



**I-225 Major Investment Study
Parker Road to Interstate 70**

Final Report

September 2001

i 225
MAJOR INVESTMENT STUDY

Submitted By:



PARSONS TRANSPORTATION GROUP



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EXECUTIVE SUMMARY

As part of RTD's *Guide the Ride* initiative, the I-225 corridor was identified as one of the primary corridors to incorporate rail transit connecting the East and Southeast Corridors. After this initiative failed in November 1997, the RTD Board pursued a course of action that included the conduct of several major investment studies (MIS) throughout the Denver Metropolitan Area. One of these MIS's included the investigation of the area between Interstate 70 and Parker Road along the I-225 corridor.

It was felt that a forum for public input was lacking in the previous *Guide the Ride* initiative and that the MIS process would provide a structured approach to gain public interest while identifying a locally preferred alternative to guide transportation investment in the corridor.

Specifically, the purpose of the I-225 MIS was to identify a mix of conceptual alternatives, screen those that would not satisfy certain evaluation criteria, perform a detailed analysis on a short-list of alternatives, and arrive at a locally preferred alternative (LPA). This process would balance various interests and impacts including mobility, cost, public support, environmental impacts, and community impacts. This is consistent with ISTEA and TEA-21, as well as the Federal Highway and Federal Transit Administration's guidance regarding major transportation investments.

Study Area

The area of study for the I-225 MIS is bounded by 56th Avenue north of Montbello; Peoria Street to the west, Chambers Road to the east, and Parker Road to the south (**see Figure E-1**). Three jurisdictions are affected by this MIS including the City and County of Denver, the City of Aurora, and the City of Greenwood Village.

Planning Process for the MIS

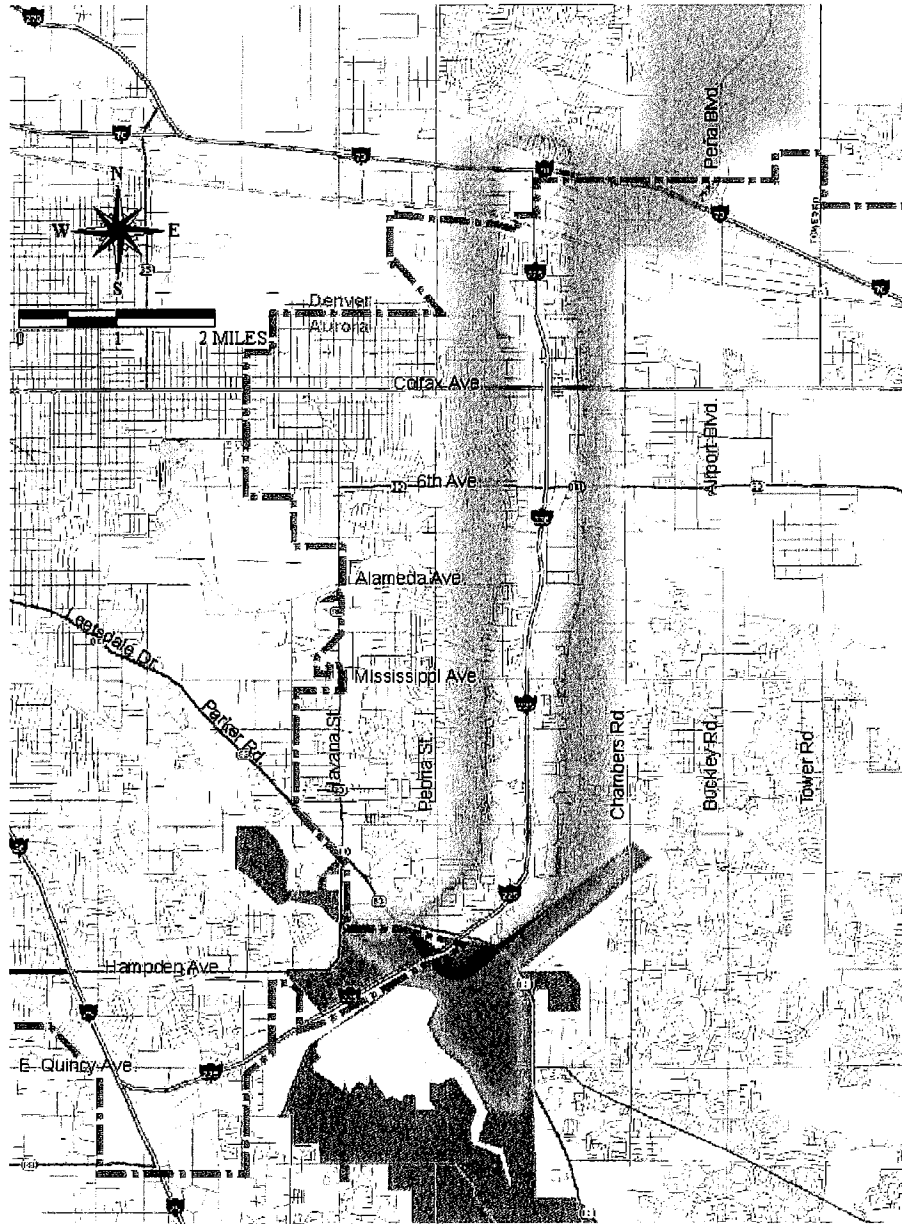
The I-225 MIS followed a standardized set of procedures to arrive at the preferred set of transportation investments for the corridor. While each of the steps was distinct, several may have been in process at the same time as new information was developed and analyzed. Input from public and agency participants was ongoing throughout the process. The following are the primary tasks involved during the I-225 MIS process:

- Data Collection and Draft Problem Definition
- Define Criteria for a Two-Stage Evaluation Process
- Develop a Wide Range of Potential Solutions
- Preliminary Evaluation of Potential Solutions
- Detailed Evaluation of Potential Solutions
- Presentation of Study Results and Recommendations

Public Involvement Structure

The public involvement process for the I-225 MIS was designed to solicit input, review, and comment from diverse constituencies throughout the MIS process.

Figure E-1: Study Area Map



Advisory Committees

Three formal standing committees were established at the outset of the study and played a significant role in the I-225 MIS planning process. These three advisory committees are described below:

- **Technical Advisory Committee (TAC)** – Composed of agency representatives with technical knowledge who could offer input on technical corridor issues, and advise on the merits of particular investment strategies, including environmental impacts, cost effectiveness, etc.
- **Policy Advisory Committee (PAC)** – Composed of key elected or appointed agency and government representatives who were familiar with policy procedures and issues regarding transportation projects.
- **Citizen Consultation Group (CCG)** – Composed of volunteer individual members and representatives from interested community organizations, with an emphasis on representing neighborhoods and businesses in the study corridor.

Public Outreach Methods

The public involvement process for the I-225 MIS also included an active outreach program to publicize the detailed alternatives under consideration and to solicit the opinions and comments of area residents and businesses. The following public outreach efforts were included during the I-225 MIS:

- News Releases
- Media Advisories
- Postcards
- Flyers
- Advertising
- Newsletters
- Website
- Open House Meetings
- Presentations to Neighborhood and Business Organizations
- Intergovernmental Briefings
- Sample of News Clips, Media Coverage

Purpose and Need

The purpose of the I-225 Corridor MIS was to identify the issues and the transportation investments which will enable I-225 to be an effective element in the area's long-range transportation system.

The need for the study has been demonstrated by the initial corridor analysis. As the preliminary information indicates, I-225 clearly provides an essential link in the Denver metro area's long-range transportation plan. The corridor as it now exists does not have sufficient capacity or facilities to handle increased volumes from employment growth within the corridor,

or from the remainder of the metro transportation system. A regional transit system requires adequate linkages to be successful, and the absence of I-225 would severely inhibit the effectiveness of transit in the Southeast and East Transportation corridors and the eastern metro area.

Certain sections of the I-225 Corridor are already experiencing congestion during peak periods. Without transportation investments, I-225 is forecast to become congested to the point of immobility by the year 2020. Without corrective measures, the addition of thousands of new employees in the corridor will only compound this situation. Therefore, this MIS process is an opportunity to develop solutions for the I-225 Corridor before this situation occurs.

Development and Screening of Alternatives

Conceptual level screening for the I-225 Corridor is one step in the MIS process, and has been prepared to identify the criteria that were used to evaluate a broad range of alternatives that have been considered for the corridor. It also served as documentation of those alternatives that are to be advanced to the detailed evaluation phase of the MIS.

Transportation Technology Overview

An overview of the various transportation technologies was presented prior to the conduct of the screening phases. This activity was developed to describe the relative operational characteristics of each mode and assist in identifying those technologies most appropriate for the I-225 corridor. Attributes were defined using a standardized list of criteria and include:

- Person/vehicle capacity
- Guideway capacity
- Running surface
- Vehicle control
- Speed
- Power supply
- Propulsion
- Suspension
- Service type
- Capital cost per mile

Specific transportation technologies considered are listed below:

- Advanced (dual propulsion) bus
- Light rail transit
- Commuter rail
- Heavy rail
- People mover
- Automated guideway transit
- Magnetic levitation
- Personal rapid transit
- Monorail

- Automobile
- Bicycle

Pre-Screening and Screening Criteria

The *I-225 Major Investment Study* employed a two-step screening process using criteria defined by both RTD's *MIS Guidance Manual*, which establishes a consistent basis of comparison for each MIS conducted, and corridor-specific criteria developed by the consultant team. A pre-screening analysis, sometimes referenced as a "fatal flaw analysis", identified alternatives that did not meet pre-screening criteria. At the pre-screening level, potential alternatives with excessive costs or impacts were identified for elimination. Pre-screening criteria were expressed in such a way as to yield yes/no answers.

Those alternatives that advanced beyond the "yes-no" responses associated with the pre-screening process were then evaluated against screening criteria. The criteria used in this second step were also defined in RTD's *MIS Guidance Manual* and had matching corridor-level criteria developed by the consultant team. Criteria were expressed in such a way as to identify the degree to which an alternative (or its options) addresses the criteria.

Alternatives Advanced to Detailed Evaluation

At the conclusion of the conceptual screening process, five alternatives were recommended for advancement to the detailed evaluation process. These recommendations were presented to the project's Citizen Consultation Group (CCG), Technical Advisory Committee (TAC), and Policy Advisory Committee (PAC) for input, guidance, and direction. Furthermore, the RTD Board of Directors was briefed on the status of the project and the recommended alternatives to be advanced to the detailed evaluation of alternatives. All input received was favorable.

The five alternatives advanced to detailed evaluation include:

- No Action
- Transportation Management
- Freeway Lane Additions (8-lane)
- LRT in median
- Commuter Rail in median

Detailed Evaluation

The detailed evaluation phase provided additional definition for each of the alternatives, including more definitive alignments and generalized station locations. Cost estimates were developed to better differentiate between alternatives, as were the development of ridership forecasts. Information to address community and environmental impacts that would be associated with each of these detailed alternatives was also prepared.

These detailed evaluation efforts were presented to the project's three advisory committees, the general public, and the RTD Board of Directors. At the conclusion of the detailed evaluation process, a recommendation was forwarded to the RTD Board of Directors for the selection of a locally preferred alternative.

As mentioned earlier, five alternatives were advanced to the Detailed Evaluation phase of the MIS. The first round of detailed evaluation, completed in June/July 1999, addressed each of these alternatives. At the conclusion of this review, the following action was taken:

- The Commuter Rail (DMU) alternative was eliminated from further consideration due to operational headway and vehicle incompatibilities with the East or Southeast Corridors.

Therefore, the alternatives that were carried into detailed evaluation included:

- **No Action**
- **Transportation Management/Enhanced Bus**
- **Freeway Widening**
- **Light Rail Transit (LRT)** - Four alternative alignments were considered to address design options that would potentially serve the Aurora City Center, the Fitzsimons/UCHSC campus, and the Gateway area. The base alignment (LRT 1) was modified during the first round of detailed evaluation (June/July 1999), eliminating the LRT alignment in the median of I-225 from Colfax to I-70. The subsequent base alignment was revised north of Colfax, passing through the Fitzsimons/UCHSC campus and along Peoria to Smith Road where it would intersect with the East Corridor commuter rail line.
 - **LRT 1 (M-F)**
Median of I-225 Parker to Colfax, thru Fitzsimons, along Peoria to Smith Road.
 - **LRT 2 (M-F-G)**
Median of I-225 Parker to Colfax with an extension north of I-70 along 40th through Gateway to 40th/Pena.
 - **LRT 3 (M-CC-F)**
Median of I-225 Parker to Exposition, thru Aurora City Center, thru Fitzsimons, along Peoria to Smith Road.
 - **LRT 4 (M-CC-F-G)**
Median of I-225 to Exposition, City Center, Fitzsimons, and Gateway.

Evaluation Criteria

A clear understanding of the criteria used to evaluate the alternatives is critical for a meaningful interpretation of the results. RTD's Guidance Manual provides the basis for developing the detailed evaluation criteria, which are categorized into four general areas:

- Cost Measures
- Effectiveness
- Cost-Effectiveness
- Community and Environmental Impacts

Each of these general categories and their supporting criteria were used in the detailed evaluation.

Locally Preferred Alternative

The results of the detailed evaluation were presented to the TAC, PAC, and CCG for comment and reaction. As mentioned previously in this report, detailed evaluation results were presented to the project advisory committees (and the public) on two occasions: first in June/July 1999 and second in September 2000. The latter results incorporated updated demographic data. This report only presents results from the latest evaluation effort which was the basis for all action taken by project stakeholders.

Of the four remaining alternatives, the following packages were configured from the best elements of each alternative:

- Package 1: No-Build
- Package 2: Transportation Management/Enhanced Bus Network
- Package 3: Eight-lane freeway widening
- Package 4: LRT Option 1 (Median-Fitzsimons)
- Package 5: LRT Option 2 (Median-Fitzsimons-Gateway)
- Package 6: LRT Option 3 (Median-City Center-Fitzsimons)
- Package 7: LRT Option 4 (Median-City Center-Fitzsimons-Gateway)
- Package 8: Freeway widening combined with LRT Option 3

Package 8 received the greatest level of support for the following reasons:

- The cost of providing an additional through lane per each direction is minimal (\$28 M).
- It has received the most support from the TAC.
- Provides an additional 9,200 linked transit trips; 7,800 which use the LRT.
- It provides a reasonable cost per new rider of \$17.
- Responds to community input.
- Meets project goals.

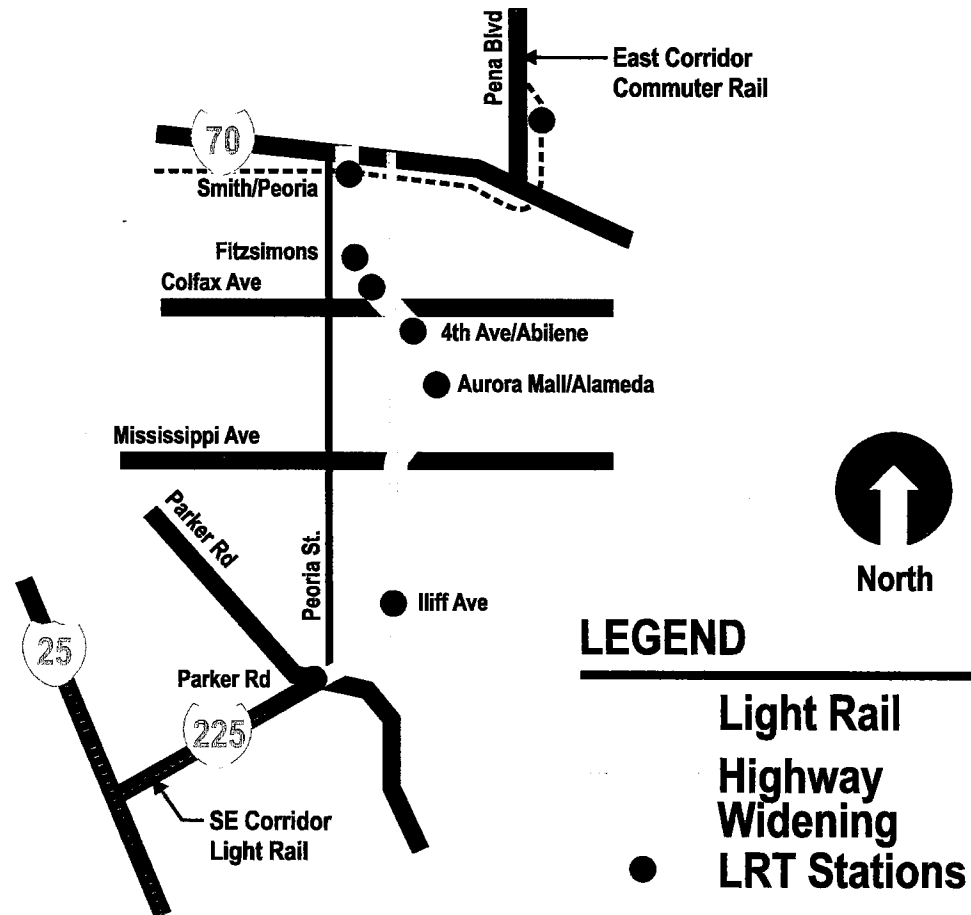
Summary Description of the LPA

The LPA (see **Figure E-2**) includes the expansion of an assumed 6-lane freeway to an eight-lane freeway between Interstate 70 and Parker Road; a distance of roughly 8 miles. The LRT portion of this LPA begins at Nine-Mile park-n-Ride at the intersection of Parker Road and I-225. This alignment continues northward in the median of I-225 to Exposition Avenue where it leaves the median and spans the northbound lanes eastward into the Aurora Mall property. It then follows the south circulator road within the Aurora Mall property and abuts the western edge of Sable Blvd. Continuing north, the LRT alignment is grade-separated over Alameda Avenue, returns to grade, and turns westward at Ellsworth Avenue. It maintains at-grade until spanning the northbound lanes again and returning to the median of I-225.

From the median, it continues northward toward Colfax Avenue where it flies over the southbound lanes of I-225 and parallels Tollgate Creek to a grade-separated structure at Colfax Avenue. The LRT alignment continues north, adjacent to the east side of Potomac Avenue (which is to become part of the Sand Creek Parkway). The Colfax Station will be located on the east side of the proposed Sand Creek Parkway between Colfax Avenue and 17th Place.

Figure E-2: Locally Preferred Alternative

- ▶ **LRT Improvements**
 - Station Locations**
 - Parker Road
 - Iliff Avenue
 - Aurora Mall/Alameda
 - 4th Avenue/Abilene Street
 - Colfax Avenue
 - Fitzsimons/UCHSC
 - Smith Road/Peoria
 - Service Frequency**
 - Peak: 8/hour/direction
 - Base: 4/hour/direction
- ▶ **Highway Widening**
 - Parker Road to I-70**
 - Widened to 8 Lanes**
- ▶ **Bus Service**
 - Reconfigured to Serve**
 - LRT Stations**
- ▶ **TSM Improvements**



North of the Colfax Station, the LRT alignment then turns west just south of the Sand Creek Parkway/Montview Boulevard intersection with an at-grade crossing of Sand Creek Parkway. The tracks will proceed west on Montview Boulevard along the south side of the roadway to a point west of the Montview Boulevard/Ursula Street intersection. This general location is being planned to serve as the focus of the Fitzsimons Commons, where the Fitzsimons Station will be located.

From this point, the LRT will cross Montview Boulevard and parallel the north side of Montview Boulevard to the western boundary of the site. As the LRT approaches Peoria Street, it will turn northward, along the east side of Peoria Street, crossing Sand Creek and terminating at the Union Pacific Railroad near Smith Road.

The possible extension of LRT from Smith/Peoria Station through the Montbello community to 40th and Pena totals 3 miles and will be re-examined during the Preliminary Engineering/Environmental Impact Statement phase of the project.

Costs

The recommended corridor investment is estimated to have a total capital cost of \$364.3 million, comprising of the following elements:

- \$332.8 million for LRT and bus network
- \$28.2 million for the 8-lane widening
- \$3.3 million for TM improvements

The annual operating and maintenance cost is estimated at \$12.9 million, including:

- \$12.8 million for LRT and bus network (\$6.7 million and \$6.1 million respectively)
- \$0.16 million for the 8-lane widening
- \$0.016 million for TM improvements

Benefits

The combined LRT Option 3/Freeway Widening Alternative would provide a number of transportation benefits to the corridor in the Year 2020 including:

- Increasing linked transit trips by 9,200 per day
- Providing LRT service to an additional 7,800 patrons
- Reducing regional person-hours of delay by 1,500 per day
- Produces the lowest number of lane-mile hours with severe, pervasive congestion second to the freeway-only alternative.
- Provides competitive travel times to automobile between Lincoln Avenue and Gateway Park.
- Allows for the greatest opportunity to implement transit-oriented development within the Denver urbanized area.
- Connects major employment centers including the Aurora City Center, Downtown Denver, Denver International Airport, Denver Tech Center, and Fitzsimons with rail transit.

SECTION 1: INTRODUCTION

As part of RTD's *Guide the Ride* initiative, the I-225 corridor was identified as one of the primary corridors to incorporate rail transit connecting the East and Southeast Corridors. After this initiative failed in November 1997, the RTD Board pursued a course of action that included the conduct of several major investment studies (MIS) throughout the Denver Metropolitan Area. One of these MIS's included the investigation of the area between Interstate 70 and Parker Road along the I-225 corridor.

It was felt that a forum for public input was lacking in the previous *Guide the Ride* initiative and that the MIS process would provide a structured approach to gain public interest while identifying a locally preferred alternative to guide transportation investment in the corridor.

Specifically, the purpose of the I-225 MIS was to identify a mix of conceptual alternatives, screen those that would not satisfy certain evaluation criteria, perform a detailed analysis on a short-list of alternatives, and arrive at a locally preferred alternative (LPA). This process would balance various interests and impacts including mobility, cost, public support, environmental impacts, and community impacts. This is consistent with ISTEA and TEA-21, as well as the Federal Highway and Federal Transit Administration's guidance regarding major transportation investments.

What is an MIS?

To achieve an equitable distribution of limited funds, resources have been re-directed toward identifying transportation corridors and multi-modal investments that provide the greatest potential for improved region-wide mobility. The MIS is the vehicle used to evaluate and select these investments, particularly for those projects that may use federal funds or are considered locally significant transportation investments. The MIS process requires the consideration of a wide range of transportation improvements for a corridor. Each potential improvement or mode is subjected to a standardized process to objectively evaluate and identify the key transportation improvements (e.g., freeway, transit, or a combination) that most effectively meet a corridor's mobility needs and, thus, warrant expenditure of public funds. This process includes public and agency involvement, as well as technical research. Nationally, most MIS processes to date have resulted in recommendations for multi-modal corridor investments.

Following completion of the MIS process, the study's recommendations regarding transportation improvements, along with approximate costs, are included in the region's long-range plan, in this case MetroVision 2020 and the 2020 Regional Transportation Plan (RTP) developed by the Denver Regional Council of Governments (DRCOG).

It is important to note that the MIS process results in a relatively general definition of the scope of improvements which should be made. After MIS recommendations are adopted into the RTP, the identified transportation improvements must then undergo detailed planning studies and evaluation in accordance with State and Federal requirements, including preliminary engineering and National Environmental Policy Act (NEPA) documentation.

Study Area

The area of study for the I-225 MIS is bounded by 56th Avenue north of Montbello; Peoria Street to the west, Chambers Road to the east, and Parker Road to the south (**see Figure 1-1**). Three jurisdictions are affected by this MIS including the City and County of Denver, the City of Aurora, and the City of Greenwood Village.

For the most part, this portion of Aurora is considered fully developed west of I-225 between Parker Road and Interstate 70. Opportunities still exist for expansion of residential and commercial properties east of the corridor.

Major development within the study area is occurring within the Gateway Office Park near 40th and Pena Blvd., redevelopment of the Fitzsimons Army Base by the University of Colorado, and at the City of Aurora's City Center complex near Alameda Avenue and Sable Blvd. The I-225 MIS study area is situated between two adjacent corridors that have been previously examined by the Colorado Department of Transportation, the Denver Regional Council of Governments, and RTD for major transportation investments. The East Corridor, extending from downtown Denver to Denver International Airport, is located along the Union Pacific Railroad right-of-way on the south side of I-70 and along Pena Boulevard. The East Corridor MIS was completed in 1997 and identified a commuter rail alternative using diesel multiple unit (DMU) vehicles on a single track with sidings (20-minute headways) as the locally preferred alternative. The Southeast Corridor MIS examined alternatives along I-25 south of Broadway. Completed in 1997, it identified a Light Rail Transit (LRT) alternative from Broadway to Lincoln Avenue (15-minute headways), including a branch line along I-225 to Parker Road. The Southeast Corridor EIS was completed in November 1999 and construction of the corridor improvements is scheduled to begin in late 2001.

Planning Process for the MIS

The I-225 MIS followed a standardized set of procedures to arrive at the preferred set of transportation investments for the corridor. While each of the steps was distinct, several may have been in process at the same time as new information was developed and analyzed. Input from public and agency participants was ongoing throughout the process. The following is a brief and general description of the primary tasks involved during the I-225 MIS process. More specific details are provided in subsequent sections of this report.

Data Collection and Draft Problem Definition

Data about current and future traffic conditions, land use, demographics, and travel patterns were among the information reviewed and analyzed to develop a clear picture of the transportation problem(s) in the I-225 Corridor in the Year 2020 that are to be addressed by the MIS process.

Information collected and the resulting corridor transportation problem definition were presented to the members of the Technical and Policy Advisory Committees (TAC and PAC), to the Citizens Consultation Group (CCG), and at initial public open houses for review and comment. The intent of this initial round of communications was for study participants and observers to understand the transportation conditions and issues that would be studied during the course of the MIS.