	The existing transit system "will need consistent but gradual improvements to become a viable means of transportation for the community."
Park-and-Ride Lots	Long-Range Transit Plan	City of Colorado Springs, 1997	Recommended 23 park-and-ride lots for the region by year 2020; six of these lots are in the I-25 Corridor.
Multi-Use Trails	Master Plan for the Pikes Peak Greenway	City of Colorado Springs, 1994	Described plan for developing north-south regional trail which closely parallels I-25.
North Powers Boulevard	Environmental Assessment, Powers Boulevard Extension North, Woodmen Road to I-25	Federal Highway Administration, CDOT and City of Colorado Springs, 1997	Concluded no significant environmental impacts for a proposed 8.5 mile extension of Powers to an I-25 interchange.
South Powers Boulevard	South Powers Boulevard Feasibility Study	PPACG, 2000	Selected proposed corridor for Powers extension from Fontaine Boulevard to I-25.

Table 3
STUDIES UNDERWAY WITH RELEVANCE TO THE I-25 CORRIDOR

Subject	Title	Sponsor	Conclusions
Population	U.S. Decennial Census for Year 2000	U.S. Department of Commerce	When available, the data will be used to update regional socio-economic and traffic forecasts.
Land Use	City of Colorado Springs Comprehensive Plan	City of Colorado Springs	Draft plan goals include less congestion and "more choices in how we move around the City."
Interstate Freight	Ports to Plains Study	U.S. Department of Transportation	Seeking route for NAFTA traffic from Mexico to Denver.Focus is U.S. Highway 287, 90 miles east of Interstate 25.
Transportation	Intermodal Transportation Plan	City of Colorado Springs	Recommends support for I-25 Corridor improvements, Powers Boulevard, expanded carpooling and establishing a regional transit system. improved ramp design to increase safety.
Transportation	East-West Mobility Study	City of Colorado Springs	Seeking improved east-west mobility across Colorado Springs.
Transportation	Woodmen Road Corridor Study	City of Colorado Springs	Awaiting completion of East-West Mobility Study.
Transportation	Drennan Road Corridor Route Study	City of Colorado Springs	Seeking improved east-west mobility between Municipal Airport and Interstate 25.

standards. These changes have been designed to accommodate additional lanes or other future transportation capacity.

Auxiliary Lanes: Observing all of the construction currently underway, some motorists may assume that capacity improvement is already underway. Indeed, the completed southbound acceleration/deceleration lane is helping to improve traffic flow. However, it does not improve the practical capacity for I-25 through-traffic, as the auxiliary lane ends ("right lane must exit") at each successive interchange. Provision of auxiliary lanes is highly beneficial for safety improvement, but does not improve capacity on a par with addition of through-lanes.

Interchange Reconstruction — Safety Projects: Under the safety program, interchange reconstruction has occurred at North Academy Boulevard, South Circle Drive, Uintah Street and Fontanero Streets. Reconstruction will begin soon at the following interchanges:

- Woodmen Road
- South Nevada Avenue/Tejon Street
- SH 105 (Monument)

While these 40 year-old interchanges are being reconstructed to modern safety standards, they are also being designed to accommodate future capacity improvements. Interchange improvements are usually much more complicated than simple freeway widening, and do take longer to construct. Being reconstructed under the safety program, these interchanges will not be impediments to capacity improvement.

Interchange Reconstruction — Capacity Projects: A number of other interchanges do not accommodate capacity improvements at this time. The following interchanges fall into this category:

- Bijou Street
- Cimarron Street
- Fillmore Street
- North Nevada Avenue/Rockrimmon Blvd

The redesign of these interchanges to better accommodate traffic flow is currently underway. These design efforts began with direction to accommodate additional lanes or other transportation capacity options, consistent with the 2020 Regional Transportation Plan. Reconstruction of interchanges at Baptist Road and Northgate/future Powers also will be needed to accommodate capacity improvements between northern Colorado Springs and Monument.

Other Interchange Reconstruction Projects: Unrelated to the I-25 mainlaine capacity issue, two additional interchanges are being considered for reconstruction in the near term:

- State Highway 16
- SH 85 Fountain

South of Colorado Springs, reconstruction of the State Highway 16 interchange is needed to accommodate current traffic volumes and to facilitate the imminent connection of Powers Boulevard to I-25 via Mesa Ridge Parkway. Reconstruction of the State Highway 85 interchange in Fountain is being designed to meet local demands. These interchanges provide for only one through-lane of east-west traffic per direction across I-25. The SH16 and SH 85 interchange projects are not directly related to the I-25 north-south transportation capacity issue.

Chapter 2
Existing and Future Conditions

Introduction

This section describes existing transportation facilities and services in the I-25 corridor, as well as the expected future development and use. Over time, regional growth is increasing the travel demand burden on Interstate 25. The region's projected 30 percent population growth by 2020 is expected to increase travel demand in the I-25 corridor by approximately 60 percent.

A brief summary of current use of alternate modes in the Interstate 25 corridor is provided below in **Table 4**. The predominant form of transportation used in the corridor is the personal automobile. As is noted later in this section, I-25 also carries a significant amount of freight in heavy trucks.

Figure 3 *(see page 12)* depicts the extent of bus transit service and other multi-modal transportation facilities in the region. Access to the Colorado Springs Municipal Airport is possible via I-25 plus connecting east-west routes, and will be improved in the future as Powers Boulevard is extended northward and southward to meet I-25.

Further insights into the use and availability of the various transportation modes are offered in **Table 5** *(see page 13)*. This table briefly discusses the past, present, and future development of the alternate modes.

I-25 Physical Characteristics

Interstate 25 through El Paso County is a four-lane divided freeway running generally north-south for a distance of approximately 48 miles. Throughout much of this corridor, the freeway right-of-way is 300 feet wide. Typically, the width of pavement is 76 feet, consisting of a 10-foot outside shoulder, two 12-foot travel lanes, and a four-foot inside shoulder in each direction, plus a median of varying width. This typical cross-section is depicted in **Figure 4** *(see page 14)*.

Continuous acceleration/deceleration lanes are being constructed for several miles in central Colorado Springs. The resulting, improved cross-section is also presented in **Figure 4.**

The maximum width of pavement on I-25 occurs at the interchange with the US 24 Bypass, where

Table 4
CURRENT USE OF ALTERNATE MODES IN THE I-25 CORRIDOR

Single-occupant driving is the predominant mode choice for work trips within the I-25 corridor through El Paso County. Alternate mode use is relatively minimal, and can be summarized very briefly as follows:

- Passenger rail ..... none
- High occupancy vehicle lanes ..... none
- Bus transit ..... one route uses I-25
- Vanpools ..... a few, primarily commuting to Denver
- Carpools ..... estimated 10% of commute trips
- Park-and ride lots, formal ..... one lot with bus service, one without

Figure 3
I-25 CORRIDOR MULTI-MODAL TRANSPORTATION FACILITIES

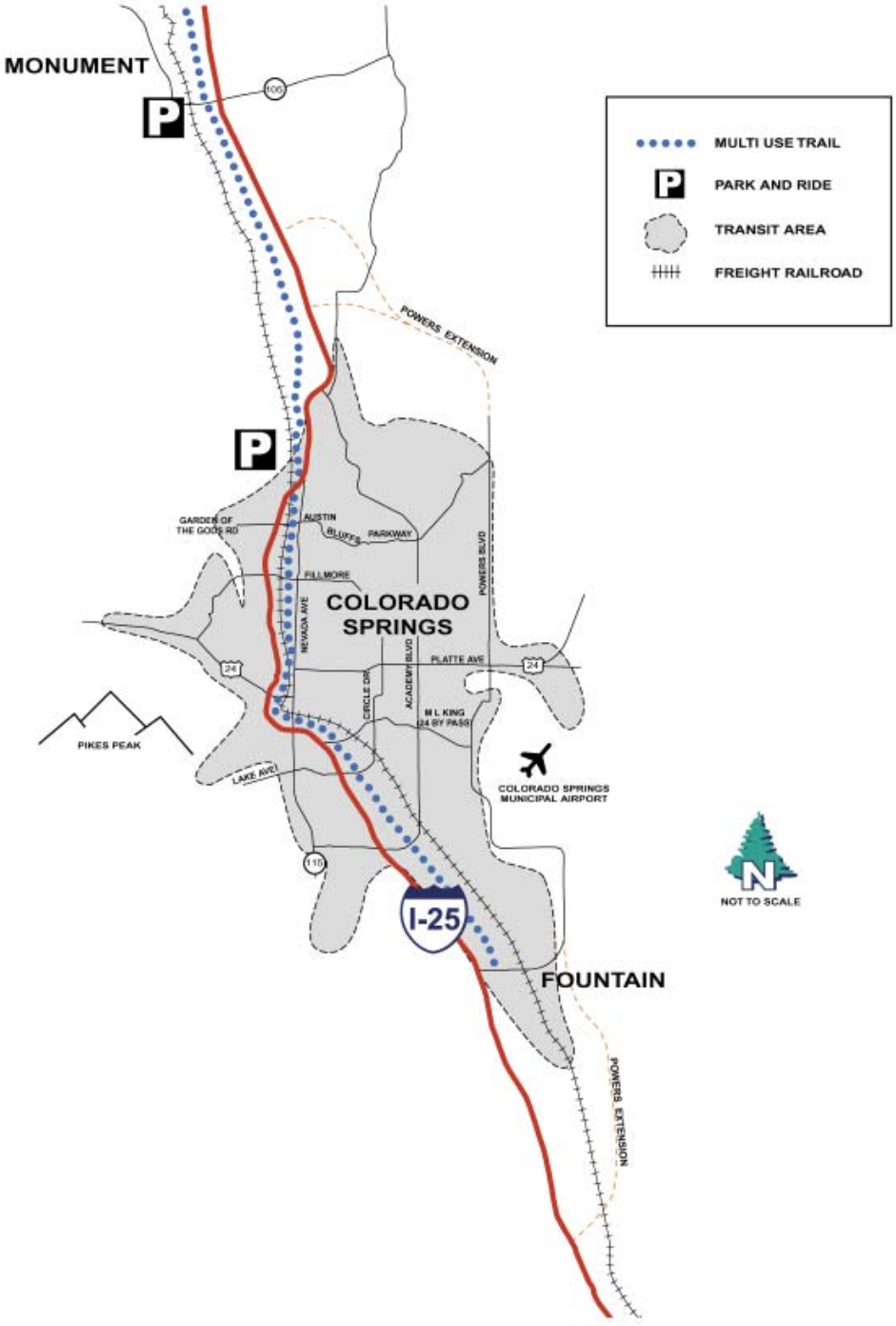
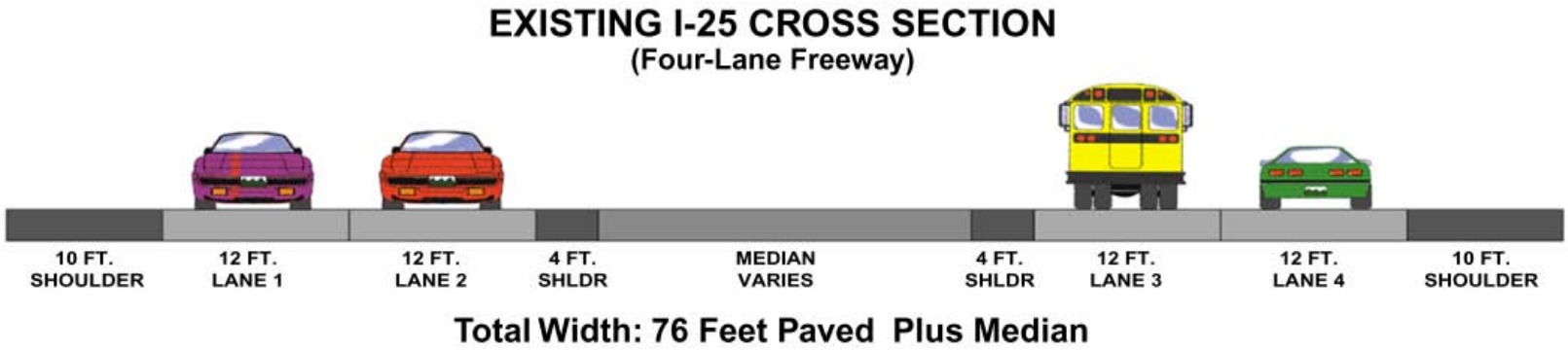
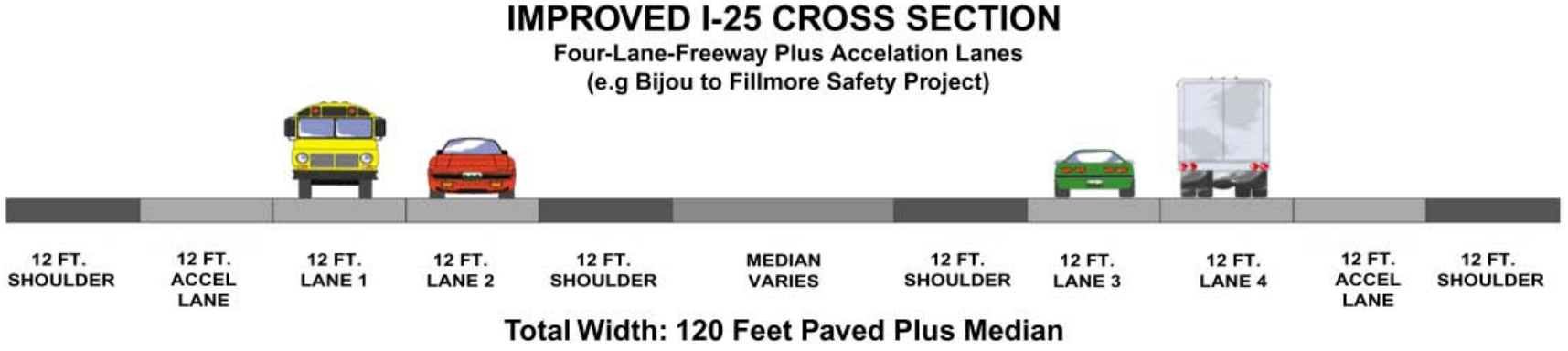


Table 5
TRANSPORTATION PROFILE OF INTERSTATE 25 CORRIDOR

Facility or Service	Past	Present	Future
Interstate 25 (in central Colorado Springs)	Opened in 1960. Four-lane freeway carried 8,500 vehicles per day.	Congested. Filled to capacity in peak hours. Still four lanes. Carries 108,000 vehicles per day.	Without additional capacity, congestion will spread to envelop more miles, more hours of the day.
Alternate Routes: •Nevada Avenue	Was main north-south State Highway before I-25.	Congested. Used as detour during I-25 closures.	Will cease to be a State Highway and become a City street.
•Academy Boulevard	Served the City's eastern edge in the 1970s.	Congested; heavily commercialized.	Will cease to be a State Highway and become a City street.
•Powers Boulevard	Planned since 1963.	Congested in peak hours. Experiencing rapid development.	Will become State Highway, extend north and south to I-25. Will gradually be upgraded to a freeway.
•Eastern Bypass	This role was expected to be played by Powers Boulevard.	Private consortium is seeking investment for a 200-mile Toll Road 20 miles east of I-25.	North-south parkway planned to serve Banning-Lewis Ranch (east of Marksheffel) when it develops.
Carpooling	Popular as result of OPEC oil price shocks in 1970s.	Diminished substantially in late 1990s due to low oil prices.	May increase due to higher fuel prices and traffic congestion.
Bus Transit	Radial route system met City's needs in the 1970s and 1980s.	No significant expansion since 1980, despite City's growth.	Voters may be asked again to approve dedicated funding source.
Rail Transit	Local trolley service ended in 1932.	A private group is raising funds to restore limited trolley service.	Historic trolley service may connect West Colorado Avenue and downtown.
Multi-Use Trails	Master Plan for Pikes Peak Greenway completed in 1994.	Greenway completed, connected to New Santa Fe Trail and Fountain Regional Trail.	Develop further connections to regional trails and open space.

Figure 4
INTERSTATE 25 EXISTING AND IMPROVED CROSS-SECTIONS





auxiliary lanes and ramps increase the total to 126 feet. Median width varies from two feet (jersey barrier) found in several locations, to 230 feet near the north gate to the U.S. Air Force Academy. For most of the corridor, the typical median width does not exceed 25 feet.

I-25 within El Paso County has 27 interchanges varying in design. The standard diamond interchange is the predominant design. The I-25 mainline crosses under about half of these cross-streets, and is on overpass structures for the other half. No freeway-to-freeway interchanges exist, but the I-25 interchanges with the US 24 Bypass does provide free-flowing connections (the Bypass meets I-25 from the east – there is no continuation west of I-25).

A noise barrier parallels I-25 for 2.7 miles through central Colorado Springs.

A pedestrian overpass crosses I-25 near Uintah Street. Noise walls have been constructed along I-25 (west side) from Bijou to Fillmore, and near Circle Drive (southeast quadrant).

I-25 INCIDENT MANAGEMENT PROGRAM

Another physical characteristic of I-25 is its freeway management system infrastructure, including traffic surveillance and control technology. Video-surveillance of traffic at numerous I-25 locations is monitored by personnel of the Colorado Springs Traffic Operations Center (TOC), located under the Colorado Avenue bridge just east of I-25. The video feed is also broadcast live on cable television and can be accessed via the Internet. The TOC operations are closely coordinated with the Colorado Department of Transportation, the State Highway Patrol, police/fire/medical units, and the local news media.

Events that threaten to cause major backups trigger the use of procedures to alert motorists and implement detours. To alert motorists, variable message signs are moved into position and media advisories are issued. When necessary, detours are implemented.

The Response Manual prepared for the I-25 Incident Management Program details 53 preplanned detours for use in the event of an I-25 closure on any of two dozen I-25 segments between State Highway 85 in Fountain and County Line Road in Monument.

ALTERNATE MODE USE

Passenger rail service has not been available for many years in the Colorado Springs area, although it was critical to the region's development in the 1870s. Trolley service was available in Colorado Springs until 1932, and may soon be provided again by a private organization to link downtown Colorado Springs and West Colorado Avenue.

A private trolley advocacy group is working to revive trolley service in Colorado Springs.

Elsewhere in Colorado, the Denver metropolitan area (2.5 million residents) has a growing light rail system operated by the Regional Transit District. An extension of the system will be constructed in the I-25 Southeast Corridor to Lincoln Avenue.

High occupancy vehicle (HOV) lanes for carpools and buses do not exist in El Paso County. Elsewhere in Colorado, the Denver metro area has HOV lanes on north I-25, the Boulder Turnpike, and South Santa Fe Drive.

Bus transit in Colorado Springs is provided by the City of Colorado Springs. By inter-

governmental agreement, some service is provided to Fountain, Manitou Springs, and portions of unincorporated El Paso County. Due to limited funding, the amount of transit service provided since 1980 has been stagnant. There is no express service on I-25 and only one local route uses I-25. Average daily use of the entire fixed route transit system (all routes, all service hours) is less than 15,000 riders per day – less than the capacity of one four-lane minor arterial street.

All fixed-route service on the Springs Transit system uses buses equipped with wheelchair lifts. Curb-to-curb van service provided by Springs Mobility is available for persons with disabilities. Currently, no transit route serves the Colorado Springs Municipal Airport.

Vanpools are minimally used in the Colorado Springs area. The regional carpooling offices in Denver and Colorado Springs indicate that six vanpools operate between Colorado Springs and the Denver Tech Center. Vanpools provide cost-effective commuter transport for groups of about 15 commuters who regularly travel much farther than average commuting distances.

Park-and-ride lots in El Paso County are found at the I-25 interchanges with Woodmen Road and at State Highway 105 in Monument. The lots are used primarily by carpoolers. The 96-space Woodmen Road Park-and-Ride lot has transit service, while the 60-space lot in Monument does not. Additionally, informal meeting places for carpools exist at several locations in El Paso County (e.g. gasoline station parking lot at I-25/ Baptist Road).

The park-and-ride lot in Monument serves carpoolers, but has no transit services.

Carpools are the most used alternative transportation mode in the I-25 corridor. Carpooling offers more flexible scheduling and routing than transit or vanpooling. Based on data reported in the 1993 Colorado Springs Area Travel Survey, it is estimated that carpools account for between 10-13% of home-based work trips. Comparison of 1980 and 1990 Census Journey-to-Work data indicated that the prevalence of carpooling in El Paso County declined significantly during the decade (likely due to steadily declining fuel costs). Carpool matching assistance is available free of charge by calling the RideFinders program at 719/385-RIDE.

Employer-based transportation demand management (TDM) programs seek to encourage alternate mode use in areas where a heavy concentration of employment causes significant congestion. In Colorado Springs, the Clean Air Campaign and Garden of the Gods Transportation Management Association work together to address critical congestion problems on Garden of the Gods Road west of I-25.

The Pikes Peak Greenway crosses under I-25 just north of the Rockrimmon interchange.

Non-motorized modes including bicycle and pedestrian travel are accommodated by the north-south regional multi-use trail system that parallels I-25. The New Santa Fe Trail extends from the Palmer Lake and Monument areas to Colorado Springs, where it connects with the Pikes Peak Greenway. The Greenway connects to El Paso County's Fountain Creek Regional Trail to Fountain. This system generally follows the Monument and Fountain Creek waterway.

Rail freight is carried by the Union Pacific (UP) and Burlington-Northern Santa Fe (BNSF)

railroads on tracks that generally parallel Interstate 25 through El Paso County. Northbound and southbound trains wait their turn to use the single set of tracks through the region. The single, shared line through Colorado Springs operates at full capacity, accommodating roughly 35 trains per day, including a high volume of trains taking coal from Wyoming to New Mexico and Texas.

ALTERNATE ROUTES

The intensive use of I-25 for "local" trips within El Paso County is due in part to the lack of viable alternate routes. No alternate routes provide comparable continuity and grade-separated traffic flow. For topographical reasons, most potential alternate routes are east of I-25, through heavily developed urban areas as shown in **Figure 5** *(see page 18)*. All of these alternate routes are truck routes. They are all congested with traffic and meet numerous cross-streets at signalized intersections:

- Nevada Avenue (State Highway 85), provides a continuous route between I-25 exits 140 and 148 (seven miles), traversing the downtown central business district and the historic Old North End neighborhood. Because Nevada Avenue is the closest major arterial route to I-25 (less than one mile east), it is frequently used as a detour.
- Academy Boulevard is the I-25 alternate route providing the greatest continuity (15 miles) and highest posted speeds, connecting to I-25 at exits 135 and 150. However, it also the region's most heavily used arterial street, and highly congested. Through central Colorado Springs, Academy Boulevard is located four miles east of I-25.

Within the next five years, motorists should be able to utilize a new alternate route, located even further east.

- Powers Boulevard will be accessible via State Highway 16 (I-25 exit 132) and Mesa Ridge Parkway, through eastern Colorado Springs and connecting to I-25 in the north via Interquest Parkway (exit 153).

Completion of the southern and northern connections of Powers Boulevard will make it a more viable alternate to a 21-mile stretch of I-25. Further extensions northward and southward from its interim connections could extend Powers ultimately from I-25 exit 123 to exit 155 (32 miles). The State of Colorado has allocated $220 million to extend Powers Boulevard and to improve some of its highest priority intersections (e.g. Platte and Woodmen) to grade-separated interchanges. Powers is planned to be gradually upgraded to a full freeway, for an estimated total cost of $650 million.

The pre-planned detours set under the I-25 Incident Management Program primarily use short portions of the routes listed above (not yet including Powers Boulevard). Additionally, Highway 85 is a detour route through the Fountain area, and South Nevada Avenue is the detour for incidents occurring immediately south of the downtown Colorado Springs.

Within El Paso County, I-25 volumes range from a low of 27,000 vehicles per day at the Pueblo/El Paso County Line to 108,000 vehicles per day in central Colorado Springs.

CURRENT USE OF INTERSTATE 25

The operation of Interstate 25 is affected by numerous factors that are discussed below. These factors include:

- **weekday congestion**
- **local versus through trips**
- **truck traffic**
- **temporal variation in I-25 traffic volumes**
- **special event traffic**
- **accidents**

Weekday Congestion: Average weekday traffic volumes for 1999 are presented in **Figure 6** *(see page 19),* which breaks out the volume into local versus through traffic. Within El Paso County, I-25 volumes ranged from a low of 27,000 vehicles per day at the Pueblo/El Paso County Line to 108,000 vehicles per day in central Colorado Springs. These figures

Figure 5
I-25 CORRIDOR
NORTH-SOUTH ALTERNATE ROUTES

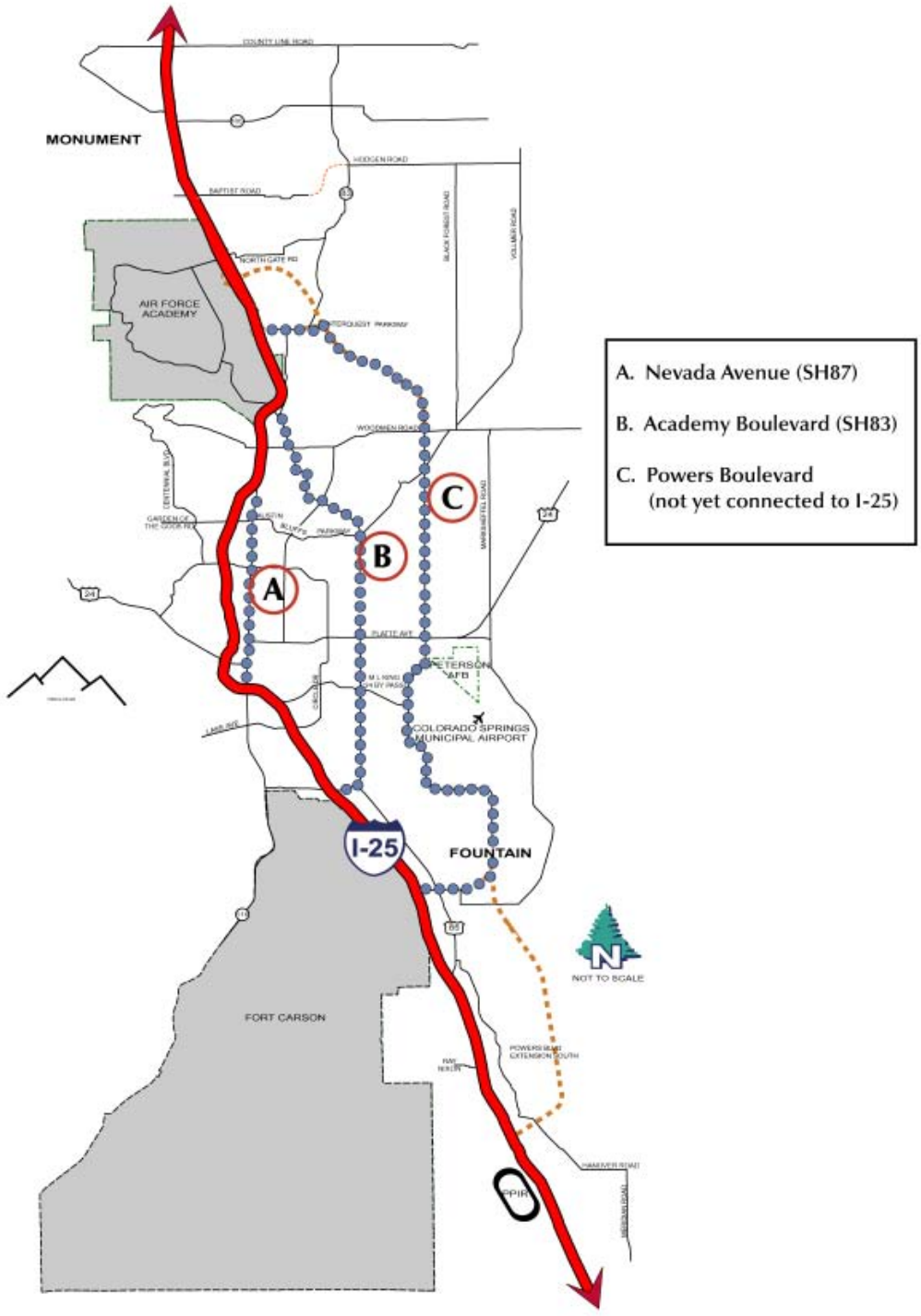
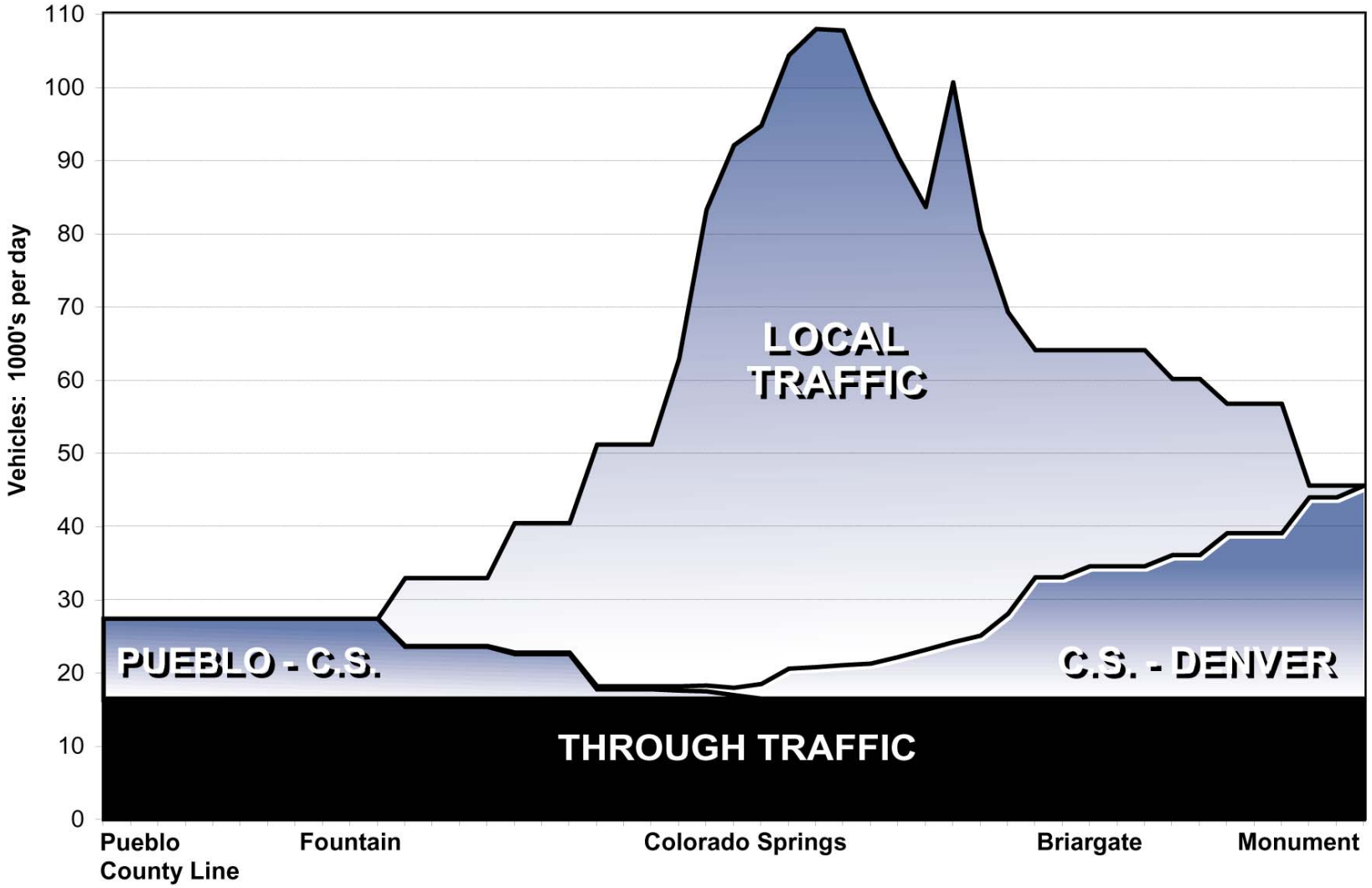


Figure 6
YEAR 1999 ESTIMATED COMPOSITION OF I-25 TRAFFIC THROUGH EL PASO COUNTY, COLORADO



represent an average weekday. On the busiest days of the year (Fridays in spring and summer), counts between 115,000 and 120,000 vehicles have been recorded. The days with the higher counts had routine congestion during peak hours (i.e. filled to capacity), but had higher than normal volume during off-peak hours.

Congestion is generally assessed on an hourly basis, rather than on a daily basis. Based on the standard methods of the nationally-used *Highway Capacity Manual,* it has been calculated that the design capacity of Interstate 25 is approximately 2,000 vehicles per lane per hour. Traffic is considered congested when volumes exceed 85% of capacity, or 1,700 vehicles per hour. Volumes of 100% of design capacity can occur and are considered extremely congested. Additional clarification is provided in **Table 6** below.

One-hour volumes on I-25 exceed 2,000 vehicles per lane (reaching "Extreme Congestion") on about one in every four weekdays.

Applying these definitions to the average weekday traffic volumes observed on I-25 indicates that the freeway routinely experiences congestion for one hour in the morning and three hours each afternoon, as shown in **Figure 7** *(see page 21)*.

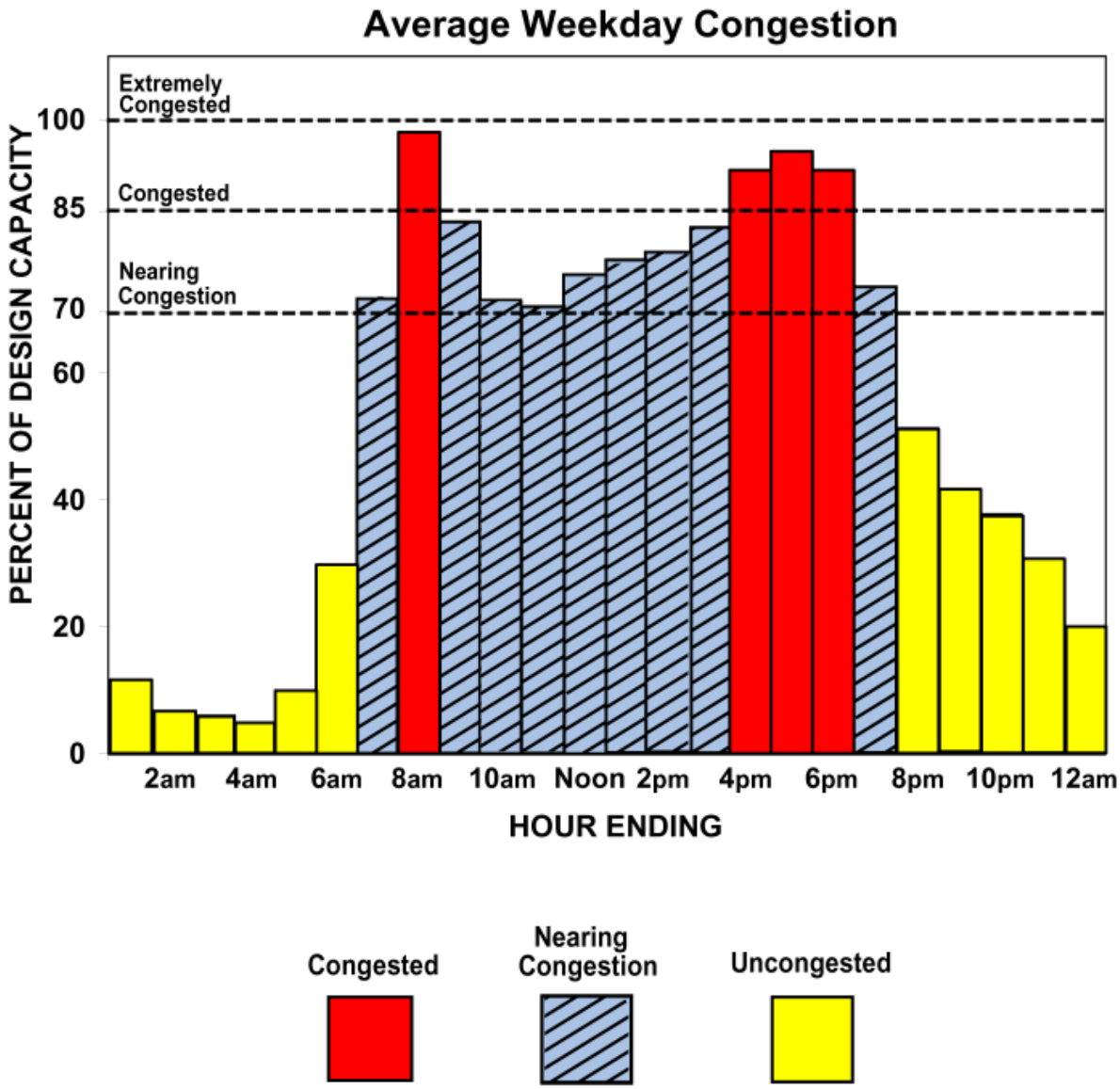
The most recent twelve months of I-25 traffic counts available from the downtown counting station (north of Bijou) were examined, and it was determined that peak period volumes exceed 1,700 vehicles per lane on 95% of normal weekday

Table 6
INTERSTATE 25 CONGESTION SCALE

Vehicles per lane in one hour	Traffic Flow	Percent of Design Capacity	Significance
2,200 ↕ 2,000	EXTREMELY CONGESTED	110% / 100%	Theoretical capacity on 4-lane freeway under ideal conditions. Highest single-hour I-25 volume recorded in central Colo. Springs was 2,150 (107.5%).
1,999 ↕ 1,700	CONGESTED	85%	Design capacity of I-25 based on local conditions. Traffic flow becomes unstable when volume exceeds 85% of design capacity.
1,699 ↕ 1,400	NEARING CONGESTION	70%	Volumes between 70% and 85% of design capacity result in some slowing and travel delays due to congestion.
1,399 ↕ 0	NOT CONGESTED		Volumes below 70% of design capacity offer relatively easy maneuverability between lanes and high travel speeds.

Figure 7
YEAR 1998 EXISTING I-25 CONGESTION BY TIME OF DAY

(At traffic data site on I-25 north of Bijou Street.)



mornings, and 99% of the normal weekday evenings. One hour volumes exceed 2,000 vehicles per lane (reaching "Extreme Congestion") on about one in every four weekdays. The single-highest hourly volume recorded was equivalent to 2,150 vehicles per lane (7.5% above capacity).

In central Colorado Springs, where northbound and southbound traffic is evenly split during peak hours, the two-way capacity of the four-lane freeway is thus 8,000 vehicles per hour. Since the highest peak hour of the day (7-8 a.m.) accounts for 7.5% of the all-day traffic, a 24-hour two-way volume of 106,667 or more vehicles (8,000 divided by .075) is a reasonable representation of 24-hour capacity. The all-day volume indicative of congested peak-hour traffic is 85% of this figure, or roughly 90,000 vehicles per day.

All-day traffic volumes through the central Colorado Springs area exceed 90,000 vehicles per day between South Nevada Avenue and Woodmen Road, a distance of nine miles. In the next mile north and south of this area, volumes exceed 80,000 vehicles per day, which can be considered "nearing congestion." Combined, the area with an existing or emerging congestion problem encompasses the 11 miles from US 24 Bypass to North Academy Boulevard.

Local versus Through Trips: Interstate 25 "local" trips (trips begun and completed within El Paso County) account for the vast majority of the freeway's traffic volume in central Colorado Springs, where the facility is most congested. The composition of the I-25 traffic stream through El Paso County is described below, and is depicted graphically in **Figure 6** *(see page 20)*, presented earlier.

An analysis conducted for the South Front Range Corridor Assessment Study determined that in central Colorado Springs, local trips (travel both begun and completed within El Paso County) comprises 75% or more of the total I-25 traffic volumes. From this data, it can be predicted, locally-oriented capacity improvements would have more congestion-reduction potential than externally-oriented strategies (e.g. bypass route 20 miles east of Colorado Springs).

Truck Traffic: Interstate 25 is Colorado's major north-south corridor for highway transport of freight.

Based on data available from the I-25 weigh station in Monument, the Colorado Department of Revenue estimates that more than 5 million tons of freight are trucked through El Paso County on I-25 every year. Truck traffic on I-25 varies from location to location, with the heaviest volumes observed at the north end of El Paso County, where shipments to and from the Denver area are at their maximum.

One-day truck counts on I-25 were taken at four locations in 1999 as part of the mode alternatives analysis. The all-day results shown below in **Table 7** reflect all single unit trucks as well as tractor-trailer semis.

A review of peak-hour traffic videotaped by the Colorado Springs Traffic Operations Center for two

Table 7
TRUCKS AS A PERCENTAGE OF I-25 ALL-DAY TRAFFIC (1999 COUNTS)

I-25 Location	Trucks	Other Vehicles	Total Vehicles	%Trucks
Monument	9,111	36,484	45,595	20%
Bijou Street	5,283	102,743	108,026	5%
SH16 Widefield	6,414	34,079	40,493	16%
PP International Raceway, exit 122	5,068	20,746	25,814	20%

locations showed that in central Colorado Springs (Bijou and Woodmen locations) heavy trucks amounted to 2.5% of peak-period traffic. Apparently, truckers avoid driving during peak periods, since operating in congested peak hours is less cost-effective than at other times of the day.

Hazardous material shipments on I-25 through El Paso County account for an estimated 40 truckloads per day (less than one percent of truck traffic). Flammable liquid shipments (e.g. gasoline tanker trucks) account for two-thirds of this number. Each week, several truckloads of radioactive material are transported down I-25 from Washington, Idaho, or Colorado weapons plants to an underground storage facility near Carlsbad, New Mexico.

I-25 TRAFFIC VARIATION

The amount of total traffic passing any given location on I-25 varies from one time period to the next. Along with the underlying increase in I-25 traffic with regional growth over time, there are recurring patterns of monthly, daily, and hourly traffic variation, as discussed below and shown in **Figure 8** *(see page 24)*.

Monthly Traffic Variation: The graph presenting average daily traffic by month indicates that volumes are highest during May, June and July, and lowest during November, December, and January. In the highest month, July, average daily traffic is about 9% above the average for the year. Traffic in the lowest month, January, traffic is about 8% below the annual average. These figures include volumes for weekends, as well as weekdays. Removing the weekend component yields the same general pattern, but with somewhat less variability. The higher volumes in summer include increased trips made for recreational activities, by both tourists and local residents.

The highest traffic volumes routinely occur on Fridays, due to the combination of weekday commuter trips plus entertainment activities or travel at the beginning of the weekend.

Daily Traffic Variation: I-25 traffic volumes vary in a highly dependable pattern that is based upon the day of the week. Mondays routinely have the lowest weekday traffic, as post-weekend commuters beginning their new work week make fewer extra-curricular trips than normal. Tuesday, Wednesday and Thursday, the middle of the work week, produce I-25 traffic volumes that most closely correspond to average weekday traffic.

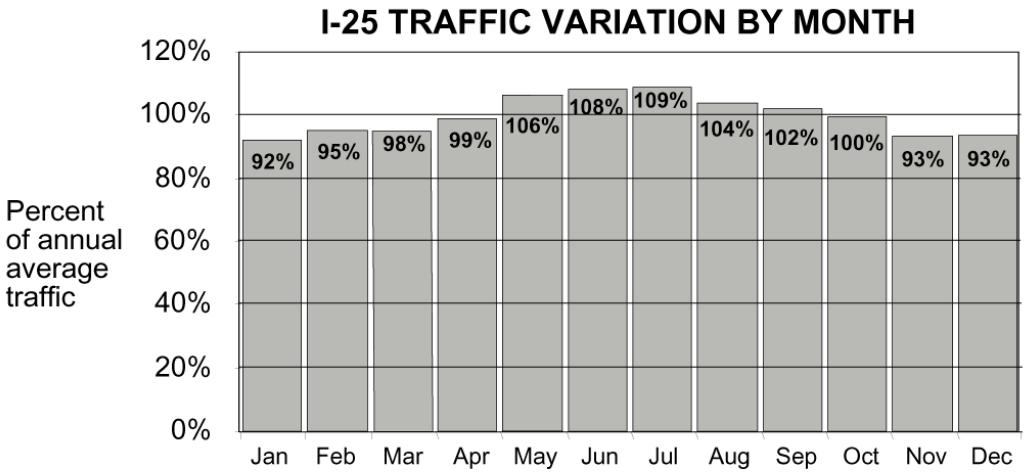
Because schools, offices and some retail businesses typically are closed on weekends, I-25 volumes on Saturdays are significantly lower than traffic on any normal weekday. Even more stores and businesses are closed on Sundays, which therefore normally have the least traffic of any day of the week.

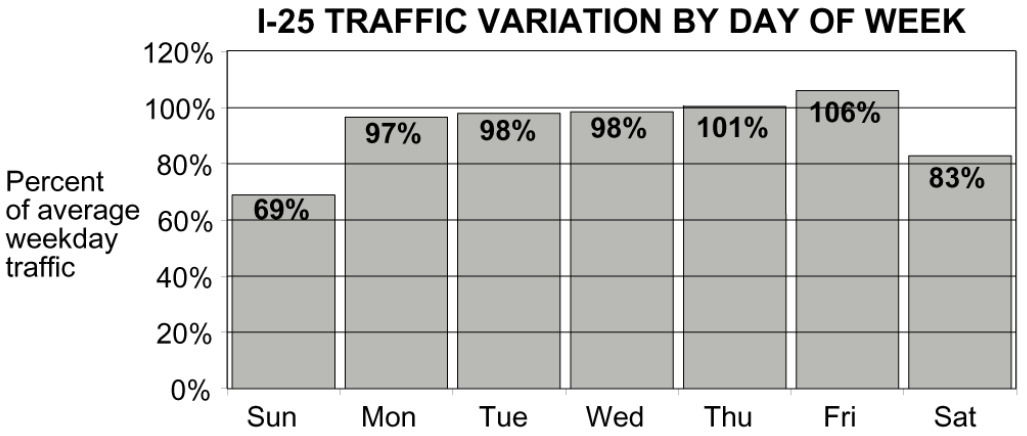
Traffic Variation by Hour of the Day: The pattern of I-25 hourly traffic variation presented in **Figure 8** represents conditions for an average weekday. Minimal traffic is observed through the late night and early morning hours, increasing dramatically at 6:00 a.m., and peaking for the day as workers commute to their jobs in the 7:00 to 8:00 a.m. rush hour. Traffic during this peak hour amounts to approximately 7.5% of all-day traffic on the freeway. From its daytime low in the 10:00 a.m. through the 11:00 a.m. timeframe, the volume steadily builds through the afternoon en route to an afternoon plateau of heavy traffic from 3:00 p.m. until 6:00 p.m., as commuters share the road with others returning home after making other types of trips during the day. Essentially, the afternoon peak period is three hours long, with each hour accounting for about 7% of all-day total traffic. Volumes in the evening hours wind down more slowly until again reaching low late-night levels.

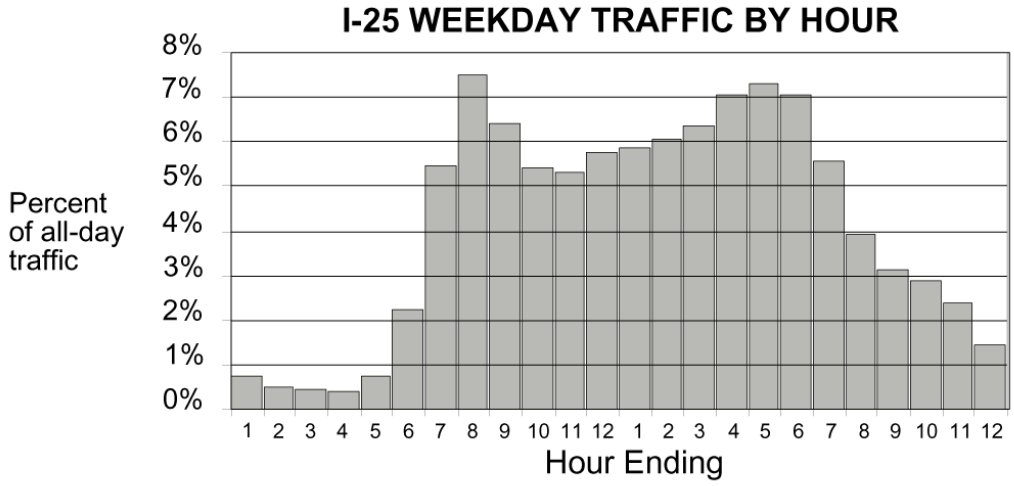
In the absence of major capacity improvements, further spreading of the morning and evening rush hours maybe expected. Peak hour volumes already at capacity would not increase, but volumes during off-peak hours would increase to take advantage of available capacity.

Special Event Traffic: Adding to the mix of normal monthly, weekly, and hourly traffic variation, I-25 traffic is occasionally boosted to capacity by special events within the corridor.

Figure 8
I-25 Variations by Month, Day, and Hour* (1998 Data)







*Average weekday traffic was 108,000 vehicles per day.

Examples include:

- **I-25 at North Academy Boulevard and Northgate Road:** Air Force Academy football games on Saturday afternoons in autumn.
- **I-25 at Milepost 123:** NASCAR racing events at the Pikes Peak International Raceway (PPIR) on summer weekends.
- **I-25 at Circle/Lake interchange:** Hockey games, high school graduations, or entertainment events at the World Arena.

Given a directional capacity of 4,000 vehicles per hour northbound or southbound on two lanes of I-25, the freeway can be overwhelmed with traffic from events at the above locations. To maximize fan attendance, many of these events occur on Saturdays or Sundays, when it happens that I-25 daily volumes are relatively light.

The proposed development of a convention center and adjacent Sky Sox (AAA League professional baseball) stadium in downtown Colorado Springs could someday generate special event impacts at the I-25 interchanges with Bijou Street, Cimarron Street, and South Nevada Avenue.

Impacts from special event traffic dissipate rapidly with increased distance from the site of the event. Traffic generated by professional sporting events in the Denver region, or by the State Fair in Pueblo, typically has minimal impact on traffic congestion within El Paso County.

Accidents: In addition to special event traffic and weekday peak-period traffic, accidents can be a significant source of I-25 traffic congestion. The total number of reported I-25 accidents yearly within El Paso County increased steadily from about 1,062 in 1994 to 1,366 in 1997, equating to a recent average of roughly four per day. The number of fatality accidents during this period averaged about twelve per year, or one per month. A major surge in fatalities in 2000 is discussed later in this section. The number of reported traffic accidents in 1997 on a mile-by-mile basis is demonstrated by **Figure 9** *(see page 26)*.

The total number of accidents reported on I-25 annually within El Paso County equates to an average of four accidents per day.

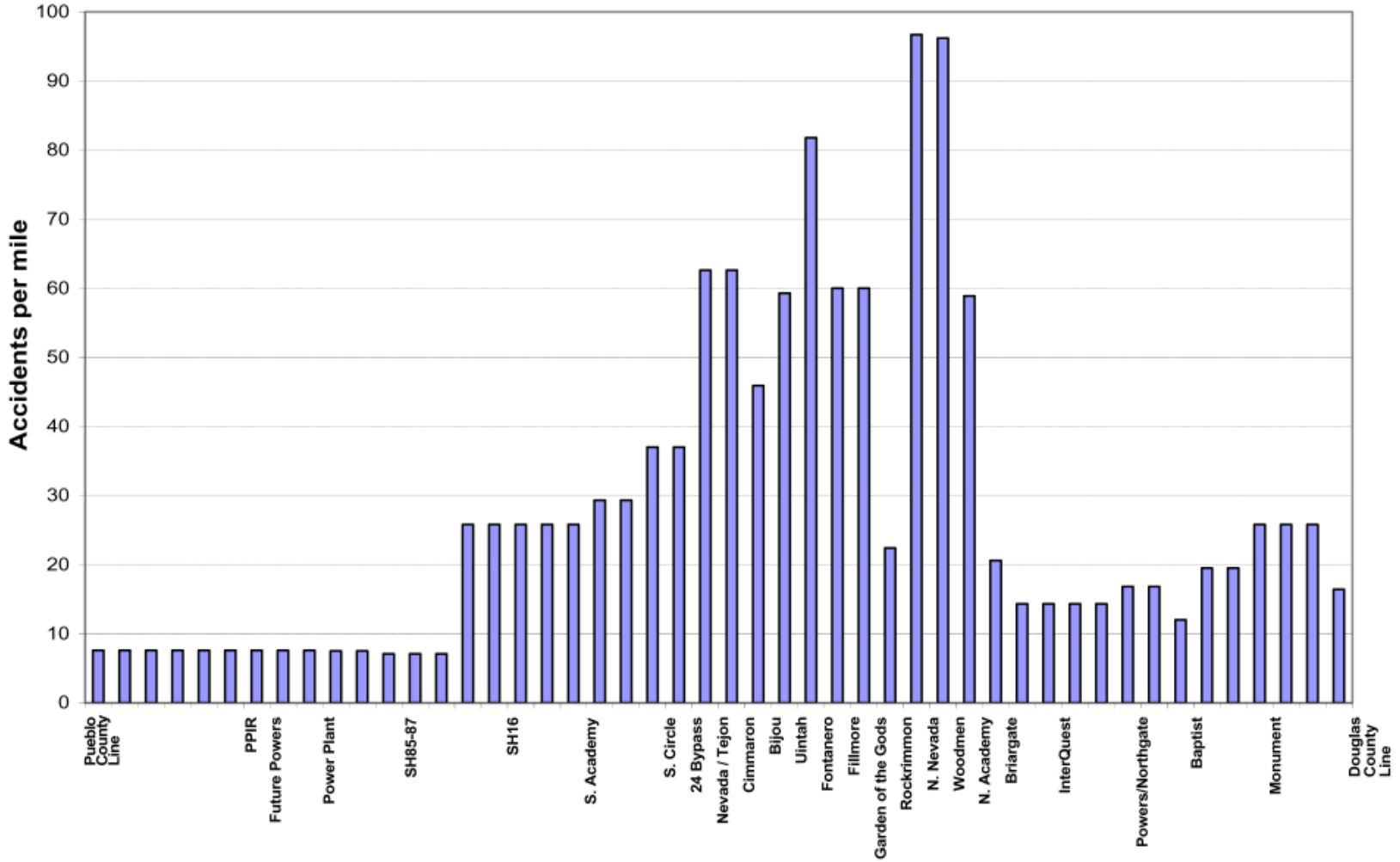
Between exits more than one mile apart, the total accidents were divided by the number of miles in the segment, to derive average accidents per mile. Fewer than ten accidents per mile occurred at the south end of the corridor, where there is the least traffic. Through central Colorado Springs, 60 accidents per mile was the typical rate — an average of one accident every six days.

The accidents per mile correlate with traffic volumes reasonably well with notably higher accident rates near the interchanges at Woodmen Road and State Highway 105 in Monument. Safety projects will reconstruct both of these interchanges beginning in year 2001.

The Woodmen Road vicinity experienced roughly 95 accidents per mile annually, the highest number in the corridor, despite not having the highest traffic volume. Accidents north of the SH105 interchange occurred on the steep Monument Hill, I-25's highest elevation in Colorado. Monument Hill is notoriously dangerous in icy conditions. Additionally, a weigh station along both sides of I-25 is located immediately north of State Highway 105. At the base of Monument Hill, traffic traveling at or faster than the posted 75 miles-per-hour speed limit must contend with heavy trucks traveling at lower speeds to enter or exit the weigh station.

The year 2000 will likely set a tragic record for the most I-25 fatalities in El Paso County for a single year. In the first three weeks of April alone, eight fatal accidents claimed 11 lives. A review of the accident reports reveals that most of the drivers at fault were 18 to 24 years old, and most of the victims were not wearing seat belts. Two of the crashes, claiming three victims, allegedly were the result of deliberate collisions. "Road rage" is a very real and dangerous

Figure 9
YEAR 1997 -- I-25 CORRIDOR ANNUAL ACCIDENTS PER MILE
(Before Corridor Safety Projects)



phenomenon that is increasing in Colorado, as well as around the nation. In all of Colorado, the State Highway Patrol issued more than 32,000 citations for aggressive driving in the twelve months that ended in June 1999.

Under congested conditions, I-25 traffic can get backed up for miles by an accident, disabled vehicle, or a major material spill. Approximately one third of the reported incidents on the freeway result in one travel lane being blocked, and one out of twenty reported incidents blocks both lanes. Significant delay for the public can be avoided by promptly detecting an incident, expediting arrival of emergency personnel, alerting motorists of the problem, and in some cases diverting traffic to emergency detour routes. As noted earlier, this is the role of the Colorado Springs Incident Management Program.

FUTURE CONDITIONS

TRAVEL DEMAND

Travel volumes from place-to-place depend upon numerous factors, fundamentally beginning with the location of potential trip origins and destinations. Traffic projections used in this Mode Feasibility Alternatives Analysis were based on the PPACG Regional Travel Model (TRANPLAN), using population and employment forecasts that were adopted by PPACG in May 1996.

[Note: New projections were adopted by PPACG in October 2000. Impacts of the revised pro-jections will be taken into consideration in the environmental analysis for I-25 capacity improvements.]

PROJECTED POPULATION AND EMPLOYMENT

The 1996 PPACG Population and Employment forecasts were developed using 1990 Census data, combined with local government data pertaining to land use. The final projections for 2020 reflected an annual growth rate of 1.5%. For the Colorado Springs Urbanizing Area, this resulted in projections of 505,420 residents in 2000 and nearly 660,000 residents in the year 2020. [The new projection is 681,000 residents.] Employment growth in the urbanizing area for the same period was forecast to average 1.7% annually, to nearly 285,000 employees. A key assumption underlying both projections is that the region's largest single employer, Fort Carson, will remain open and significantly unaffected by military force reductions.

For use in transportation modeling, regional projections are disaggregated into 480 small areas called Transportation Analysis Zones. The regional traffic model is used to predict trips from each zone to every other zone, subject to the constraints and opportunities afforded by the available transportation network (e.g. roadway system and transit routes).

A generalized picture of the region's projected population growth through 2020 is provided in **Figure 10** *(see page 28)*. For graphic representation purposes only, contiguous Transportation Analysis Zones in the region were grouped into the 19 "super zones" depicted in the figure. The largest population increases are shown for the northern portions of Colorado Springs, including the areas labeled Northwest, Powers, Briargate, North Central, and North Powers. Also shown with an increase of more than 10,000 residents is the Southwest super zone.

Employment, on the other hand, is projected to increase most in the area closer to central Colorado Springs, as shown in **Figure 11** *(see page 29)*. The Central, Powers, Northwest and Southwest areas are projected to have the highest numbers of new jobs. Less growth, but still in excess of 5,000 new jobs, is expected in the Fort Carson and Briargate super zones.

Again, most of the population growth will be in the northern part of the region, while most of the job growth will be closer to central Colorado Springs. This implies that new residents will generate additional north-south commuting trips. Given the lack of alternate routes, Interstate 25 will attract a significant increase in travel demand, especially in the northern part of the region.

As noted previously, the Draft Comprehensive Plan currently under development by the City of Colorado Springs has been examining land use scenarios with potential to redirect growth from

Figure 1.3
YEAR 1997 TO 2020 POPULATION INCREASE BY AREA*

**Based on PPACG projections adopted in May 1996.*

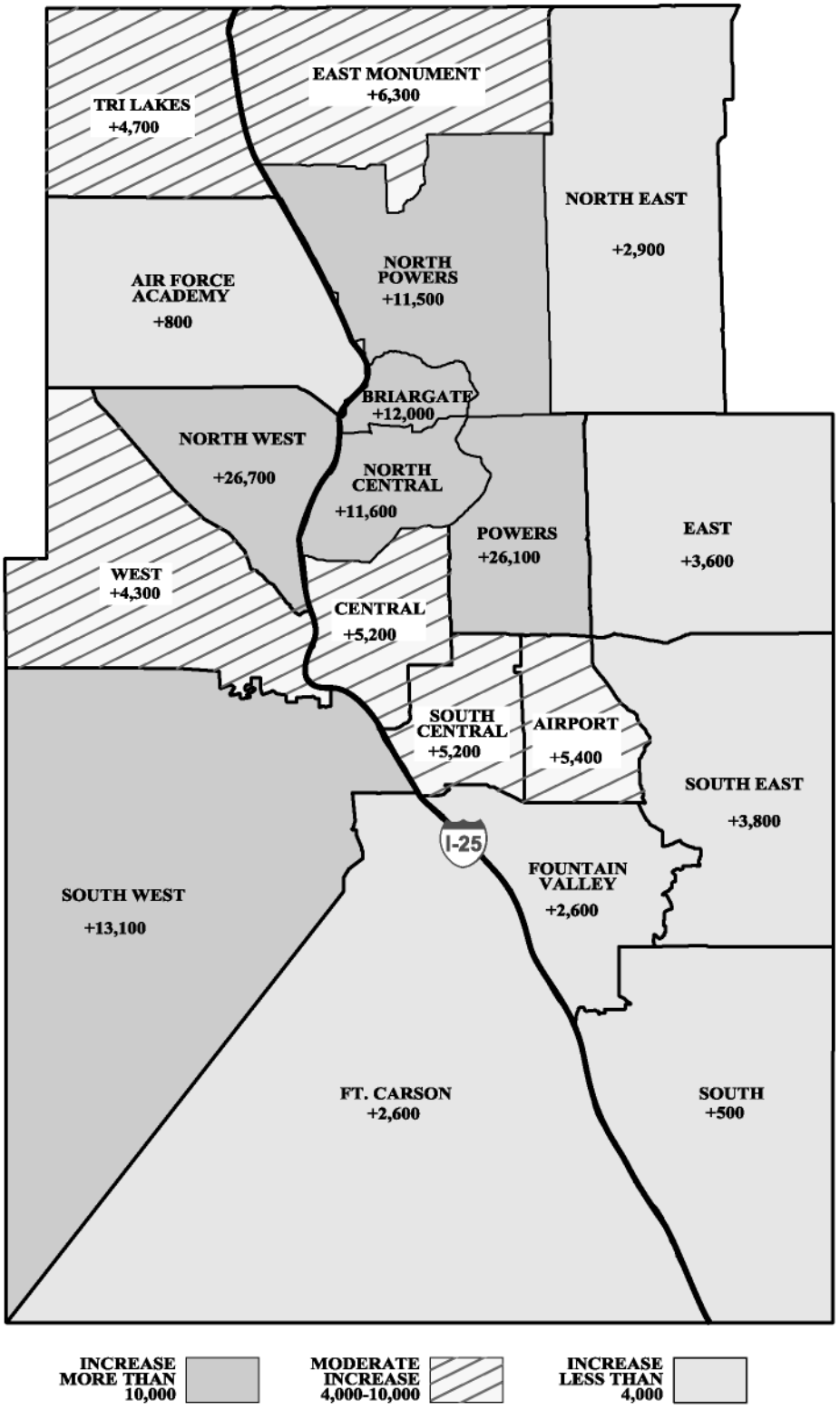
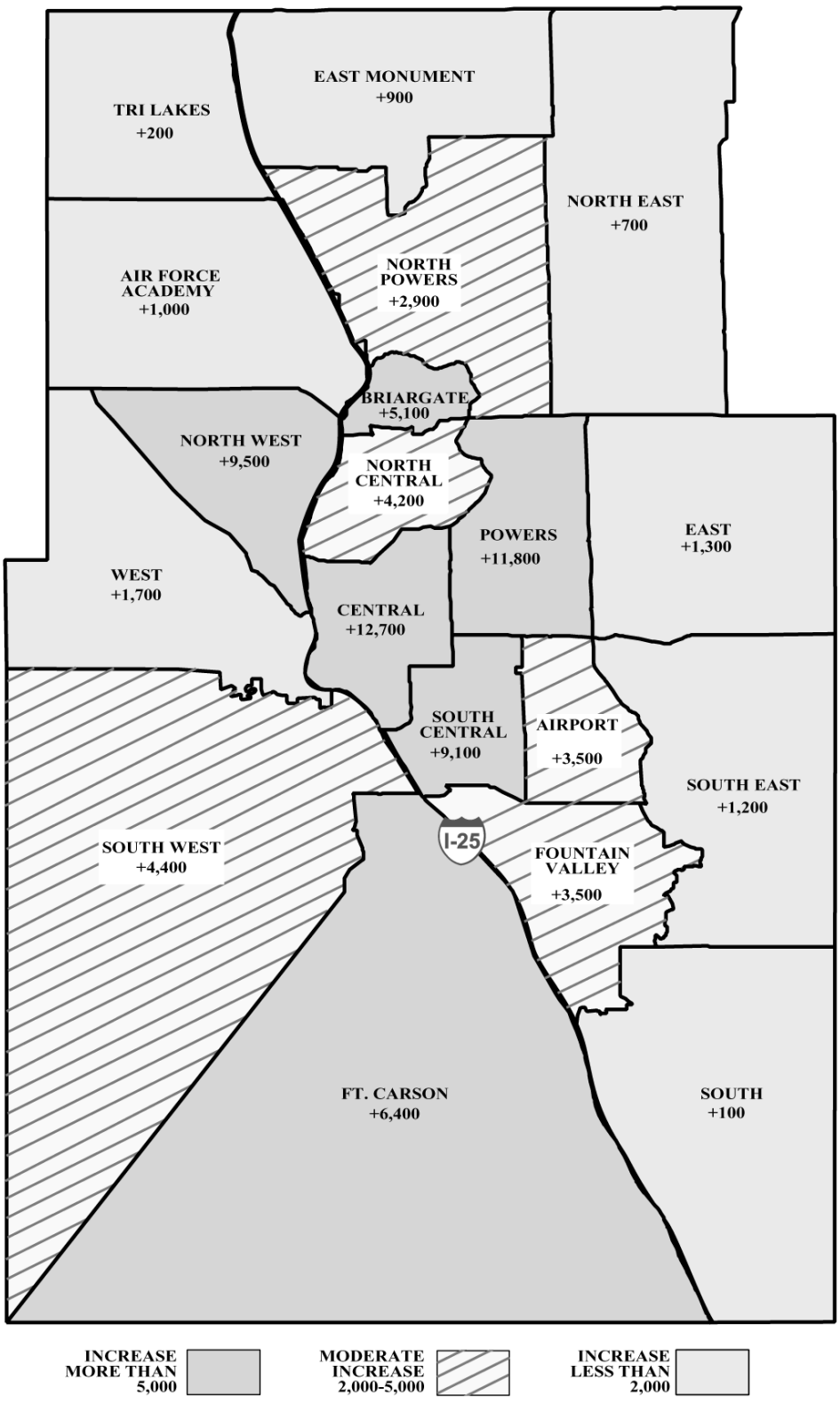


Figure 11
YEAR 1997 TO 2020 EMPLOYMENT INCREASE BY AREA*

**Based on PPACG projections adopted in May 1996.*



its expected locations to make better use of overall community resources. Some of these scenarios would focus growth into regional activity centers, potentially along Powers Boulevard, or around the Colorado Springs Municipal Airport. Another scenario focuses on "in-fill," meaning development of vacant land that is already surrounded by urban development, rather than growing outward to undeveloped areas. These strategies have some potential benefit for the Interstate 25 corridor, compared to the projected base case for 2020. However, it would take many years for such policies to generate a significant cumulative impact.

In an area of dynamic development, it does not take long for population and land use forecasts to become outdated. For example, the projections adopted in 1996 do not take into account new downtown developments including the Lowell School redevelopment project and Confluence Park. New proposals for a convention center and possible Sky Sox Stadium relocation could also attract additional traffic to central Colorado Springs (and again I-25 would be a preferred travel route). Regional projections were updated by PPACG in October 2000, and will be re-examined after results of the 2000 Decennial Census become available.

PLANNED TRANSPORTATION IMPROVEMENT PROJECTS

Numerous improvements to transportation facilities throughout the Colorado Springs Urbanizing Area have been selected for funding through the regional transportation planning process conducted by the Pikes Peak Area Council of Governments. Projects that can be funded within the upcoming six-year period are included in PPACG's Transportation Improvement Program. These projects plus others to be implemented in the seven- to twenty-year timeframe are included in PPACG's 2020 Long Range Transportation Plan.

For purposes of estimating future travel demand on Interstate 25 in the year 2020, it was assumed that all PPACG-planned projects except I-25 capacity improvements would be implemented. Thus, the I-25 traffic projections discussed in this report do take into account projects such as improvements to Powers Boulevard.

As noted in El Paso County's 2000 Tri-Lakes Comprehensive Plan, the Town of Monument has identified Higby Road (midway between SH 105 and Baptist Road) as a location for a possible future I-25 interchange. This interchange is not included in the PPACG Long Range Transportation Plan for 2020.

I-25 SAFETY IMPROVEMENTS

With or without recommended capacity improvements to I-25, the freeway will be the scene of construction activity for the next several years. Reconstruction is occurring on I-25 northbound between Bijou and Fillmore Streets to smooth out the previously existing curves and to provide extended acceleration/deceleration lanes. Additionally, reconstruction will begin soon at the I-25 interchanges with South Nevada Avenue and Tejon Street, as well as Woodmen Road and at the SH 105 interchange in Monument.

ALTERNATE MODES

Incremental improvements in alternate mode facilities anticipated through the year 2020 are quite modest, in terms of their potential impact on the Interstate 25 corridor. The PPACG 2020 Regional Transportation Plan does not include any plans to implement fixed rail transit, nor high occupancy vehicle lanes. The Plan details the need for transit service improvements, but does not identify funding available to make such improvements.

Transit: Under Federal regulations, the PPACG 2020 Plan is required to be fiscally constrained; that is, the final adopted plan may not include improvements for which funding is not reasonably certain. One key question that cannot be answered at this time is the future availability of funding for transit service.

The Transit Element in the PPACG 2020 Long Range Transportation Plan examined four scenarios for transit provision, generally based on: status quo funding (declining service hours per capita); fixed service hours per capita;

increase service hours per capita by 55%; and increase service hours per capita by 127%. The Plan concluded that the most ambitious of these scenarios was "unrealistic at this time," and, therefore, suggested that the 55% service increase be pursued. Additionally, the plan aims to convert the route system away from an old-fashioned hub pattern to a grid-configuration, to reduce the need for passenger transfers.

In November 1999, Colorado Springs voters turned down a set of three ballot issues that would have created a regional transportation district, providing improved bus service funded by a new sales tax. Similar issues are likely to appear on future ballots, and eventually bus service improvements may occur.

It is important to note that transit service in the Colorado Springs area serves about one percent of the area's work trips. Conceptually, if funds could be found for service to double this amount, the result would not significantly reduce congestion in the I-25 corridor.

In the near future, relocation of the City's downtown transit station is likely. The existing station at the corner of Nevada Avenue and Kiowa Street does not offer the capacity for current operations, nor for any service expansion.

Carpools, Vanpools, Employer-Based TDM Programs: The PPACG 2020 Regional Transportation Plan provides for continuation of ongoing transportation demand management (TDM) efforts, including carpool matching services, vanpool facilitation, and encouragement of employer-based programs. These voluntary programs exist today, and their utilization is dependent upon market demand. The Ride-Finders program reportedly receives about 1,500 calls annually for carpool matching assistance.

Increased carpooling in the future may occur due to increased fuel costs (recently $1.50 per gallon of gasoline), or due to increased congestion on Interstate 25. High parking costs also serve as motivation for carpooling, but are not prevalent today or generally likely to occur through much of the Colorado Springs metropolitan area.

Park-and-Ride Lots: One of the region's transit system deficiencies is the small number of park-and-ride lots within El Paso County. A 1997 Regional Park-and-Ride Study conducted for the City of Colorado Springs indicated that the region should develop approximately one park-and-ride lot for every 30,000 residents. The Study recommended improvement of both the region's existing formal park-and-rides, plus provision of 24 new lots throughout the region. Four of the recommended new locations are within the I-25 corridor:

- Pikes Peak Community College (PPCC) (I-25 at South Academy Boulevard)
- Town of Fountain at I-25
- South Circle Drive at I-25 (World Arena)
- Air Force Academy North Gate

The existing Monument and Woodmen Road lots were recommended for expansion to 250 spaces. The same number was recommended for new lots at PPCC and South Circle Drive, while the Fountain and North Gate lots were recommended to provide 100 spaces each.

Ultimately, provision of transit service to park-and-ride lots is desired, but in the absence of bus service, the facilities do function usefully as park-and-pool lots (a place for carpoolers to rendezvous and park), as is observed at the existing lot in Monument. As part of the Monument interchange reconstruction project, the Monument park-and-ride lot will soon be relocated to the northeast quadrant of the I-25/ SH105 interchanges.

Prospects for implementing proposed park-and-ride lot improvements are relatively good. Federal funding for capital projects is more readily available than money for operating transit service. Funding for the Monument and Fountain lots was approved by PPACG in September 2000.

Multi-Use Trails: The recent connection of the New Santa Fe Trail to the Pikes Peak Greenway in northern Colorado Springs created a continuous north-south trail from Palmer Lake and Monument to Fountain. No other north-south trail is planned in the I-25 corridor, although improvements to connecting east-west trails are anticipated. A high priority for the immediate future is restoration of the Greenway and the Fountain Creek Regional Trail to repair major damage sustained in 1999 spring flooding.

ALTERNATE ROUTES – POWERS BOULEVARD

Apart from completion of I-25 safety improvements, the planned regional transportation improvement most likely to impact traffic volumes on Interstate 25 is the northward and southward extension of Powers Boulevard to provide a significant alternate route. A recent inter-agency agreement between the Colorado Department of Transportation and the City of Colorado Springs provides for Powers Boulevard to become part of the State Highway System. The State of Colorado has allocated $220 million in Strategic Corridor funding for improvements to Powers. This available funding is about one-third the estimated cost of constructing Powers as a full freeway facility connected to I-25 with new interchanges at both its northern and southern termini.

Powers will be extended northward initially as a four-lane expressway with traffic signals at major cross-streets. Construction is beginning in the year 2000 to extend Powers northward from its current terminus at Woodmen Road. On an interim basis, access between I-25 and Powers Road will be available via Interquest Parkway (milepost 153), where a new developer-funded interchange opened in 1999. Ultimately, Powers will extend two miles further north, to a new interchange (exit 155) just south of Northgate Road, according to the approved Environmental Assessment for the Powers project.

An interim connection with I-25 will soon be provided at the south end of the existing Powers Boulevard. Construction in 2000 will extend Powers Boulevard southward from Fontaine Boulevard then curve eastward to join Mesa Ridge Parkway to State Highway 85, continuing westward as State Highway 16 (exit 132). The South Powers Boulevard Feasibility Study, conducted for PPACG during 1999-2000, recommended a further southern extension of Powers to a new I-25 interchange replacing the existing exit 123. This facility also would be constructed in a phased approach, as the need for the planned four-lane facility is highly dependent upon the timing of growth in the Fountain Valley area.

It is anticipated that Powers Boulevard ultimately will be upgraded from an expressway to a full freeway. This will require reconstruction of existing at-grade, signalized intersections with grade-separated freeway interchanges. Construction of the Powers interchange at Platte Avenue is currently underway. Constructing a new interchange at Powers Boulevard and Woodmen Road is a top priority improvement that will be implemented in the near future. Additional interchanges will be provided in the future, subject to the timing and availability of funding. As an expressway, Powers will be a valuable alternate route in the event of a major incident on I-25, and will provide much-needed mobility for the rapidly growing eastern side of Colorado Springs.

OTHER ALTERNATE ROUTES

Two additional north-south highways are planned east of I-25 for some time in the future, but were not included as part of the PPACG 2020 Transportation Plan. These are the Banning-Lewis Parkway and the Front Range Toll Road.

The Banning-Lewis Parkway is a planned freeway to be located approximately one mile east of Marksheffel Road, providing north-south mobility for the 24,310-acre Banning-Lewis Ranch area that was annexed by the City of Colorado Springs in the 1980s. Construction of this facility will occur when there is sufficient market demand for large-scale development in the area, and in concurrence with other needed infrastructure (e.g. wastewater facilities). The impending sale of 21,400 acres to a California-based land developer was announced in October 2000. Banning-Lewis Parkway is planned to tie into Marksheffel Road at its southern terminus, and to connect to Research Parkway in the north.

Even further east of I-25 is the corridor for the Front Range Toll Road. A private consortium has approval from the Colorado State Assembly to plan and implement a privately-funded 200-mile toll road extending from Fort Collins to Pueblo. By offering an uncongested, high-speed highway at a modest toll (e.g. ten cents per mile for automobiles), the consortium hopes to attract 16,000 paying users daily in the year 2020. This market

would consist of long-distance through traffic, including a high volume of heavy trucks. Only two exits are planned within El Paso County – providing access at US Highway 24 and SH 94.

PROJECTED CONGESTION ON I-25

Associated with the projected growth described above, overall vehicular traffic in the region is expected to increase significantly. The number of total vehicle miles traveled (VMT) modeled in the region will increase from about 11 million daily miles (year 2000) to 15 million miles by 2020. In the absence of I-25 corridor capacity improvements, projected growth in the region will further increase congestion on Interstate 25, as well as on other parallel routes. Interstate 25, if not improved, cannot carry much more traffic through central Colorado Springs during the four current peak hours, but can and will carry additional traffic during more hours of the day. **Figure 12** *(see page 34)* depicts this phenomenon, with traffic in 2020 operating at congested or extremely congested conditions throughout the day. **Figure 13** *(see page 35)* shows that congested conditions would be experienced from central Colorado Springs to Monument.

Additionally, regional projections of peak-hour traffic in the year 2020 also show congestion on most major north-south and east-west routes throughout Colorado Springs, from State Highway 16 (Interim South Powers extension) to North Academy Boulevard.

The PPACG 2020 Regional Transportation Plan identified the need for major capacity improvement in the I-25 corridor, and modeled eight lanes on I-25 to represent the needed capacity improvements. **Figure 14** *(see page 36)* presents the current volumes (two-way total, in thousands of vehicles per day) and projected year 2020 volumes consistent with the 2020 Plan. Under the Plan scenario, maximum volumes would increase from about 108,000 vehicles daily in 1999 to 172,000 vehicles per day in 2020. This volume easily surpasses the capacity of a six-lane freeway. The same Plan scenario included six lanes on I-25 from Briargate to Monument, where projected 2020 volumes of 124,000 daily vehicles easily surpass the capacity of a four-lane freeway.

SUMMARY

The long-predicted need for capacity improvement in the Interstate 25 corridor has arrived. A nine-mile stretch of the roadway routinely experiences morning and afternoon congestion for up to four hours per day. In the absence of major capacity improvements, the extent and duration of existing congestion will more than double by the year 2020. Higher volumes will lower travel speeds and increase travel times for all trips, local and otherwise. The limited capacity of the four-lane freeway also results in major delays during traffic incidents.

A 30 percent increase in regional population and an even higher increase in projected vehicle travel by 2020 make it clear that additional transportation capacity will be needed. Over and above existing demand, it is projected that the I-25 corridor would serve an additional 50,000 vehicle-trips per day, if the capacity were provided. In the absence of improvements, this unmet demand would filter through an already overburdened local street system. Regardless of the transportation choices made, traffic will increase, resulting in environmental and community impacts.

Figure 12
YEAR 2020 I-25 CONGESTION BY TIME OF DAY

(Location: I-25 north of Bijou Street.)

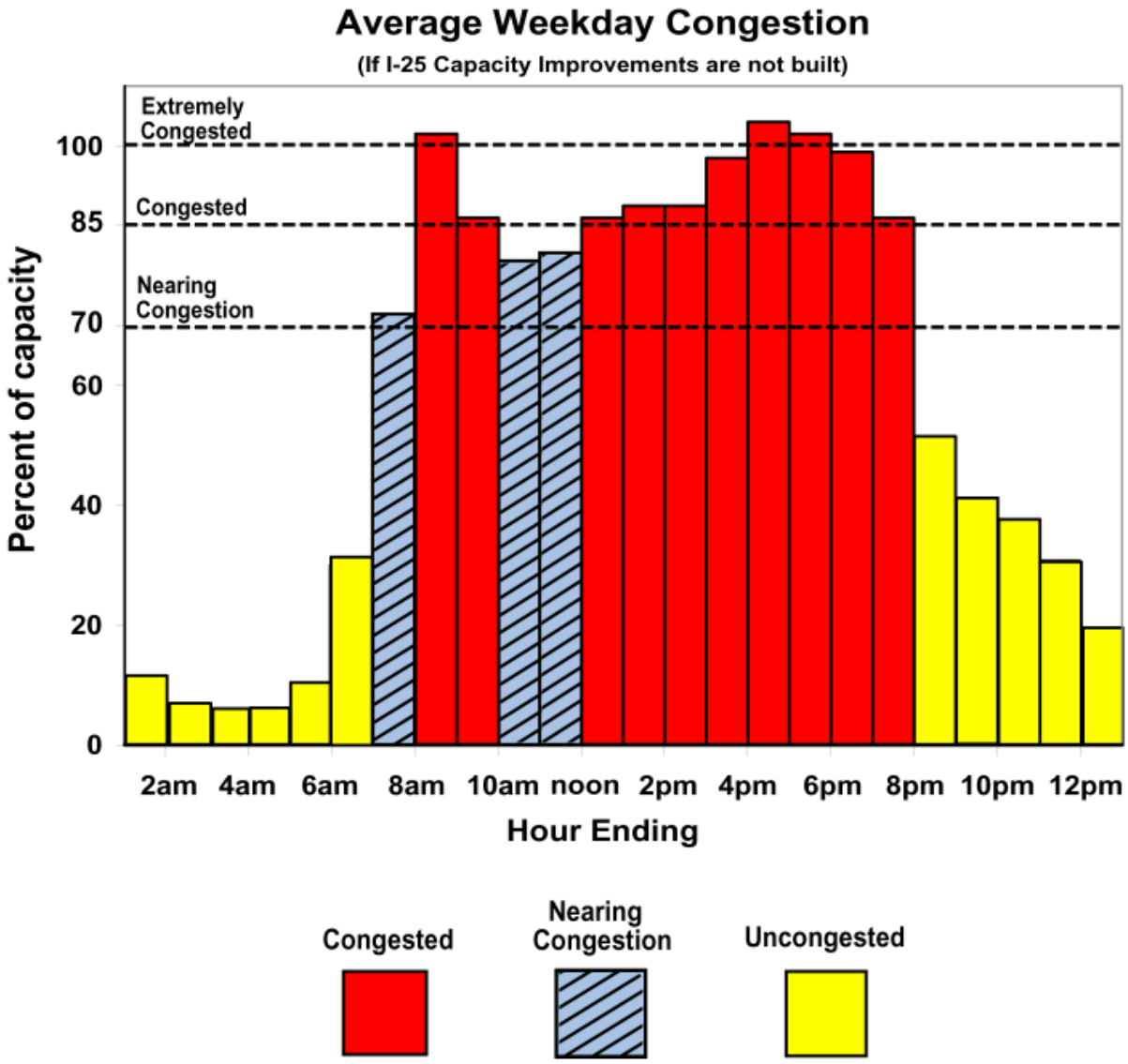


Figure 13
YEAR 2020 PROJECTED I-25 CONGESTION

(Assuming no corridor capacity improvements.)

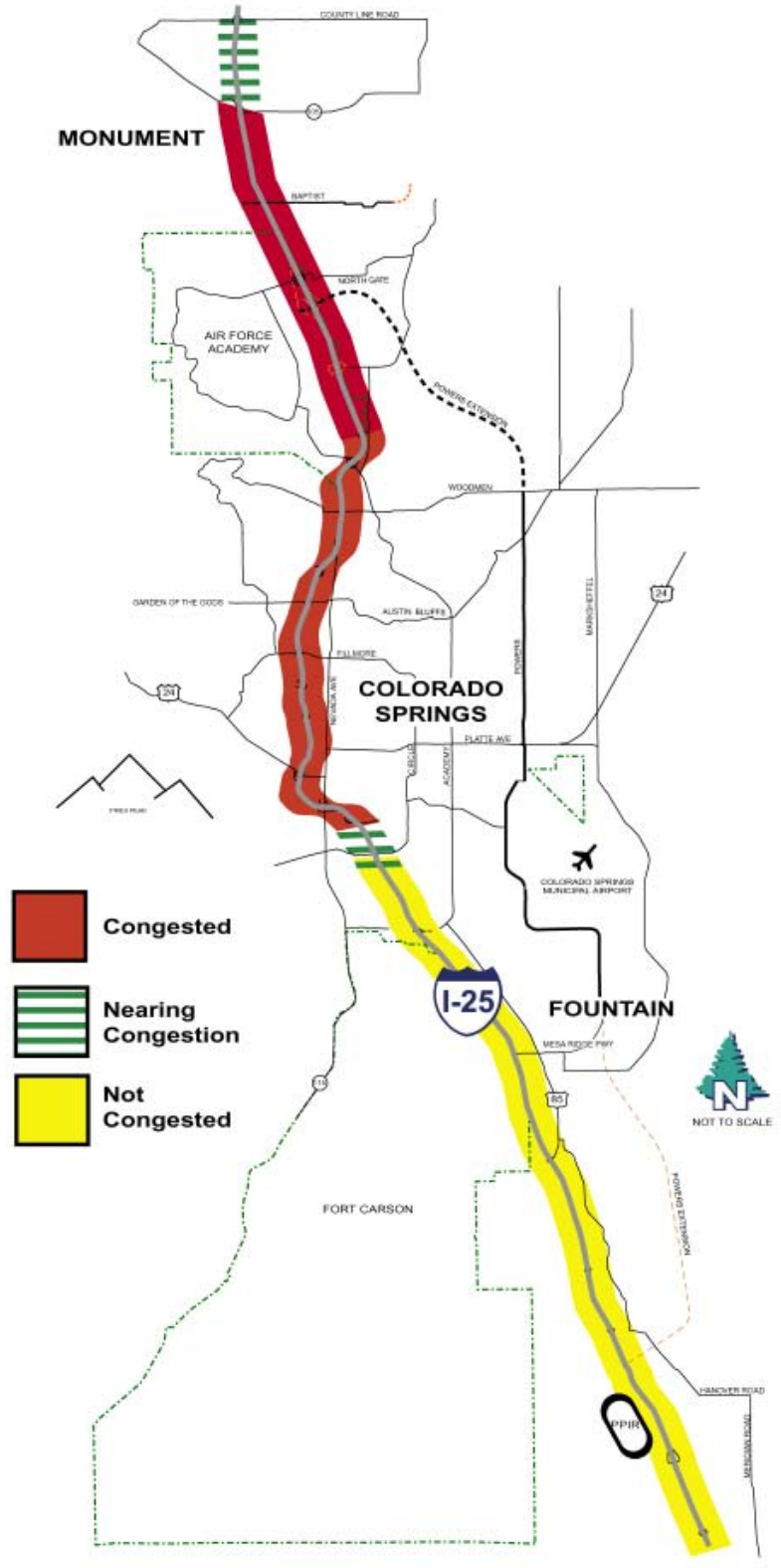
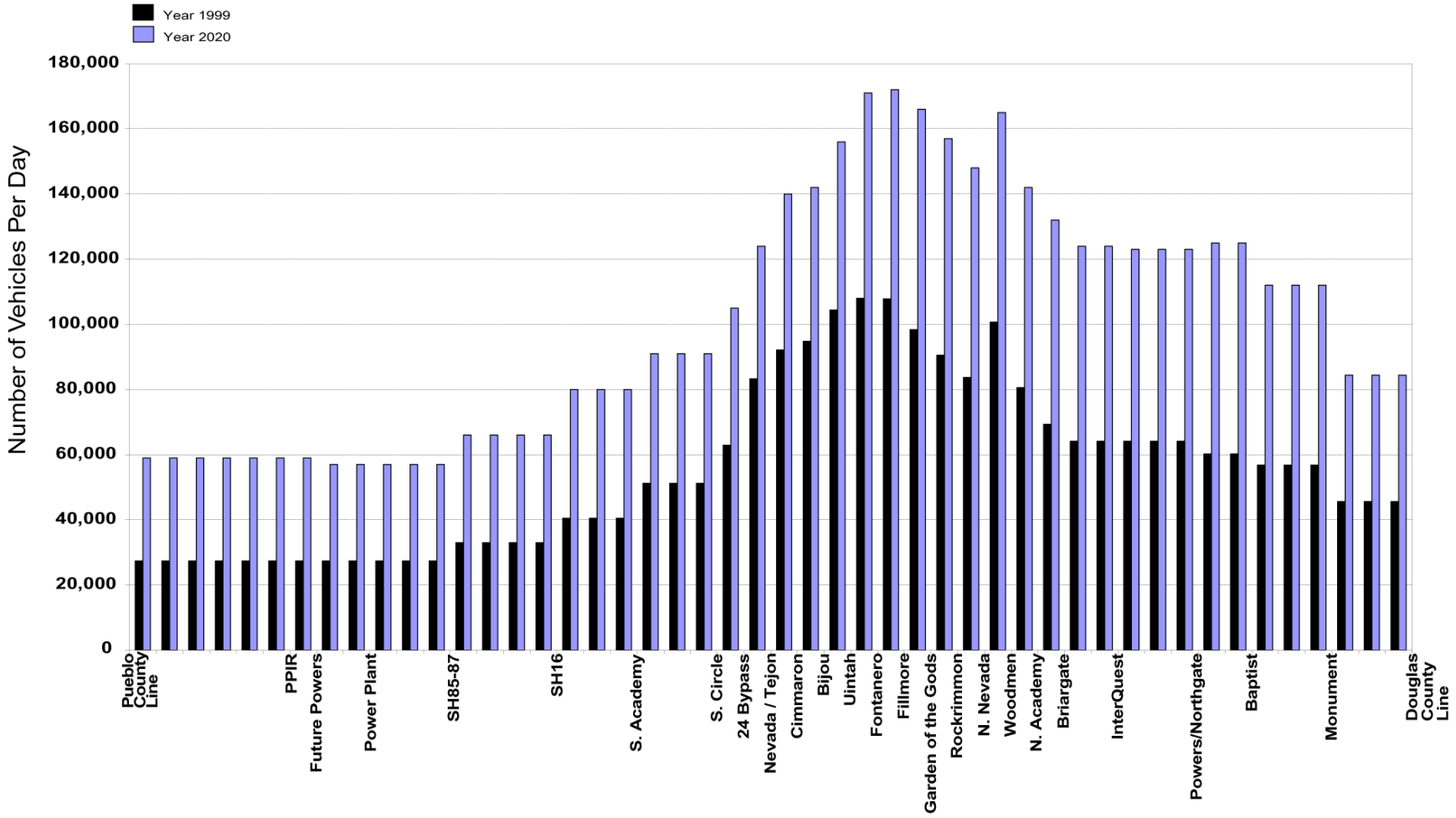


Figure 14
I-25 WEEKDAY TRAFFIC VOLUMES THROUGH EL PASO COUNTY, COLORADO



Chapter 3
Development of Initial Alternatives

Introduction

A number of transportation alternatives were considered for possible use in addressing the need for additional capacity in the Interstate 25 corridor within El Paso County. This effort began with development of a long list of potential modes, to ensure consideration was given to any mode likely to be familiar to the public. A screening process was then applied to identify alternatives that were cost-prohibitive or otherwise non-responsive to the mobility needs of the corridor. This screening step was designed to ensure that project resources would be focused on alternatives more likely to be found feasible for I-25 corridor application. These remaining alternatives were converted into implementation concepts in enough detail to facilitate estimation of approximate costs and benefits, as discussed in the subsequent chapter, **Evaluation of Alternatives**.

Long List of Alternatives

A long list of alternatives initially considered in the overall process included 18 capacity alternatives that would address the congestion problem on the I-25 corridor. The term "capacity alternatives" refers to strategies that would enable the I-25 corridor to carry more people and goods north-south through the region. Strategies that primarily achieve more effective use of the existing system without actually adding capacity are considered Transportation Demand Manage-ment or Transportation System Management measures.

The alternatives that were initially considered are presented as follows. No preference is implied by the order in which they are listed.

I-25 Roadway Improvements

- Widen I-25 (add general purpose lanes)
- Add bus/carpool lanes on I-25
- Add bus/carpool/toll lanes on I-25
- Add a reversible commuter lane on I-25
- Add commercial vehicle lane(s) on I-25

New Eastern Bypass Route

- Powers Boulevard as a Freeway
- Marksheffel Road or Banning-Lewis Parkway
- Front Range Toll Road

Transit Alternatives

- Regional bus service improvements
- Light rail system on new track
- Commuter rail on existing freight track
- Commuter rail on double freight track
- Commuter rail on new track
- Electric trolley
- Magnetic levitation ("Mag-lev") transit
- Personal Rapid Transit (PRT)
- Monorail
- Automated Guideway Transit (People Mover)

Also considered throughout the process was a No-Action scenario, although it is not a "capacity" alternative.

As noted above, a supplementary list of transportation management strategies was developed, based upon recommendations in the PPACG Congestion Management System Plan, an element of the 2020 Regional Transportation Plan. These strategies do not add capacity, but instead promote more efficient use of existing capacity. It was determined that transportation management strategies would be considered for potential implementation with any proposed capacity alternative. Therefore, no transportation management strategies were eliminated in the initial screening process. The strategies are discussed later in **Chapter 4: Evaluation of Alternatives.**

SCREENING CRITERIA

Speed, cost and capacity were selected as initial screening criteria by the I-25 Environmental Assessment project team. The intent of this effort was to screen out infeasible alternatives based on typical operating characteristics. The key decisions in this process, therefore, focused on the determination of what operating characteristics would be considered acceptable for application in the I-25 corridor.

Speed: Interstate 25 is a grade-separated freeway with posted speed limits of 75 miles per hour (mph) in rural areas, 55 mph in urban areas, and 65 mph in-between, through transition areas. Operating speeds of less than 30 mph are experienced on I-25 under extremely congested conditions, but generally not as an average speed for the entire freeway trip. For use as a screening criterion, it was judged that modes offering an average trip speed less than 30 mph under free-flow conditions would not be considered to be appropriate to serve the types of trips that use the I-25 corridor.

Cost: Going into the analysis, available funding was not absolutely defined, although the earmarked allocation of funds under the State's Strategic Corridors ("7th Pot") funding program appears to be approximately $555 million (which includes the costs for current and upcoming safety projects). For the 48-mile I-25 corridor within El Paso County, this equates to an average of approximately $11 million per mile. The project team selected the figure of $25 million per mile (approximately twice to 2.5 times the available funding) as the screening criterion for typical system-level capital cost. Under this approach, alternatives costing well over double the amount of expected available resources would be eliminated, as they were clearly not affordable.

Capacity: As noted previously, all four of I-25's existing lanes already experience congested operation (more than 1,700 vehicles hourly per lane) during peak commuter periods. The project team selected 1,650 vehicles per hour as the capacity criterion for the screening analysis. That is, an alternative that could not carry as many trips as one nearly congested freeway lane would not provide enough capacity to be considered feasible for application to the I-25 corridor congestion problem.

SCREENING RESULTS

The results obtained from applying the screening criteria to the long list of alternatives are described below. The typical operating characteristics used in this screening process reflected experience from application around the United States, and were not derived from specific analysis of conditions within El Paso County. The alternatives from the initial long list are discussed below under three subheadings: I-25 Improvements, Eastern Bypass Route, and Transit Alternatives.

I-25 Improvements *(see* **Table 8,** *page 39)***:** The screening results for roadway improvements on I-25 are shown in the following table. All of the figures shown below are typical characteristics for the added facility.

Generally, regardless of exact configuration or use, the addition of new lanes on I-25 is likely to meet the speed criterion (at least 30 mph) as any such lanes would likely have a posted speed of 55 mph or more, depending on location.

With regard to cost, recent State experience suggests that adding freeway through-lanes in Colorado costs roughly $12 to $15 million per mile, depending on the need for right-of-way acquisition and structure modification. Lanes restricted for use by high occupancy vehicles (i.e. carpools and buses) or commercial vehicles would be slightly more expensive, due to added costs for striping and signage. Per lane-mile, reversible HOV lanes or HOV/toll lanes would be more costly still, due to additional physical barriers and/or toll-collection infrastructure. Nevertheless, none of these alternatives would approach the $25 million per mile cost criterion for elimination in the screening process.

All but one of the I-25 improvement scenarios met the capacity criterion of being able to carry the equivalent of one congested lane of mixed traffic during the peak period. General-purpose lanes meet this criterion by definition, as would even a half-full HOV lane, since HOVs each

Table 8
SCREENING RESULTS FOR I-25 IMPROVEMENTS

	Alternative	Uncongested Average Speed	Capital Cost Per Mile	Person-Trip Peak-Hour Capacity per Lane
	Desired performance:	***At least 30 mph***	***Not more than $25 million/mile***	***At least 1,650 trips/hour***
PASSED	Add general purpose lanes *(one lane per direction)*	55 mph	$12 to 15 million	2,760 person-trips
PASSED	Bus/carpool Lanes	55 mph	$13 to 18 million	3,450 to 6,000 person-trips
PASSED	Bus/carpool toll lanes	55 mph	$15 to 20 million	3,875 person-trips
PASSED	Reversible commuter lane	55 mph	$15 to 20 million	3,450 to 6,000 person-trips
FAILED	Commercial vehicle lane(s)	55 mph	$13 to 18 million	1,150 vehicle-trips*

* = indicates performance characteristic not meeting desired performance

carry at least twice as many people as solo-driver vehicles. The number of person-trips associated with a highway lane is shown as 2,760, representing 2,300 non-mixed vehicles with 1.2 occupants per vehicle.

The screening capacity criterion would not be met by the commercial vehicle lane alternative. Heavy trucks have different breaking and spacing needs than average mixed traffic. Counting each truck as the equivalent of two automobiles, the maximum capacity of a trucks-only lane would be half of 2,300 passenger-vehicles per hour, or 1,150 trucks per hour. Therefore, it would not be possible to carry 1,650 trucks on a lane in one hour. Further, it has been determined that heavy trucks on I-25 through Colorado Springs avoid congested commuter traffic periods. On whole, it is apparent that providing a lane serving only commercial vehicles would fail to carry enough traffic to address the peak-period capacity needs of the I-25 corridor.

Eastern Bypass Routes *(see* **Table 9,** *page 40)*: Constructing a freeway on Powers Boulevard, Marksheffel Road, Banning-Lewis Parkway or further east *(see* **Figure 15**, *page 41)* would involve costs per mile, operating speeds, and lane capacities generally comparable to widening I-25. Based on the criteria described above, none of these alternatives was eliminated in the screening process.

The Front Range Toll Road would be located in a rural area and be able to offer the 75 miles per hour speed limit. The Toll Road is expected to offer interchanges only at two locations within El Paso County, which will keep down its construction cost per mile to a level lower than the cost of converting Powers Boulevard to a freeway.

Transit Alternatives *(see* **Table 10,** *page 42)*: The ten initial transit alternatives featured a wide variety of operating speeds, capital costs, and capacity. Seven of the ten were eliminated, and three were not eliminated in the screening process, as documented below.

Express bus service on I-25 would operate either in mixed traffic or on HOV lanes, therefore at

Table 9
SCREENING RESULTS FOR EASTERN BYPASS ALTERNATIVES

	Alternative	Uncongested Average Speed	Capital Cost Per Mile	Person-Trip Peak-Hour Capacity per Lane
	Desired performance:	***At least 30 mph***	***Not more than $25 million/mile***	***At least 1,650 trips***
PASSED	Powers Boulevard	55 mph	$15 to 20 million	2,760 person-trips
PASSED	Marksheffel Road or Banning-Lewis Pkwy	65 mph	$20 to 25 million	2,760 person-trips
PASSED	Front Range Toll Road	75 mph	privately funded	2,760 person-trips
FAILED	None			

speeds comparable to or faster than normal freeway traffic. The capacity is shown as 2,700 person-trips per hour, representing 60 buses each carrying 45 passengers. This level of service is physically possible to provide, but may prove to be unwarranted or unaffordable based on local needs.

Light rail is provided in the Denver area by the Regional Transportation District.

Light rail is a fixed-guideway transit system powered by electricity from overhead wires. It was assumed that light rail would operate on new tracks, not in mixed traffic with freight. Based on typical experience elsewhere in the U.S., light rail has the potential to meet the screening criteria, although this mode would be relatively expensive and relatively slow (average operating speed is lowered by station stops and related vehicle acceleration/deceleration).

Although existing freight tracks could carry commuter rail transit vehicles, these tracks are already filled to capacity with freight traffic (30 to 35 trains daily, many of them mile-long coal trains). For this reason, commuter rail service on existing tracks is not a viable option. If a second set of tracks were provided, to allow concurrent two-way traffic, freight traffic would still slow passenger service to unacceptably slow speeds.

Commuter rail would require the building of new tracks.

Commuter rail on new tracks would be expensive, but would have the potential to carry a large number of passengers. A train set of four cars, each carrying 80 passengers, could carry 320 people. At this rate, ten trains per hour (one every six minutes) could accommodate

Figure 15
EASTERN BYPASS ALTERNATIVES

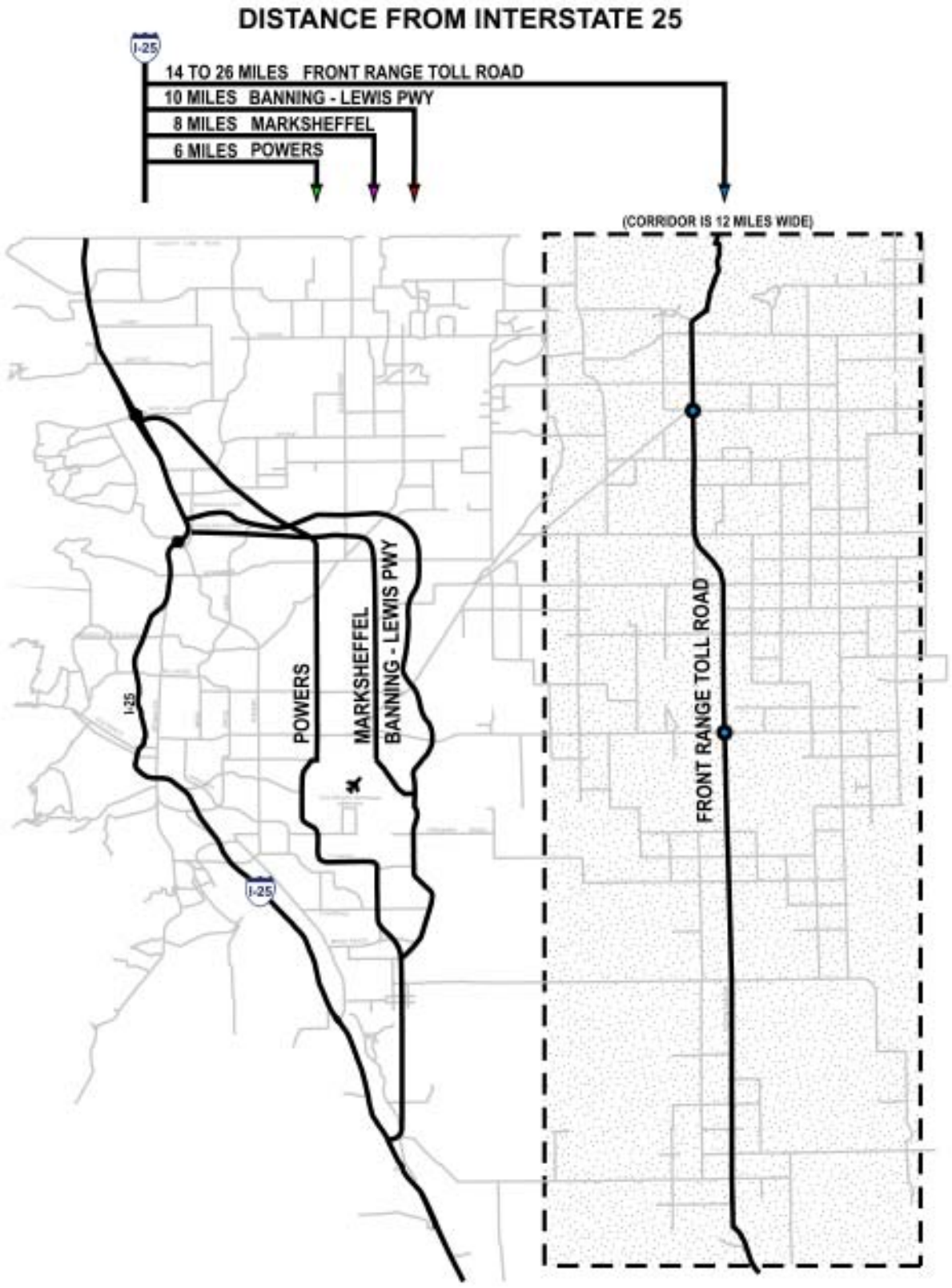


Table 10
SCREENING RESULTS FOR TRANSIT IMPROVEMENTS

	Alternative	Uncongested Average Speed	Capital Cost Per Mile	Person-Trip Peak-Hour Capacity per Direction
	Desired performance:	***At least 30 mph***	***Not more than $25 million/mile***	***At least 1,650 trips***
PASSED	I-25 express bus service	55 mph	$2 to 3 million	2,700 person-trips
PASSED	Light rail on new track	25-30mph	$20 to 30 million	1,920 person-trips
PASSED	Commuter rail on new track	35 mph	$20 to 30 million	3,200 person-trips
FAILED	Commuter rail on existing tracks	N/A	$5 to 7 million	None (freight fills existing capacity)*
FAILED	Commuter rail on double freight track	25 mph*	$7 to 9 million	3,200 person-trips
FAILED	Electric trolley	20-25 mph*	$15 to 20 million	600 person-trips*
FAILED	Magnetic-levitation Transit	55 mph	$70 to 100 million*	4,800 person-trips
FAILED	Personal Rapid Transit (PRT)	30 mph	$50 to $70 million*	2,400 person-trips
FAILED	Monorail	35 mph	$70 to 100 million*	4,800 person-trips
FAILED	Automated guideway (People Mover)	35 mph	$50 to 70 million*	2,400 person-trips

* = indicates performance characteristic not meeting desired performance

3,200 passengers. This is again a theoretical capacity, not necessarily a recommended level of service.

Electric trolleys are designed for on-street use with frequent stops. Twenty trolleys per hour (e.g. one every three minutes), each carrying 30 passengers, would accommodate 600 passengers. It would take nearly one trolley per minute to reach the screening capacity criterion. Regardless of vehicle frequency, however, the trolley concept does not provide an adequate average operating speed to be viable for I-25 corridor use.

The last four transit alternatives fail to meet the screening cost criterion. Experience elsewhere indicates that Personal Rapid Transit (e.g. Morgantown, West Virginia prototype) and Automated Guideway Transit (e.g. terminal-

Personal Rapid Transit does not meet screening criteria.

concourse system at Denver International Airport) could easily cost $50 million per mile. Both systems are designed for short trips in high-density travel corridors, rather than for the type and length of trips using the I-25 corridor.

Monorail is estimated to cost $70 million per mile.

Monorail and magnetic-levitation transit generally are much more expensive, estimated to cost $70 million per mile. Using magnetic forces to eliminate friction, mag-lev transit can achieve much faster potential speeds than most other transit technologies. Station stops and vehicle acceleration/deceleration times nevertheless constrain average travel speeds for intra-regional trips.

Fixed rail transit technologies may someday be used to connect ski areas along the Interstate 70 corridor in Colorado. The Colorado General Assembly in year 2000 considered asking the State's taxpayers to approve $100 million for a three-mile demonstration project ($33 million per mile) of linear-acceleration driven transit on monorail. However, the legislative session ended without approval of the proposal.

As noted above, the alternatives that met the screening criteria were carried forward in the alternatives analysis to the phase of concept development and evaluation. This phase is described in the following chapter.

SUMMARY

In summary, eight alternatives from the initial list were eliminated due to "fatal flaws." The eliminated alternatives were as follows:

- Add commercial vehicle lanes on I-25 — ***inadequate capacity***
- Commuter rail on existing freight track — ***inadequate capacity***
- Commuter rail on double freight track — ***insufficient travel speed***
- Electric trolley — ***insufficient travel speed***
- Magnetic levitation ("Mag-lev") transit — ***too costly***
- Personal Rapid Transit (PRT) — ***too costly***
- Monorail — ***too costly***
- Automated Guideway Transit (People Mover) — ***too costly***

The long list of alternatives, screening criteria and screening results were presented at a set of four public meetings in June 1999. Attendees in Monument, Briargate, downtown Colorado Springs and the Widefield/Fountain area did not express concerns about eliminating the above alternatives. There was general consensus that the remaining alternatives (widening, HOV lanes, eastern bypasses, and conventional transit) seemed reasonable for further consideration in the I-25 corridor.

Chapter 4

Evaluation of Alternatives

Introduction

The ten "most promising" capacity alternatives plus the No-Action alternative advanced from the screening process into the concept development and evaluation phase. In this effort, hypothetical implementation concepts were developed to illustrate how each alternative might be applied for I-25 corridor use. For example, in the case of a highway widening alternative, it was necessary to determine how many lanes would be needed between what locations. Similarly, for rail transit alternatives, it was necessary to determine a conceptual alignment, potential station locations, and potential frequency of service. In each case, the goal of the project team was to propose hypothetical improvements that would give the alternative its best opportunity to succeed — i.e. maximizing projected use while still remaining viable in terms of implementation cost.

Description of Alternatives

At this stage in the process, alternatives were evaluated individually, with the expectation that packages combining several strategies might be developed once the relative merits of individual alternatives were determined. The following capacity alternatives were examined:

- Widen I-25 with Additional General Purpose Lanes
- Add High Occupancy Vehicle (Carpool/ Bus) Lanes
- Add High Occupancy Vehicle (Carpool/ Bus) Toll Lanes
- Add Reversible Commuter Lane
- Eastern Bypass Route: Powers Boulevard Corridor
- Eastern Bypass Route: Marksheffel Road Corridor or Banning-Lewis Parkway
- Eastern Bypass Route: Front Range Toll Road
- I-25 Corridor Bus Service Improvements
- Light Rail Transit on New Track
- Commuter Rail Transit on New Track

The concepts developed for these alternatives are described below. The No-Action alternative has been described previously (PPACG 2020 Regional Transportation Plan without I-25 capacity improvements).

Widen I-25 with Additional General Purpose Lanes: Two different "widening" variations were developed. The first would provide eight lanes between South Academy Boulevard and Briargate Parkway, plus six lanes between Briargate and Monument (SH 105), consistent with the PPACG 2015 Plan and the transportation demand projected in the PPACG 2020 Plan. This scenario was modeled to include continuous acceleration/deceleration lanes where appropriate in the 8-lane section.

The second variation provided six through-lanes only between South Academy and Briargate, plus acceleration/deceleration lanes. This configuration was analyzed to determine whether or not six lanes would be adequate to meet demand through the year 2020. Several structures on I-25 (over or under cross-streets) are already wide enough to accommodate six lanes, but not eight lanes. Therefore, widening to only six lanes could be accomplished more quickly and at a lower cost than widening beyond six lanes.

Add High Occupancy Vehicle (Carpool/Bus) Lanes: This scenario modeled a standard pair of high occupancy vehicle lanes (one lane northbound, one lane southbound) added to the existing four-lane freeway. Not barrier-separated, such lanes could be freely, continually accessed from the inside (left) lane of Interstate 25. During morning and afternoon peak periods, use of the lane would be restricted to only vehicles with two or more occupants. Consistent with

HOV operations throughout the U.S., the "two-plus" HOV policy would not require the second occupant to be a licensed driver, or of driving age.

High-occupancy vehicle lanes perform best if adjacent lanes are congested (e.g. on the existing four-lane freeway), giving solo drivers a significant incentive to begin carpooling. As a general guideline for success, a carpool lane should offer a time savings of one minute per mile. For example, a savings of one minute per mile would occur if general freeway traffic operated at 30 miles per hour (very congested) while the carpool lane were uncongested and operating at 60 miles per hour.

The attractiveness of a high-occupancy vehicle lane generally increases with the length of the facility. The longer the trip length, the more likely it is that the potential savings (time and money) will induce solo drivers to begin carpooling. It is desirable for HOV lanes to be relatively long, potentially offering a ten-minute time savings to the carpooler. This savings helps to offset the time spent by the participants as the driver picks up or drops off passengers, or as the carpoolers rendezvous at a mutually convenient parking location (e.g. a park-and-ride lot).

The scenario modeled for the HOV alternative added lanes on I-25 between South Academy Boulevard (exit 135) and Briargate Parkway (exit 151), a distance of approximately 16 miles. Many trips would use only shorter portions of this facility. For example, commuters from Briargate to downtown Colorado Springs (Bijou Street) would be able to use the HOV lanes for nine miles. Commuters from southern Colorado Springs to the major employment corridor along Garden of the Gods Road (exit 146) might benefit from 11 miles of HOV use.

Since the added lanes would be restricted for HOV use only during peak periods, but would be open for general-purpose traffic the rest of the day, total daily use of the added lanes would be expected to be generally comparable to, although perhaps less than, the volume observed on new general purpose lanes.

Add High Occupancy Vehicle (Carpool/Bus) Toll Lanes: In this scenario, unused peak-period capacity in the high-occupancy vehicle lanes would be made available to those drive-alone commuters who were willing to pay a toll to use the faster facility. The toll could be paid via modern electronic means (e.g. data transponders), thereby not requiring the payer to stop and to pay cash. However, as a matter of policy, the number of toll-paying users would be limited to a number that would not significantly slow the flow of the HOV lane. This is typically assured by limiting the number of transponders issued, and/or by varying the amount of the toll in response to HOV lane use ("congestion pricing").

Over and above the costs associated with a standard HOV lane, a high occupancy toll ("HOT") lane would require additional signing, enforcement, and toll collection equipment. Further, the lane would likely need to have physical barrier separation from the non-toll lanes, and, therefore, would need its own emergency shoulder for each direction of travel. Thus, it would involve a wider overall roadway cross-section than adding general-purpose lanes, potentially requiring costly acquisition of additional right-of-way (primarily at freeway interchange locations). Regardless of the technology used, revenue collection itself would add ongoing administrative costs. For the limited extra usage achieved by offering toll access, the costs of building a HOT lane could be substantial. Of course, the amount of the tolls could be set at a level high enough to offset these costs.

Public acceptance is another potential hurdle facing the HOT lane concept. Many motorists typically object to being charged a toll to use a facility that they "already paid for" through their gasoline taxes.

The Colorado General Assembly passed legislation in 1998 making HOT lanes permissible in Colorado. In the 1999 session, a law was passed requiring the Colorado Department of Transportation to solicit private-sector proposals for implementing tolls on existing HOV facilities in the Denver region (e.g. north I-25 "Value

Express Lanes"). The private sector will be invited to determine whether or not they could cover their costs and also make a profit by operating such a facility.

Add Reversible Commuter Lane: A reversible commuter lane would consist of a single new carpool/bus lane to be used in the morning by traffic inbound towards downtown Colorado Springs, and used in the evening peak period by traffic outbound away from downtown. Use of a reversible lane is beneficial in areas where there is a significant directional imbalance in traffic flow during peak periods, or in areas where adding a lane in each direction would be prohibitively expensive.

One reversible commuter lane facility is operational on I-25 elsewhere in Colorado: the I-25 Express Lanes in Denver. Strong traffic flow into Denver from Boulder, Longmont, and other northern communities occurs in the morning, using the reversible I-25 Express Lanes, and the same lanes are used for outbound traffic in the evening.

The Colorado Springs area does not have a significant directional imbalance in traffic flow. Hourly traffic counts on each segment of I-25 showed no imbalance ratio greater than 53% (morning southbound)/47% (morning northbound), according to the 1998 I-25 Incident Management Program Report. Through central Colorado Springs, automatic traffic recorder data show northbound and southbound traffic evenly split during the rush hours. In Colorado Springs, therefore, a reversible commuter lane would be the equivalent of adding a regular HOV lane in only one direction.

For safety reasons, it is necessary to ensure that a reversible lane is cleared of traffic in one direction, before the flow of traffic is reversed. Closure of the lane for several hours per day reduces the all-day capacity of a reversible lane to less than the equivalent of one highway lane.

Eastern Bypass Route – Powers Boulevard Corridor: The existing Powers Boulevard extends from Woodmen Road on the north to Fontaine Boulevard on the south. Within the next several years, the road will be extended northward and southward to east-west interim connections with I-25. Further extensions northward and southward to Powers interchanges with I-25 are reflected in the region's long-range transportation plan. Initially, grade-separated interchanges will replace at-grade signalized intersections on Powers at Woodmen Road and Platte Avenue. Additional grade-separated interchanges will be provided as determined by traffic priorities and available funding. Thus, by 2020, Powers Boulevard will offer motorists an "expressway" alternative to Interstate 25 for north-south travel through the city. Powers Boulevard and other potential "bypass" corridors were previously shown in **Figure 15** *(see page 41)*.

For the alternative considered in the Mode Feasibility Alternatives Analysis, Powers was modeled as a fully grade-separated freeway facility in the year 2020. By eliminating all of the stoplights, a significant capacity improvement on Powers could be achieved: generally, increasing capacity by 50% in each lane (e.g. from 1,300 vehicles per lane per hour to 2,000 vehicles per lane per hour).

Eastern Bypass Route — Marksheffel Road Corridor or Banning-Lewis Parkway: The PPACG 2020 Transportation Plan mentions Marksheffel Road as another potential corridor for an eastern bypass route. Marksheffel Road is an existing two-lane County road generally located about two miles east of Powers Boulevard, and eight mile east of Interstate 25.

The Banning-Lewis Parkway is planned as a north-south freeway generally two miles east of Marksheffel Road. This roadway would be built in the future to serve new development in an area of 24,310 acres that was annexed by the City of Colorado Springs in 1988. It is unlikely that both roadways (Banning-Lewis and Marksheffel) would be constructed as freeways.

For evaluation purposes, Marksheffel Road was modeled as a four-lane freeway (comparable to the existing I-25) with two through-lanes per direction, connecting to Research Parkway on the north and to the Powers Expressway on the south.

Eastern Bypass Route — Front Range Toll Road: A private consortium is pursuing investors for the purpose of someday constructing a high-speed Front Range Toll Road extending approximately 200 miles from Pueblo to Fort Collins. The 12 mile-wide potential corridor for this facility is centered approximately 20 miles east of Interstate 25. The concept calls for two interchanges to provide access for the Colorado Springs area, at State Highway 94 and State Highway 24. This facility would be beneficial primarily for long-distance through-trips, as opposed to serving the intra-regional trips that comprise the bulk of the traffic in the congested central portion of Colorado Springs. The roadway was modeled to have a 75 mile-per-hour speed limit, as is typical of Interstate Highways in rural areas

I-25 Corridor Bus Service Improvements: A concept providing express bus service along the I-25 corridor was developed for evaluation. The concept involved 18 new north-south express routes connecting 16 locations, supplemented by 31 east-west feeder routes. As modeled, the concept included 80,000 annual hours of express service and nearly 120,000 hours of feeder service, for a total increase of about 200,000 hours per year. By comparison, the existing regional system provides approximately 132,000 service hours per year. It was assumed that this ambitious service plan would not be implemented if the I-25 express buses would be stuck in congested traffic, so the service was modeled in combination with the Carpool/Bus (HOV) Lane alternative described above. **Figure 16** *(see page 48)* illustrates the I-25 locations served by express bus service, and the extent of local feeder bus service proposed in this alternative.

Light Rail Transit on New Track: Similar to the I-25 express bus concept, an I-25 corridor light rail scenario was developed for evaluation. This 30-mile system between Monument and Fountain included 16 stations along the I-25 corridor, supplemented with feeder bus service providing access to and from nearby activity centers. **Figure 17** *(see page 49)* depicts the extent of the proposed light rail system, including station locations.

As envisioned, the system would operate on new track, not sharing existing track with freight operations. From Fountain to about Rockrimmon, the system could be located within existing railroad right-of-way, while between Rockrimmon and Monument, the track would be located in or east of existing I-25 right-of-way. Electrically-powered vehicles carrying about 60 passengers per rail car would operate at a top speed of about 70 miles per hour (mph), with an average line-haul speed of about 35 miles per hour when station stops are taken into account.

Commuter Rail Transit on New Track: Similar to the light rail concept, an I-25 corridor commuter rail scenario was developed for evaluation. This 30-mile system between Monument and Fountain included seven stations serving along the I-25 corridor, supplemented with feeder bus service providing access to and from nearby activity centers. The spacing between stations would be approximately five miles. **Figure 18** *(see page 50)* depicts the extent of the proposed commuter rail system, including station locations.

This conceptual system would likely use diesel-powered locomotives running at a top speed 79 mph with an average speed of 50 mph when station stops are included. About 120 passengers could be carried per rail car, and it was estimated that trains would run every 20 minutes during the peak periods. The alignment of the commuter rail system would be as described above for the light rail concept.

EVALUATION CRITERIA BASED ON THE PIKES PEAK REGION

The cost, travel speed and trip-carrying criteria used in the screening evaluation were refined for use as performance measures in the evaluation of the more detailed alternatives described above. The intent was to make the performance measures readily understandable and relevant in the context of the Pikes Peak region.

For example, one question addressed in the screening analysis had been, "How much does light rail cost to build per mile, based on

Figure 16
I-25 CORRIDOR BUS TRANSIT ALTERNATIVE

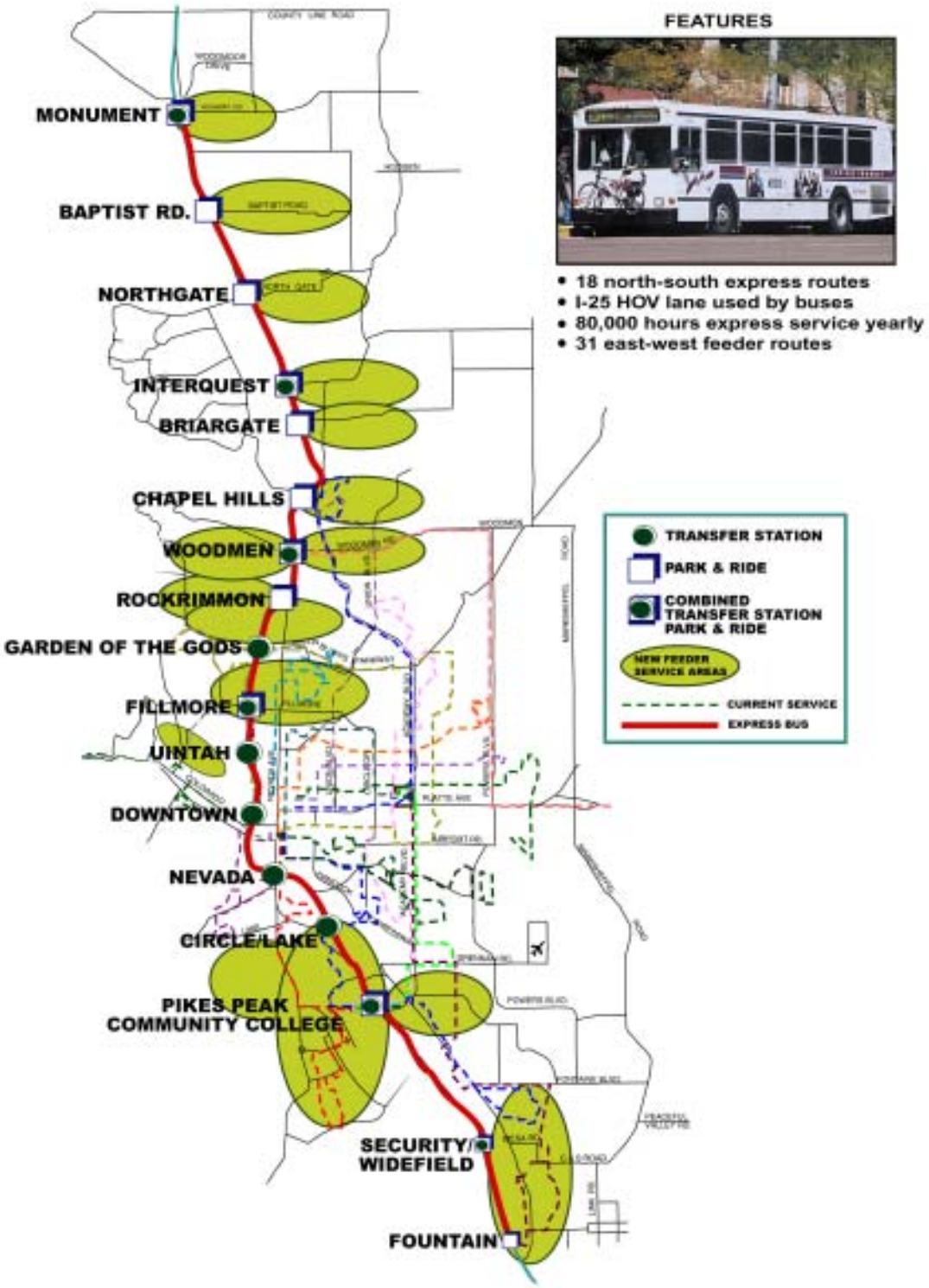


Figure 17
LIGHT RAIL ALTERNATIVE

Figure 18
COMMUTER RAIL ALTERNATIVE

FEATURES

- 30-mile system
- 7 stations
- Maximum speed of 79 mph
- Service every 20 minutes in peak hours
- Feeder bus service

experience elsewhere?" In the detailed evaluation of alternatives, the question became instead, "In the Pikes Peak region, how much would it cost to provide the 30-mile light rail system described above, including 16 stations plus the cost of the proposed feeder bus fleet?"

Instead of examining average free-flow travel speed, the detailed alternatives evaluation looked at how the new capacity would affect peak-period travel times for motorists on I-25. Auto and transit times were calculated for hypothetical peak-hour trips from downtown Colorado Springs to Fountain or Monument.

Instead of examining the potential trip-carrying capacity of each alternative, the detailed alternatives analysis made use of regional transportation modeling to estimate the number of trips that would actually be served each day through the most congested part of Colorado Springs.

For this stage of the evaluation, no pass/fail thresholds were specified; instead, the alternatives were compared to each other, in terms of their predicted performance. The results of this evaluation are described below.

PROJECTED USE OF ALTERNATIVES

Projections of year 2020 traffic volumes and alternate mode trips were prepared using the Regional Transportation Model (TRANPLAN software) and the adopted socioeconomic forecasts developed by the Pikes Peak Area Council of Governments (PPACG). The model runs were performed using the same inputs employed by PPACG in the analysis of the adopted 2020 Regional Transportation Plan. Model networks were coded for each alternative, and the model outputs were used as the basis for developing traffic projections. The resulting projections were not prepared by PPACG, but did receive methodology concurrence from PPACG staff.

The amount of future traffic using I-25 will depend upon the type and amount of capacity that is made available. In the No-Action scenario, the projected future use of I-25 through Colorado Springs in the year 2020 would be 121,000 vehicles per day. The freeway would be "full," unable to carry any more traffic. This is higher than the 108,000 average vehicles per weekday estimated for 1999, which already exceeds the roadway's capacity, and is approximately equivalent to the highest single-day total traffic that has actually been counted by CDOT on I-25 north of Bijou. In other words, today's busiest traffic day of the year would become the weekday norm in 2020. Since the four-lane freeway already reaches capacity during rush hours today, total daily traffic can increase only by having the peak hour congestion spread out to more hours of the day. This level of congestion on I-25 would also divert more traffic to other north-south routes in the region (e.g. Nevada Avenue). The number of additional trips that would be served under each alternative is presented in **Table 11** *(see page 52)*.

Compared to the No-Action scenario, the capacity alternative that is projected to serve the most additional trips in the corridor is the alternative with I-25 widened to eight lanes.

Future Use of I-25 - Widen to 8 General Purpose Lanes: Approximately 49,000 additional vehicle trips would be served, bringing the total all-day traffic volume to 170,000. This would meet the future demand and provide acceptable traffic flow. Since the number of through-lanes would double while the traffic would increase by about 40 percent, the average number of vehicles per lane would decrease substantially, resulting in better traffic flow.

Future Use of I-25 - 6 General Purpose Lanes Plus HOV Lanes: Approximately 43,000 additional vehicle trips would be served daily if the seventh and eighth lanes of I-25 were restricted to carpool and bus use during morning and afternoon peak hours. During the off-peak hours, the facility would be equivalent to the 8-lane freeway scenario.

Future Use of I-25 - Widen to 6 General Purpose Lanes: Among the alternatives that improve I-25 to only six through-lanes, the general-purpose lane alternative would serve the most daily trips, 25,000 more than the No-Action scenario. Providing two new through-lanes

Table 11
ALTERNATIVES EVALUATION:
YEAR 2020 ADDITIONAL DAILY TRIPS SERVED

ALTERNATIVE	*ADDITIONAL DAILY TRIPS SERVED*[1]
No-Action scenario (121,000 vehicles/day)	None
I-25: widen to 8 lanes	49,000
I-25: 6 lanes plus HOV lanes	43,000
I-25: widen to 6 lanes	25,000
I-25: 4 lanes plus HOV/toll lanes	19,800
I-25: 4 lanes plus HOV lanes	18,500
I-25: add reversible HOV lane	7,800
Upgrade Powers Boulevard to full freeway	16,000
New Eastern Bypass (Marksheffel or Banning-Lewis as a freeway)	14,000
Front Range Toll Road (20 miles east of I-25)	16,500
HOV lanes plus express bus system	22,500[2]
Light rail transit with feeder bus	3,000
Commuter rail transit with feeder bus	2,000

[1] Average weekday trips crossing central Colorado Springs screenline
[2] Consists of 18,500 vehicles due to addition of HOV lanes, plus 4,000 daily bus passengers

would serve approximately half of the new trips that would be served by the eight-lane alternatives described above, but leave at least 24,000 daily trips unserved. Since the six-lane alternatives would be inadequate to meet corridor demand in the year 2020, the freeway would continue to be congested during peak periods.

Future Use of I-25 - 4 General Purpose Lanes Plus HOV Lanes: This alternative would carry an estimated 18,500 daily vehicle trips more than the No-Action scenario. The added lanes would be restricted to carpool and bus use only during the peak hours, but freely available to all traffic during the rest of the day.

Future Use of I-25 - 4 General Purpose Lanes Plus HOV/Toll Lanes: By allowing solo drivers to access the lanes as toll-payers during peak-periods, I-25's use could be increased slightly over the scenario with regular HOV lanes. Operated in this manner, an estimated 19,800 additional trips per day could be accommodated in the corridor.

Future Use of I-25 - Add Reversible HOV Lane: Provision of a single, reversible HOV lane would serve only 7,800 vehicle trips more than the No-Action scenario. This is less than half the impact of providing a standard HOV lane pair, because the lane would be totally closed during the safety transition time while ramp controls and signage were being changed to reverse the direction of traffic flow. For morning outbound traffic and evening inbound traffic, this alternative would provide no advantage over the No-Action scenario.

Future Use of Eastern Bypass Alternatives: Creation of a north-south freeway well to the east of I-25 was projected to serve 14,000 to 16,500 additional vehicles per day on the new facility. Comparing this volume to the more than 100,000 vehicles per day currently using I-25, it could be interpreted that the impact of the bypasses would be less than 15% diversion of I-25 traffic. Another interpretation is that since each I-25 lane today carries 27,000 vehicles per day, the impact of the bypass would be equivalent to widening I-25 by about half of one lane, i.e. from 4 lanes to 4.5 lanes.

There is so much travel demand in the I-25 corridor that even with a bypass provided, I-25 at its current capacity would remain completely full with 121,000 vehicles per day through central Colorado Springs. Upgrading Powers Boulevard or Marksheffel Road to a freeway facility would attract north-south traffic away from other parallel roadways in eastern Colorado Springs and would generally improve mobility for the region's fast-developing eastern side. Similarly, construction of the planned Banning-Lewis Parkway would be beneficial for its surrounding area, but would not reduce congestion on the unimproved I-25 freeway.

Construction of the proposed Front Range Toll Road between Pueblo and Fort Collins would have a slightly different effect. The toll road could potentially remove 16,500 long-distance through-trips from I-25, but these trips would be replaced by local trips for which there would be a pent-up demand. By removing heavy truck traffic and pass-through traffic by out-of-town motorists from I-25, the toll road could potentially improve safety on the Interstate.

Projected Use of Transit Alternatives: Based on the modeled scenarios, it was projected that transit alternatives could serve 2,000 to 4,000 trips per day through the most congested part of central Colorado Springs. This would equate to approximately one or two percent of the person-trip volume through the corridor.

Faring best would be the alternative providing regional express bus service on a high-occupancy vehicle lane. It was noted that the HOV lane pair (one lane northbound, one southbound) without bus service was projected to carry 18,500 vehicles per day, if no new general-purpose lanes were added to I-25. In addition to this amount, the lane would carry 4,000 bus riders, if the modeled express bus service were provided.

Light rail and commuter rail service would carry 3,000 or 2,000 daily riders, respectively, through central Colorado Springs. These alternatives assumed provision of extensive bus feeder service, but did not include express bus service or HOV lanes. Modeled in conjunction with the existing four-lane I-25 facility, rail transit would not reduce I-25 traffic volumes. The four-lane I-25 through Colorado Springs would remain completely filled with 121,000 daily vehicles, whether rail transit service were provided or not.

PROJECTED IMPACTS ON TRAVEL TIMES

Having estimates of the quantity of trips served in the I-25 corridor by the respective alternatives, it is possible to calculate travel times, a key measure of the quality of the trip-making. Based on national research, most traffic models focus primarily on travel time as the key determinant in mode selection for a trip. The travel times reported below were not used as inputs to the Regional Traffic Model, but were instead derived from model outputs. To demonstrate the travel time impacts of the capacity alternatives, two hypothetical trips were developed. Travel time calculations were prepared for I-25 peak-hour trips between downtown Colorado Springs and Monument, as well as between downtown Colorado Springs and Fountain.

The hypothetical trips in the analysis included time to access the transportation mode and to get to the I-25 corridor, as well as the time spent traveling in the I-25 corridor. Since the trip between Colorado Springs and Monument is longer and more congested than the trip between Colorado Springs and Fountain, travel time differences between alternatives were more pronounced for the Monument trip. For example, the eight-lane alternative was projected to save 23 minutes for the 21-mile trip to Monument,

but only 5 minutes for the 14-mile trip to Fountain. All other alternatives saved less than 5 minutes in travel time for the trip between Colorado Springs and Fountain.

The projected trip time for the 2020 No-Action scenario was 56 minutes, consisting of five minutes of local street access time at each end of the trip, plus 46 minutes traveling 19 miles of I-25 at an average peak-period speed of 25 miles per hour. This would represent a significant degradation from the 35 minute trip-time for solo driving under today's congested conditions. Additional minutes are needed, both now and in the future, for carpool drivers to pick up and drop off their passengers.

For all alternatives, it was assumed that the posted speed limits north of Briargate will be reduced to urban standards (55 miles per hour) by 2020 in response to traffic congestion and intensified development. The number of minutes saved by I-25 motorists under each alternative is presented below in **Table 12**.

Future Travel Time for I-25 - Widen to 8 General Purpose Lanes: Compared to the No-Action scenario, the eight-lane alternative would save I-25 motorists approximately 23 minutes on the peak-period trip between downtown Colorado Springs and Monument. The average freeway speed in the peak period would improve to 50 miles per hour, and the total trip time would be reduced to 33 minutes.

Future Travel Time for I-25 - 6 General Purpose Lanes Plus HOV Lanes: The alternative providing six general-purpose lanes plus HOV lanes would yield a time savings of 21 minutes for solo drivers on I-25, and a savings of 24 minutes for carpools using the HOV lane for the trip between downtown Colorado Springs and Monument. Comparing this situation with the alternative with eight general purpose lanes, described above, solo drivers would face two extra minutes of driving in order to improve the carpool trip time by one minute.

Table 12
ALTERNATIVES EVALUATION:
YEAR 2020 PEAK-PERIOD TRAVEL TIME SAVINGS

ALTERNATIVE	*TRAVEL TIME SAVINGS (Minutes) for I-25 Motorists**
No-Action scenario (time = 56 minutes)	None
I-25: widen to 8 lanes	23
I-25: 6 lanes plus HOV lanes	21
I-25: widen to 6 lanes	10
I-25: 4 lanes plus HOV/toll lanes	3
I-25: 4 lanes plus HOV lanes	3
I-25: add reversible HOV lane	3
Upgrade Powers Blvd. to a freeway	2
New Eastern Bypass (Marksheffel or Banning-Lewis as a freeway)	2
Front Range Toll Road (20 miles east of I-25)	2
HOV lanes plus express bus system	3
Light rail transit with feeder bus	None
Commuter rail transit w/ feeder bus	None

* compared to No-Action scenario

Future Travel Time for I-25 - Widen to 6 General Purpose Lanes: Provision of six through-lanes on I-25 through central Colorado Springs would yield a savings of ten minutes for the peak-period trip between downtown Colorado Springs and Monument, compared to the No-Action scenario. The resulting 46-minute trip in the year 2020 would represent a 31% increase from current conditions, indicating that this alternative would not provide sufficient capacity to accommodate projected traffic growth.

Future Travel Time for I-25 - 4 General Purpose Lanes Plus HOV Lanes: Adding carpool lanes to the existing four-lane I-25 facility would reduce travel time for solo drivers and carpoolers alike, compared to the No-Action scenario. Solo drivers would save about 3 to 4 minutes on their trip between downtown Colorado Springs and Monument. Users of the HOV lane would save 11 minutes. Compared to the alternative providing six general purpose lanes, described above, solo drivers would face six extra minutes of driving time to improve the carpool trip time by one minute. All drivers would face a slower commute than they experience today.

Future Travel Time for I-25 - Add Reversible HOV Lane: This alternative would provide the same time savings as the regular HOV lane alternative (3 to 4 minutes for solo drivers, 11 minutes for carpools), except that it would do so only for one direction of traffic (southbound in the morning, northbound in the evening). For the direction of traffic not benefiting during each peak period, no time savings would occur.

Future Travel Time for Eastern Bypass Alternatives: It was noted earlier that in 2020, demand for use of the I-25 corridor in central Colorado Springs will be far greater than the capacity afforded by the existing four-lane freeway. An eastern bypass freeway (e.g. Powers, Marksheffel, Banning-Lewis, Front Range Toll Road) would help to serve otherwise unmet demand, but would not reduce traffic volumes through central Colorado Springs. A nominal time savings (e.g. 2 minutes) could be realized on I-25 in the area from the Northgate interchange to North Academy Boulevard, since traffic to and from eastern Colorado Springs would meet I-25 further north than was previously the norm.

No eastern bypass travel times were calculated for a trip between downtown Colorado Springs and Monument because the bypasses do not go to central Colorado Springs or serve the I-25 corridor.

Future Travel Time for Transit Alternatives: As noted earlier, the existing four lanes of I-25 will be filled to capacity by 2020, unable to meet demand. If 2,000 to 3,000 daily trips could be carried by a rail transit system, any capacity freed up on I-25 would be consumed by the latent corridor demand. Accordingly, travel time for I-25 motorists would not change under these rail transit alternatives. The same would be true for regional express bus service, except it was assumed that the express buses would operate on high-occupancy vehicle lanes. As noted earlier, adding HOV lanes to the four-lane freeway would save solo drivers about three to four minutes on their commute between downtown Colorado Springs and Monument. Busses in the HOV lanes would save 11 minutes, compared to their trip time under the No-Action scenario.

Under the light rail and commuter rail alternatives that were analyzed, the travel time between downtown Colorado Springs and Monument would be competitive with driving an automobile under congested freeway conditions, but would not be as attractive as the eight-lane freeway alternative. The commuter rail alternative, with faster trains and fewer stops than light rail, would take 20 minutes from station to station, but a total of 40 minutes from trip origin to trip destination. The trip by light rail would take ten minutes longer.

PROJECTED CAPITAL COSTS FOR THE CAPACITY ALTERNATIVES

Capital costs for the highway-based capacity alternatives were projected based on cost experience with recent construction projects in the I-25 corridor. Capital costs for transit

alternatives were estimated based on recent cost data from the City of Colorado Springs transit system, as well recent costs from transit agencies in other metropolitan areas. The results of this effort are summarized below in **Table 13**.

Projected Cost of I-25 - Widen to 8 General Purpose Lanes: The cost of the 8-lane alternative was estimated at approximately $422 million. This figure does not include the cost to complete the current program of I-25 improvements, which are being made to improve safety. For capacity, there would be major costs to reconstruct various I-25 interchanges and other bridge structures that are not wide enough to accommodate an eight-lane freeway.

Projected Cost of I-25 - 6 General Purpose Lanes Plus HOV Lanes: The estimated $435 million cost for this alternative involves all of the costs for an eight-lane freeway, plus costs for customizing the seventh and eighth lanes for peak-period HOV use. Extra pavement width would be provided for a painted two-foot safety buffer between the HOV lane and the inside general-purpose lane. Special signage and lane striping are also needed under this alternative.

Projected Cost of I-25 - Widen to 6 General Purpose Lanes: The cost of the 6-lane alternative was estimated at approximately $242 million. This figure does not include the cost to complete the current program of I-25 improvements, which are being made to

Table 13
ALTERNATIVES EVALUATION FOR I-25 CORRIDOR: PROJECTED CAPITAL COSTS

ALTERNATIVE	*$ MILLIONS**
No-Action scenario *(includes completion of current safety improvements)*	None
I-25: widen to 8 lanes	$ 422
I-25: 6 lanes plus HOV lanes	$ 435
I-25: widen to 6 lanes	$ 242
I-25: 4 lanes plus HOV/toll lanes	$ 278
I-25: 4 lanes plus HOV lanes	$ 255
I-25: add reversible HOV lane	$ 230
Upgrade Powers Blvd. to a freeway	$ 440[1]
New Eastern Bypass (Marksheffel or Banning-Lewis as a freeway)	$ 310
Front Range Toll Road (20 miles east of I-25)	$ 540[2]
HOV lanes plus express bus system	$ 425
Light rail transit with feeder bus	$ 380
Commuter rail transit with feeder bus	$ 270

* beyond the costs of the No-Action scenario.
[1] Additional costs beyond the funds currently programmed for upgrading Powers Boulevard.
[2] Covers only the portion of the facility within El Paso County.

improve safety. For capacity, there would be major costs to reconstruct various I-25 interchanges and other bridge structures that are not wide enough to accommodate a six-lane freeway. These are the I-25 interchanges at Cimarron Street, Bijou Street, Fillmore Street, North Nevada Avenue, and Rockrimmon Boulevard.

Projected Cost of I-25 - 4 General Purpose Lanes Plus HOV Lanes: The estimated $255 million cost for this alternative involves all of the costs for a six-lane freeway, plus costs for signing and striping to restrict the seventh and eighth lanes for peak-period HOV use. Extra pavement width would be provided for a painted four-foot safety buffer between the HOV lane and the inside general-purpose lane. Special signage and lane striping are also needed under this alternative.

Projected Cost of I-25 - 4 General Purpose Lanes Plus HOV/Toll Lanes: The estimated $278 million cost for this alternative involves all of the costs for standard HOV lanes, plus costs for customizing the HOV lanes to accommodate electronic toll collection. The construction cost does not include the ongoing operating costs and revenues for toll collection.

Projected Cost of I-25 - Add Reversible HOV Lane: The estimated $230 million cost for this alternative involves all of the costs for one standard HOV lane, plus costs for customizing the HOV lane to accommodate reversible operation. The reversible lane would need to have its own breakdown shoulder, and barriers would be needed to separate the reversible lane from the rest of traffic. The construction cost does not include the ongoing operating costs of daily lane reversing.

Projected Cost of Eastern Bypass Alternative - Powers Boulevard Freeway: As noted earlier, $220 million has been earmarked for major improvements to Powers Boulevard in the PPACG 2020 Regional Transportation Plan. This amount will connect Powers to I-25 at points north and south of Colorado Springs, and upgrade key intersections to grade-separate interchanges. Completion of the corridor as a freeway was recently estimated to cost $660 million. Since one-third of this amount is funded under the No-Action scenario (the PPACG 2020 Plan, less I-25 capacity improvements), $440 million would be the remaining cost for upgrading the expressway to freeway design standards.

Projected Cost of Eastern Bypass Alternative - Marksheffel Road or Banning-Lewis Parkway: The cost for constructing a four-lane freeway in the Marksheffel Road corridor was estimated at $310 million. This freeway would have fewer interchanges than a Powers freeway, and would not be as long, since it would connect to the Powers expressway at its northern and southern termini. Similar costs could be expected for a comparable facility two miles east, on the Banning-Lewis Parkway alignment.

Projected Cost of Eastern Bypass Alternative - Front Range Toll Road: The proposed Front Range Toll Road would extend approximately 200 miles, between Pueblo and Fort Collins, and its cost would be in the range of $1 to $2 billion. As part of this alternatives analysis, the 48-mile portion within El Paso County was estimated to cost $540 million. Of course, this portion would not be constructed independently, but only as part of the larger project. The cost-per-mile for this facility is relatively low because only two interchanges would be provided within El Paso County (at SH 94 and US Highway 24).

The Front Range Toll Road is proposed as a privately funded enterprise. Private investors would supply the funds to build the facility. Tolls and other corridor revenues would be used to maintain and operate the facility, and to repay investors their capital with interest.

Projected Cost of Express Bus Service on HOV Lanes: The total capital cost projected for this alternative was $425 million, consisting of $255 million for the HOV lanes plus $170 million for the cost of buses, bus transfer stations, and supporting bus maintenance facilities. The concept involved 18 new north-south express routes connecting 16 locations, supplemented by

31 east-west feeder routes. Implementing the new service would require acquisition of 200 new buses, which far exceeds the size of the entire fixed route transit fleet for the region (approximately 60 vehicles).

Currently, there is no available revenue source to pay for the substantial annual costs of operations and maintenance for the scope of express and feeder bus service envisioned under this alternative. Typical farebox revenues cover far less than half of these costs, and federal subsidies for transit operating costs are a thing of the past. Creation of a permanent revenue source to cover operating costs would be necessary to make any transit alternative viable as a capacity alternative for the I-25 corridor.

Projected Cost of Light Rail Transit: The cost for the light rail alternative was projected to be $380 million. This estimate includes the costs for providing a 30-mile rail line, light rail train vehicles, and 16 train stations with parking lots. Also included is the cost of feeder buses and supporting bus maintenance facilities.

Projected Cost of Commuter Rail Transit: The cost for the commuter rail alternative was projected to be $270 million. This estimate includes the costs for providing a 30-mile rail line, commuter rail train sets, and seven train stations with parking lots. Also included is the cost of feeder buses and supporting bus maintenance facilities. The cost for this alternative is less than the cost for light rail in part due to the reduced number of train stations.

PUBLIC INPUT REGARDING I-25 MODE FEASIBILITY ALTERNATIVES

The implementation scenarios and their projected performance results were presented at public meetings in September 1999 for information and to solicit citizen input. Attendees generally expressed support for widening I-25, HOV lanes, Powers/eastern bypass options, and rail transit. No strong support was voiced for bus service, a reversible HOV lane, or HOV/toll lanes.

The following is a brief summary of the input received regarding I-25 mode feasibility alternatives:

June 1999 Public Meeting: Four advertised public meetings were held in Monument, Briargate, downtown Colorado Springs and Fountain. Attendees were presented information regarding the initial list of 18 alternatives, the screening results, and the upcoming alternative evaluation process. They did not object to the elimination of seven alternatives (mostly rail options) found to be too expensive, too slow, or not likely to accommodate a significant volume of trips.

September 1999 Public Meetings: Three advertised public meetings were held in Monument, downtown Colorado Springs, and Fountain. Attendees were presented information regarding the evaluation of eleven alternatives, including an eight-lane freeway, a six-lane freeway, and a four-lane freeway with HOV lanes. The scenario with six general-purpose lanes plus HOV lanes had not yet been analyzed at that time. Options receiving the most support included widening I-25, eastern bypass routes, providing HOV lanes on I-25, and establishing light rail (more commonly mentioned than the heavier commuter rail). Attendees did not express support for regional express bus service, nor for high occupancy/toll lanes. Support was expressed for consideration of multi-modal packages of improvements.

The alternative providing for a six-lane I-25 freeway plus HOV lanes was developed after the September 1999 public meetings, in response to interest expressed from the public. Results for this alternative are reported above to facilitate comparison.

April 2000 Public Meetings: Three advertised public meetings were held in Monument, downtown Colorado Springs, and Fountain. Attendees were presented with information about the evaluation results to date, including two multi-modal, multi-phase improvement packages, built around the eight-lane freeway option and the six-lanes plus HOV option. Some supporters of I-25 expansion urged one-time construction of the ultimate design, as opposed to six-laning followed by eight-laning in a later phase. Citizens primarily from the Old North End Neighborhood expressed concern about existing noise from

I-25, and opposed capacity improvements in the corridor due to concerns over their potential to increase noise in the neighborhood. Generally, they favored diversion of earmarked I-25 capacity funding to expedite completion of Powers Boulevard improvements.

CONCLUSIONS

A first major conclusion from the alternatives analysis was that none of the transit or eastern bypass alternatives would provide effective relief for I-25 congestion. The reason for minimal time savings on I-25 for these scenarios was that although the alternative mode or route carried some traffic, the existing four-lane I-25 freeway would still be at capacity. *Relief for I-25 congestion would be most effective if provided on I-25 itself* – not in another type of vehicle, and not in another corridor 6, 8, 10, or even 20 miles east.

A second conclusion from the analysis was that a six-lane I-25 freeway (three lanes northbound and three southbound) would not be sufficient to meet projected travel demand in 2020. The projected 46-minute travel time for a peak-period trip on a six-lane I-25 freeway from downtown Colorado Springs to Monument represents a slight degradation, not an improvement, compared to today's congested conditions. Additional capacity is needed now to relieve existing congestion. Accordingly, further analysis focused on alternatives providing more capacity than a six-lane I-25 facility.

Chapter 5
Proposed Corridor Improvement Strategy

Introduction

Based on the results of the alternatives evaluation, development of final alternative packages was initiated. Project limits, sequencing, and multi-modal coordination were among the factors assessed in this effort. To address corridor demand in the year 2020, the packages needed to provide more capacity than the six-lane freeway alternative.

This phase of the analysis also included a preliminary inventory of environmental aspects of the I-25 corridor, to determine whether or not there were any "fatal flaws" that would make I-25 improvements infeasible. By this point, it had been determined that improvements elsewhere would not be adequately responsive to the transportation needs of the I-25 corridor. Therefore, the environmental inventory did not need to include more than 100 miles of eastern bypass corridors (combined length of Powers Boulevard, Marksheffel Road or Banning-Lewis Parkway and Front Range Toll Road), and now could focus on I-25 highway options.

Meeting Capacity Needs

Capacity improvements meeting the long-range transportation demand of the corridor were the foundation for the final alternative packages. It had been determined that six lanes through central Colorado Springs would not be adequate to meet future demand. The alternative providing eight lanes through central Colorado Springs and six lanes from Colorado Springs to Monument was found to meet the demand through 2020. A variation of this alternative, restricting the seventh and eighth lanes to carpool and bus use during the peak periods, was subsequently developed and determined to be nearly as effective. These two capacity alternatives are the only choices that avoid significant deterioration in I-25 peak-period travel times which today are already of serious concern in the region.

As noted earlier, project limits and project sequencing were two of the factors needing to be addressed in the final alternatives packages. The two factors are inter-related, since the extent of I-25 congestion is changing over time.

Consistent with past PPACG Regional Transportation Plans, the eight-lane freeway alternative was modeled initially with eight lanes from South Academy to Briargate Parkway, and six lanes from Briargate to Monument. Examination of the resulting traffic volumes, presented in **Table 14** *(see page 61)*, was useful in determining logical project termini for the ultimate capacity improvements.

In the earlier discussion of existing conditions in the corridor, it was noted that at a two-way volume of 90,000 vehicles per day, a four-lane freeway experiences unstable, congested traffic during the peak periods. Below are the 2020 capacity needs for various I-25 segments.

- **Pueblo County Line to State Highway 16/Interim Powers —** Unimproved, the existing four-lane freeway will remain uncongested, carrying volumes up to 66,000 vehicles per day by 2020.
- **State Highway 16 to South Academy Boulevard —** Unimproved, the existing four-lane freeway would carry 80,000 vehicles daily, nearing congested conditions by 2020.
- **South Academy Boulevard to South Circle Drive —** Carrying 91,000 vehicles per day, this section of I-25 would be congested as a four-lane facility, but not congested as a six-lane facility. Providing an eight-lane section for this three-mile stretch of the highway would not be necessary. Six lanes will be adequate even if the City of Colorado Springs improves airport access via an upgraded Drennan Road, connecting to I-25 either at South Academy Boulevard or a new interchange.

Table 14
YEAR 2020 PROJECTED I-25 TRAFFIC VOLUMES FOR THE 8-LANE ALTERNATIVE

From	To	# of Lanes	Average Weekday Volume
Pueblo County Line	SH 16/ Interim Powers	4	< 66,000
SH 16/ Interim Powers	S. Academy Blvd.	4	80,000
S. Academy Blvd.	S. Circle Drive	6	91,000
S. Circle Drive	US 24 Bypass (MLK)	6	105,000
US 24 Bypass	S. Nevada/Tejon	8	124,000
S. Nevada/Tejon	N. Academy Blvd.	8	140,000 to 172,000
N. Academy Blvd	Briargate Parkway	8	132,000
Briargate Parkway	SH105/Monument	6	112,000 to 125,000
SH105/Monument	Douglas County Line	4	84,000

- **South Circle Drive to US 24 Bypass** — This existing six-lane section will be adequate to carry 105,000 vehicles daily in 2020. Eight lanes, providing uncongested flow for daily volumes over 135,000, would not yet be needed here.
- **US 24 Bypass to South Nevada/Tejon** — Carrying 124,000 vehicles daily in 2020, this section of I-25 would be uncongested with eight lanes, or "nearing congestion" with six lanes. If the US 24 Bypass were improved as the result of the current City of Colorado Springs East-West Mobility Study, higher volumes could result.
- **South Nevada/Tejon to North Academy Boulevard** — Traffic demand ranging from 140,000 to 172,000 vehicles per day in this section would result in unstable, congested operations exceeding the capacity of a six-lane freeway. Eight lanes are needed to meet this demand.
- **North Academy Boulevard to Briargate Parkway** — A projected daily volume of 132,000 vehicles on six lanes in 2020 would be considered "nearing congestion." Eight lanes would meet the demand here.
- **Briargate Parkway to SH105/Monument** — Traffic in this section will vary from 112,000 to 125,000, clearly surpassing the capacity of a four-lane highway and well below the need for eight-lanes. A six-lane cross-section is appropriate here.
- **State Highway 105 (Monument)** — "Climbing lanes" north of the Monument weigh station provide significant traffic flow benefits here. A projected volume of 84,000 vehicles per day on four lanes in 2020 will put I-25 traffic to the north of this segment in the "nearing congestion" category.

For the year 2020, summarizing, the portion of the corridor between South Academy and State Highway 105 will need additional roadway capacity to provide acceptable traffic flow. By 2020, a six-lane cross section would be appropriate between South Academy and US 24 Bypass, as well as from Briargate to Monument. Eight lanes are needed from Briargate Parkway to South Nevada/Tejon and are recommended for continuation to the US 24 Bypass.

In the shorter term, there is not an immediate need for eight through-lanes to meet existing congestion. Current traffic exceeding 80,000 vehicles per day is at or nearing congestion between US 24 Bypass and North Academy Boulevard. Widening to six lanes in this section

will be adequate for 2010 and is feasible by 2010 with regard to available funding and construction logistics. Widening to eight lanes immediately, rather than first going to six lanes, would take longer to implement because there are interchanges in the corridor that can already accommodate six lanes, but not eight. For maximum cost-effectiveness, all improvements made to implement the six-lane phase should be designed to accommodate the ultimate eight-lane plan for this section.

Due to continued rapid development in northern El Paso County, the addition of capacity between Briargate Parkway and Monument is an emerging need. The projected volumes for 2020 are so far beyond the capacity of a four-lane freeway that congestion on the existing four-lane facility is clearly foreseeable by 2020.

Thus, regardless of whether the seventh and eighth lanes of I-25 would be constructed as general-purpose lanes or used as HOV lanes during peak periods, the following sequence of improvements is recommended:

1. Immediately address existing congestion by widening I-25 to six through-lanes between US 24 Bypass and Briargate Parkway. Design these improvements to accommodate later expansion to meet needs for 2020.
2. Promptly begin efforts to provide six through-lanes on I-25 between Briargate Parkway and State Highway 105 (Monument) by 2010.
3. Plan and design for future widening of I-25 to provide eight ultimate through-lanes as needed by 2020 between Briargate Parkway and US 24 Bypass, plus six through-lanes from US 24 Bypass to South Academy Boulevard.

The decision as to whether the seventh and eighth lanes on I-25 should be designed for general-purpose use or used as HOV lanes during peak periods is needed prior to the implementation of first-phase improvements.

Similarly, potential implementation of congestion management system (CMS) strategies is appropriately considered in the specification of first phase improvements, to ensure their compatibility with the ultimate capacity configuration.

CONGESTION MANAGEMENT SYSTEM (CMS) STRATEGIES

In the initial consideration of the long list of alternatives, reference was made to recommended strategies from the PPACG Congestion Management System (CMS) Plan, an element of the 2020 Regional Transportation Plan. CMS strategies do not provide additional physical capacity to the regional transportation system, but instead are intended to facilitate more efficient use of existing capacity. It was noted earlier in the alternatives analysis that these strategies would not be considered in lieu of capacity alternatives, but would be considered for potential implementation in conjunction with the preferred alternative.

The regional CMS Plan describes a broad spectrum of implementation strategies and indicates that the following may be appropriate for consideration in freeway corridors:

- Ramp metering
- Incident management
- Provision of storage space for disabled vehicles
- Provision of traffic condition information
- Selective on-ramp closures
- In-vehicle and highway system technology
- Direct access to park-and-rides for transit
- Bus/HOV bypasses at ramp meters
- Addition of general-purpose lanes

These corridor-specific CMS strategies are briefly discussed below.

Ramp metering is a long-established transportation system management strategy which regulates the flow of entering traffic at freeway on-ramps to optimize freeway traffic flow. Freeway sensors upstream from the regulated on-ramp detect traffic density and communicate to the ramp meter the rate of entry that will be most compatible with smooth traffic flow. Ramp metering has been used by CDOT on I-25

through Denver, and has been successfully used for years in other metropolitan areas. Colorado Springs already monitors the freeway's traffic flow from its Traffic Operations Center, and thus ramp metering is a logical strategy for use in the I-25 corridor. It is recommended that capacity improvements be designed to accommodate ramp metering, so that CDOT will be able to initiate its use as conditions may warrant.

Incident management for the I-25 Corridor is provided by the Colorado Department of Transportation, in partnership with the City of Colorado Springs.

Freeway surveillance cameras are used to monitor I-25 traffic flow at the City's Traffic Operations Center. When crashes, breakdowns, or other incidents are detected, the system enables authorities to assess the severity of the problem and to dispatch appropriate emergency personnel quickly. Corridor capacity improvements should be designed to accommodate and incorporate the continuing implementation of the Incident Management System.

Provision of storage space for disabled vehicles is beneficial in avoiding the significant traffic delay impacts that result from lane closures. Sufficient right-of-way is generally available in the I-25 corridor to accommodate standard 12-foot shoulders adjacent to both the inside and outside lanes in each direction of the freeway. Wherever feasible throughout the corridor, it is recommended that 12-foot shoulders be provided in conjunction with the recommended capacity improvements. Even when removed to the shoulder, disabled vehicles continue to cause a degree of "gaper's block," which is the slowing of passing motorists to look at the vehicle. Therefore, in conjunction with provision of adequate shoulders, it is advisable to remove disabled vehicles from the roadside in an expeditious manner, which can be facilitated by the Incident Management Program.

Provision of traffic condition information can be accomplished by various methods, several of which are already implemented in the Colorado Springs area. Video feed from the freeway traffic surveillance cameras is broadcast live via public access cable television, which can be used for last-minute pre-trip planning. Additionally, the video feed is available to the region's television and radio stations, and their news departments also receive special advisories from the Traffic Operations Center. Continually updated traffic camera images are also available via the Internet. CDOT also operates fixed and mobile variable message signs to communicate important traffic advisories to motorists on the road. Continued implementation of these methods is planned as part of the I-25 Incident Management Program.

Selective on-ramp closures can be made on a temporary basis as part of pre-planned detour systems already developed for the I-25 Incident Management Program. Permanent closure of substandard interchanges has been considered in conjunction with ongoing safety projects.

In-vehicle and highway system technology in the future may offer additional methods for disseminating traffic information to the motorist. Some vehicles already have on-board navigation systems that use satellite (global positioning system) technology to inform the motorist of his/her location relative to a mapped roadway system. Increasingly, in the future, these systems will be able to receive real-time traffic data and continually determine an optimal route to the driver's destination. In the long-term future, it may become possible to get increased capacity from existing roadways by transferring control of the vehicle from the driver to a control center. Currently, there is not sufficient wide-scale application of these technologies to warrant specialized design features for I-25, apart from continued implementation of the Incident Management Program.

Direct access to park-and-ride lots for transit is another freeway corridor strategy listed in the PPACG Congestion Management System Plan. Currently, the region's only park-and-ride lot with transit service is accessed via Corporate Drive, west of the I-25/Woodmen interchange. The Monument park-and-ride lot, serving carpoolers but lacking transit service, is to be

relocated to the northeast quadrant of the I-25/ SH 105 interchange. Existing transit service in the I-25 corridor is so limited that the significant expense of providing direct access ramps for buses does not appear to be warranted at this time.

A 1997 Regional Park-and-Ride Study conducted for the City of Colorado Springs indicated that the region should develop approximately one park-and-ride lot for every 30,000 residents. The Study recommended improvement of both the region's existing formal park-and-rides, plus provision of 24 new lots throughout the region. Four of the recommended new locations are within the I-25 corridor:

- Pikes Peak Community College (I-25 at South Academy Boulevard)
- Town of Fountain at I-25
- South Circle Drive at I-25 (World Arena)
- North Gate Road

Implementation of these recommended park-and-ride lots will be beneficial to I-25 operations by facilitating carpooling, and the lots may someday also feature freeway corridor bus service. Although rail transit alternatives are not recommended for implementation at this time, their potential future implementation could be facilitated by building the planned park-and-ride lots in close proximity to existing railroad rights-of-way.

Bus/HOV bypasses at ramp meters allow buses and carpools to pass by solo drivers who are waiting to enter the freeway at a metered on-ramp. Provision of these bypasses generally require freeway on-ramps to be built longer and wider than otherwise necessary. Their potential benefits are largely constrained by the lack of I-25 corridor bus service at the current time. As with freeway HOV lanes, improper use of the ramp meter bypasses by solo drivers will occur, creating an additional law enforcement burden. It is recommended that ramp meter bypasses be evaluated on a case-by-case basis in conjunction with capacity improvements, especially at interchanges with existing or proposed park-and-ride lots.

The **addition of general-purpose lanes**, a PPACG congestion management strategy, has been examined in this alternatives analysis as a capacity improvement. A related strategy is the provision of extended acceleration/deceleration lanes to accommodate safer merging for interchange on-ramp and off-ramp traffic. "Continuous" acceleration lanes are being constructed as part of the I-25 safety improvements between Bijou and Fillmore Streets. These lanes provide merging or diverging traffic more distance and time in which to find a safe gap for the lane change out of or into the freeway through-lane. The result is smoother flow of traffic on the mainline through-lanes. In areas with close spacing (e.g. one mile or less) between interchange ramps, the lanes can be continuous. The extended accel/decel lanes are not continuous in areas with significantly greater interchange spacing.

An additional CMS issue relevant to I-25 improvements is the potential impact on multi-use trails. As noted in earlier chapters, I-25 generally parallels the region's major north-south trail system, comprised of the New Santa Fe Trail, the Pikes Peak Greenway, and the Fountain Creek Regional Trail. At various locations in the corridor, east-west trails cross under I-25 to connect to the north-south system. Additionally, some streets that cross I-25 are designated on-street bicycle routes. It is recommended that I-25 capacity improvements be designed to accommodate and/or enhance affected bicycle and pedestrian facilities.

ENVIRONMENTAL ISSUES IMPACTING THE PROPOSED CORRIDOR IMPROVEMENTS

During the process of developing the Final Alternative Packages, a review of potential environmental issues in the corridor was prepared. An environmental inventory was prepared to document existing conditions in the affected environment of the corridor. The factors examined included:

- land use
- wetlands
- floodplains
- water quality
- farmland
- wildlife habitat

- threatened/endangered species
- environmental justice
- parks
- air quality
- visual impacts
- noise impacts
- historic resources
- hazardous waste and hazardous materials

Based on this inventory, the following key issues pertinent to the proposed action were identified:

- Wetlands, floodplains and water quality along Monument Creek and Fountain Creek.
- Threatened and endangered species, primarily the Preble's Meadow Jumping Mouse.
- Hazardous waste sites, primarily within central Colorado Springs.
- Air quality conformity throughout the corridor.
- Noise issues.

Each of these issues is briefly discussed below.

Wetlands/Floodplains/Water Quality: Interstate 25 roughly follows Monument Creek through northern El Paso County, then Fountain Creek, below the confluence of the two waterways. Interchange reconstruction and any proposed horizontal realignment of I-25 have the potential to cause water-related impacts in these waterways.

Preble's Meadow Jumping Mouse: The Preble's Meadow Jumping Mouse, officially designated as threatened by State and Federal wildlife agencies, is known to inhabit the Monument Creek and its tributaries in the Interstate 25 corridor. This mouse has been found as far south as the Cottonwood Creek confluence with Monument Creek (near the interchange of I-25 and Woodmen Road), and has not been found in central Colorado Springs. A Habitat Preservation Plan is under development to ensure that future development in northern Colorado Springs and El Paso County adequately takes into account the habitat needs of this threatened species.

Hazardous Waste: Additional right-of-way to accommodate I-25 corridor capacity improvements is most likely to be needed in the vicinity of proposed interchange improvements (e.g. Cimarron, Bijou, Fillmore, Nevada/Rockrimmon). Because remediation (clean-up) of contaminated soil or groundwater on such right-of-way is costly and time-consuming, acquisition of such parcels will be avoided if possible. Gasoline stations often are found at freeway interchanges, and their underground storage tanks generally require some on-site investigation.

Air Quality: As required under Federal conformity regulations, the PPACG 2020 Regional Transportation Plan and successive Transportation Improvement Programs were analyzed to determine projected total regional emissions of carbon monoxide. These analyses have included the assumption of eight lanes on Interstate 25, and have always passed the conformity requirements. The most recent analysis, performed for the Fiscal Year 2001-2006 TIP, indicated that carbon monoxide emissions in 2020 would total 221 tons per day, which is well within the corresponding emissions budget of 270 tons per day. This result was a scenario in which use of wintertime oxygenated fuels would no longer be required. Future air quality under the eight-lane I-25 scenario has been examined for regional carbon monoxide emissions, and does meet Federal requirements.

The Colorado Springs area is in air quality "maintenance" status, having recorded violations of the carbon monoxide standard in the 1970s

The Preble's Meadow Jumping Mouse held in a biologist's gloved hand.

and 1980s (but none since 1989). Improving traffic flow by increasing capacity may reduce total emissions regionally, but high-volume interchanges will need to be examined to ensure that new pollution "hotspots" do not result.

Air quality monitoring station along Cimarron Street, west of I-25.

Noise Issues: Traffic noise also will be a concern in the corridor. Noise barriers have been constructed at several locations along I-25 in Colorado Springs as mitigation for impacts from safety projects (southbound Fillmore to Bijou, and the Circle Drive interchange reconstruction). In these locations, predicted impacts met CDOT's noise abatement criteria, and mitigation was found to be feasible and reasonable. Mitigation is not provided in locations that do not meet these requirements.

The impact of increasing I-25 traffic from its current 108,000 vehicles daily (on four lanes) to 170,000 vehicles per day in 2020 is predicted to be an increase of about two decibels (on the A-weighted scale) at the homes, businesses and other properties located closest to the freeway. The noise prediction analysis is based on the noisiest hour of the day for the design year being considered (e.g. 2020).

As part of the environmental inventory, an acoustical engineer examined the I-25 corridor and identified the location of residential receptors that have the potential to be impacted by I-25 improvements. Field work and further analysis will be needed to determine the feasibility of noise mitigation at these locations.

Noise concerns have been raised by residents of the Old North End Neighborhood, which is located east of I-25 in the area between Uintah Street and Fillmore Street. In response to these concerns, CDOT completed the North End Neighborhood Noise Study in January 2000. The study examined the estimated impacts of recently completed I-25 safety improvements, including the issue of sound reflection from the new noise barrier west of I-25. The study concluded that the resulting noise increase was not sufficient to meet the noise abatement criteria. CDOT held public meetings to present the study findings to area residents. The matter remains an issue of concern for the neighborhood.

Although these key issues will be particularly relevant in the corridor, it is not anticipated that any of them would clearly preclude transportation capacity improvements. Before any clear environmental conclusions can be made, more detailed analysis will be needed to quantify specific impacts and potential mitigation based on the conceptual plans for proposed improvements. All of the issues required to be examined pursuant to the National Environmental Policy Act (NEPA) will be evaluated and documented in sufficient detail to satisfy the requirements of the applicable federal and state resource agencies.

As noted above, the noise issue will be further examined through the upcoming environmental analysis.

Noise monitoring along Interstate 25.

CORRIDOR IMPROVEMENTS STRATEGY

A three-phase program for capacity improvements was proposed and is shown in **Figure 19** *(see page 68)*:

PHASE 1 — Widen I-25 to six through-lanes between US 24 Bypass and Briargate Parkway, to address immediate capacity needs. These improvements would be designed to accommodate or otherwise not preclude further improvements scheduled for Phase 3.

PHASE 2 — Widen I-25 to six through-lanes between Briargate Parkway and State Highway 105 (Monument), to address emerging capacity needs in this high-growth area.

PHASE 3 — Widen I-25 to eight through-lanes between US 24 Bypass and Briargate Parkway, and to six lanes from South Academy Boulevard to US 24 Bypass. The added lanes from US 24 Bypass to Briargate Parkway would either be general-purpose lanes, or lanes that in peak periods would be reserved for use only by High Occupancy Vehicles (carpools and buses). Cross-sections for these two options are depicted in **Figure 20** *(see page 69)*.

CONGESTION MANAGEMENT FEATURES

For optimal traffic flow and congestion management, the above improvements should be designed with extended or continuous acceleration/deceleration lanes. In addition, the improvements would include continued implementation of the I-25 Incident Management Program, and provision for ramp metering of freeway on-ramps. Six park-and-ride lots are recommended for provision or improvement:

PHASE 1 — Relocate Monument and Woodmen park-and-ride lots. Provide new park-and-ride lot near South Academy Boulevard interchange.

PHASE 2 — Provide new park-and-ride lots near I-25 interchanges with State Highway 85/87 (Fountain), and South Circle Drive.

PHASE 3 — Provide new park-and-ride lot near I-25/Northgate interchange.

This phasing for park-and-ride provision is consistent with the priorities recommended in a 1997 comprehensive park-and-ride study prepared for the City of Colorado Springs.

POWERS BOULEVARD IMPROVEMENTS

Powers Boulevard improvements currently planned through 2020 were assumed as future base case conditions for the alternatives analysis. Completion of Powers Boulevard as an expressway will provide a valuable alternate route for incident management purposes. However, Powers Boulevard improvements are not included as part of the I-25 capacity improvements package. A separate environmental evaluation under NEPA will be prepared for the Powers Boulevard corridor.

Public Input on Proposed Strategy: Information regarding the Corridor Improvement Strategy options was provided at a series of advertised public meetings held in April 2000. Additionally, presentations were made at that time to committees of the Pikes Peak Area Council of Governments, including PPACG's Urban Area Policy Committee, which is the decision-making body of this metropolitan planning organization.

At the I-25 public meetings, some citizens urged that the ultimate capacity improvements be implemented in one step, to avoid any unnecessary future reconstruction and to minimize overall costs. However, as noted above, eight-lane capacity is not needed to meet near-term demand. Also, due to interchange modification issues and anticipated funding schedules, a phased approach can provide additional capacity more expeditiously than construction of ultimate capacity in a single construction phase.

Attendees of the I-25 public meetings generally agreed that I-25 congestion is a problem, but had varying opinions as to the best solutions. Residents from central Colorado Springs urged provision of an eastern bypass freeway and increased emphasis on alternate modes as efforts to avoid increased I-25 traffic through the City. Residents of the Old North End Neighborhood expressed their continuing concern over traffic noise.

Figure 19
PROPOSED I-25 CORRIDOR IMPROVEMENT STRATEGY

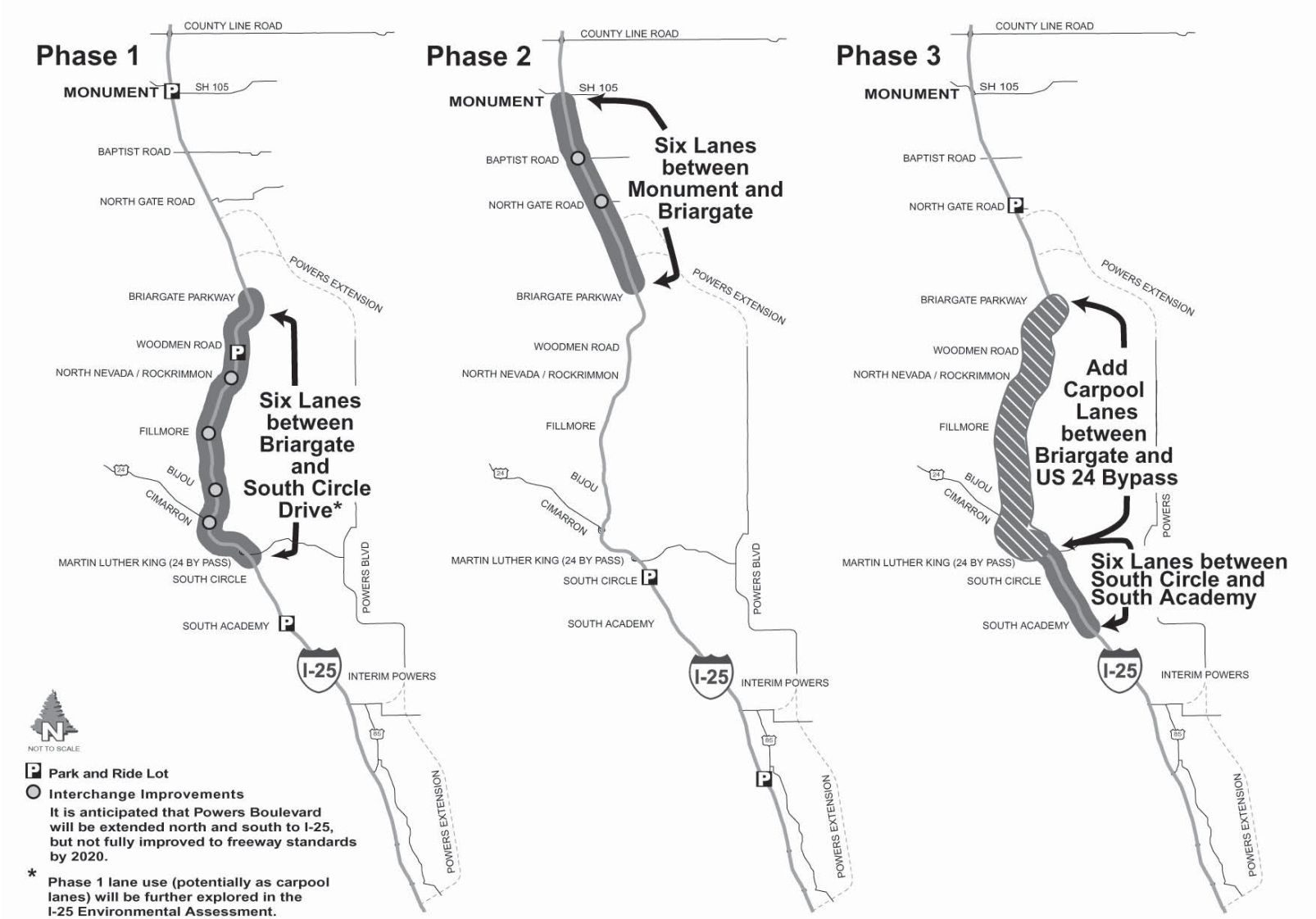
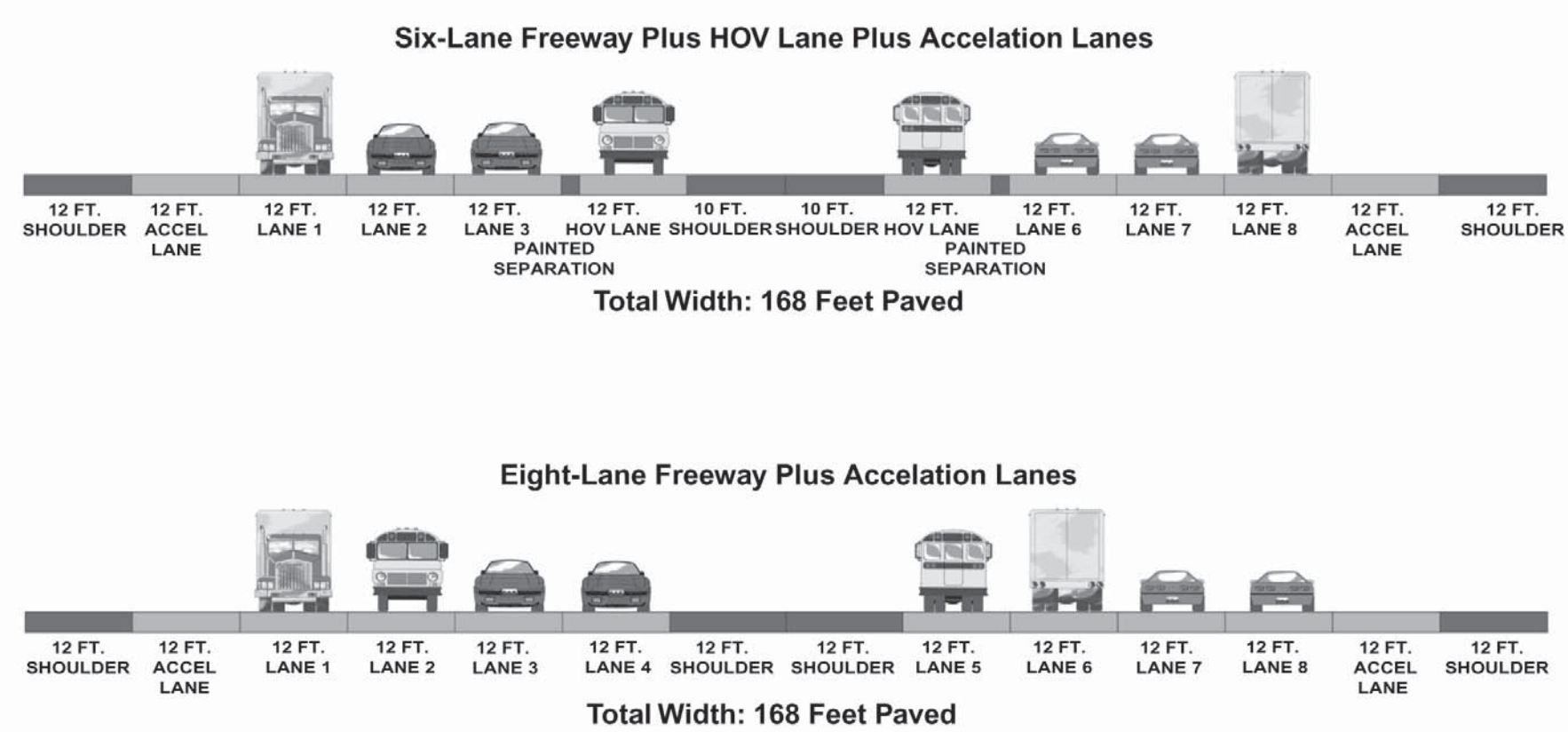


Figure 20
I-25 CROSS SECTIONS



November 2000 Public Meetings:

Three advertised public meetings were held in Monument, downtown Colorado Springs, and Fountain. Attendees were presented information regarding the proposed three-phase approach for providing additional general purpose lanes, high-occupancy vehicle lanes, and park-and-ride facilities. Attendees were asked to identify the I-25 corridor environmental concerns most important to them. From their responses, the top issues include:

- air quality
- noise
- visual impacts
- land use/neighborhoods
- floodplains/drainage

ADDITIONAL PERSPECTIVE ON HOV LANES

Comparison of general-purpose use and HOV use for the proposed seventh and eighth through-lanes is a complicated matter. At first glance, general-purpose lanes seem preferable because they would be slightly less expensive, and would serve more vehicle trips in the year 2020.

In the Pikes Peak region... further efforts to promote alternate mode use will need to address incentives for ridesharing.

Looking further, however, the HOV operation offers more flexibility to serve alternate modes, which may become more important after 2020.

Based on land use constraints and interchange reconstruction costs, it seems unlikely that more than eight through-lanes will ever be built through the corridor. Given that the ultimate number of lanes is limited, in the long run it will be important to use them as efficiently as possible. This observation is echoed in the City of Colorado Springs Draft Comprehensive Plan, Objective T1 (Transportation Planning): "Opportunities for expanding the roadway system within established areas of the city are limited. Therefore, increased efficiency in the use of the existing network and an emphasis on increased mode choice and access is warranted."

As a matter of public policy, the transportation and land use plans of the region support efforts to encourage transportation by means other than single occupant vehicle use. Examples include:

- *PPACG 2020 Regional Transportation Plan,* Alternate Modes Goal – "Develop and promote transportation modes offering alternatives to the single-occupant vehicle."
- *City of Colorado Springs Intermodal Transportation Plan* (Interim Policy Document, May 2000), Intermodalism Goal: "Develop programs and infrastructure to encourage the use of high occupancy vehicles (HOVs), such as buses, vans and carpools."
- *City of Colorado Springs Draft Comprehensive Plan,* Strategy T 202a – "Develop a transportation system that increases mobility options, including alternative ways to travel and strategies to manage demand."

To many, promotion of "alternate modes" suggests bus or light rail transit, but carpooling is the second most-used transportation mode in the Pikes Peak region, with more participation than transit, bicycle use and walking combined. Further efforts to promote alternate mode use will need to address incentives for ridesharing.

One interpretation of the proposed HOV lane approach is that it is in fact an eight-lane alternative, but it provides a travel speed incentive for carpooling during peak hours. Intuitively, I-25 seems to be the most logical roadway in the Pikes Peak Region for HOV treatment. It is widely recognized that carpooling and vanpooling are more viable for longer trips – the type of trips for which I-25 is ideally suited – than for shorter trips. If HOV operation is not viable on I-25, it is unlikely to be provided on the lesser roadways in the region.

The choice between HOV lanes or general-purpose lanes for the third phase of I-25 could be deferred for nearly a decade, if not for the

fact that ultimate design has an impact on the design of the immediate first phase. In fact, the decision could still be deferred, as long as the first phase improvements do not preclude future options.

At issue is the recommended two-foot safety buffer separating the HOV lanes from general traffic. If this extra width is not provided for from the inception, it may not be feasible to provide later (e.g. taking the width from the freeway's inside shoulder could position vehicle axle loading on the longitudinal seams in the pavement, resulting in long-term roadway damage). If the extra width were provided from the outset but ultimately not used for a buffer, the width could be added to the freeway's inside shoulder, making it a wider, safer place to hold a disabled vehicle. An investment in the extra pavement width today (also, extra width for I-25 bridge structures) would keep both options open for the future.

An additional perspective pertinent to the decision is offered by the Federal Highway Administration (FHWA) in "Federal-Aid Highway Program Guidance on High Occupancy Vehicle Lanes." The paper indicates that FHWA "strongly supports HOV lanes as a cost-effective and environmentally friendly option to move people along congested city and suburban routes." The paper adds that, "HOV lanes are not appropriate in every location or for every situation. Even after they are installed, changes happen in land use, the kinds of trips people take, the time people travel, and the level of congestion that may warrant adjustment in the operation of the HOV lanes." Adjusting the operation of the lanes typically implies changing the auto occupancy requirement or the hours of HOV-only use, but can extend all the way to eliminating HOV requirements, as was done on two New Jersey roadways in 1999.

Use of new lanes for peak-period HOV operation is recommended in the third phase of corridor improvements (I-25's seventh and eighth through-lanes), rather than the first phase (I-25's fifth and sixth through-lanes), for better overall integration with other modal facilities. HOV use would be reinforced by the addition of new park-and-ride lots plus potential future transit service in the corridor, which are not yet funded (a transit funding initiative in 1999 failed to win voter approval). Additionally, the potential market for carpooling will increase over time with overall traffic volume in the corridor. Accelerating HOV lane implementation to the first phase, on the fifth and sixth through-lanes, could result in underused HOV lanes, thus undermining public acceptance of this mode in the long term.

REQUEST BY REGIONAL PLANNING AGENCY

The draft Mode Feasibility Alternatives Analysis was presented to the Pikes Peak Area Council of Governments (PPACG) for possible action on November 8, 2000. PPACG's Urban Area Policy Committee and Board of Directors approved the report with three "modifications":

- The I-25 Environmental Assessment should further explore the potential for the first pair of added lanes (lanes 5 and 6) to be used as HOV lanes.
- The EA should include an analysis of pavement alternatives, as well as other noise mitigation measures.
- Intergovernmental partnerships involving Springs Transit, CDOT and local communities should be accelerated to plan for I-25 corridor express transit service and development of park-and-ride lots.

CONCLUSION

To maintain maximum flexibility for meeting the future needs of the I-25 corridor, it is recommended that corridor improvements through central Colorado Springs be designed to accommodate an ultimate cross-section of six through-lanes plus buffer-separated high-occupancy vehicle lanes that would be open to general traffic during non-peak periods. Additional recommendations regarding phasing and congestion management/alternate mode features were discussed earlier in this chapter. The general scope and phasing of the recommended improvements was diagrammed in **Figure 19** and is described in **Table 15** *(see page 72)*.

The detailed environmental analysis necessary for completion of the I-25 Environmental Assessment (EA) will focus on this proposed corridor improvement strategy, as well as the No-Action scenario.

Table 15
PROPOSED ACTION FOR I-25 CORRIDOR CAPACITY IMPROVEMENTS

System Element	Time Frame	Proposed Action
Widen I-25 to 6 General Purpose Lanes	Phase 1 Phase 2 Phase 3	South Circle Drive to Briargate Briargate to Monument South Academy to US 24 Bypass
Add I-25 High Occupancy Vehicle Lanes	Phase 3*	US 24 Bypass to Briargate (Restricted use in peak periods; unrestricted use in off-peak hours.)
Park-and-Ride/Carpool Lots	Phase 1 Phase 2 Phase 3	Improve Monument, Woodmen; Add at S. Academy. Add at South Circle; Add at SH85/87 (Fountain). Add at Northgate Boulevard.
Transit Accommodation	All Phases Phase 3	Locate park-and-ride/carpool lots for maximum flexibility to accommodate future transit options, where feasible. Peak-period HOV lanes would be available for transit use.
Congestion Management	All Phases All Phases All Phases	Design freeway on-ramps to provide for Ramp Metering. Continue implementing Incident Management Program. Provide continuous acceleration/deceleration lanes where feasible.
Multi-Use Trails	All Phases	Design all above improvements for maximum compatibility with regional trails system.

Note: The above scenario assumes implementation of all other system improvements called for in the PPACG 2020 Long Range Transportation Plan, including *I-25 safety improvements* and *Powers Boulevard improvements.*

* Potential HOV implementation for Phase I will be further considered in the I-25 Environmental Assessment, as requested by PPACG.