56TH AVENUE

Corridor Study

Planning and Environment Linkage Study
Havana Street to Peña Boulevard

Prepared for:

DENVER
THE MILE HIGH CITY

in partnership with

U.S. Department of Transportation
Federal Highway Administration

and

DOT
DEPARTMENT OF TRANSPORTATION

URS

56th Avenue, Havana Street to Peña Boulevard

CORRIDOR STUDY

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Prepared for:

City and County of Denver

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U.S. Department of Transportation
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Colorado Department of Transportation

Prepared by:

URS Corporation
Denver, Colorado

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CORRIDOR STUDY OVERVIEW

Executive Summary

This section provides a general overview of the entire corridor study. The study methodology and overall process are briefly introduced. Study findings, alternatives development and screening, and the Recommended Alternative are summarized.

Chapter 1. Introduction

The following items are documented in this chapter:

- Identify the purpose of the 56th Avenue corridor study.
- Describe the relationship of this corridor study to the 56th Avenue Environmental Assessment (EA) immediately west of the corridor.
- Introduce the corridor study process including data collection and processing, traffic safety analysis, traffic operations analysis, traffic forecasts, development and screening of corridor improvement alternatives, environmental resources investigation, etc.
- Review previous studies conducted in and/or adjacent to the study area to help establish project goals and identify issues for the 56th Avenue corridor.

Chapter 2. Project Goals and Issues

This chapter discusses the developed vision for the 56th Avenue corridor, identifies the existing and potential future issues of the corridor, and describes established goals of this corridor study.

Chapter 3. Transportation Setting

In this chapter, existing traffic conditions, in terms of traffic volumes, travel characteristics, and roadway/intersection capacity and Level of Service (LOS) are described in detail to provide a clear picture of the transportation network and traffic operations in the corridor and at various study intersections. Roadway and intersection geometry are described.

Historical intersection and roadway crashes that occurred in the corridor during a recent three-year period were analyzed by number, severity and crash type. Roadway crash rates are presented and compared with corresponding statewide average crash rates of similar roadways.

Traffic forecasting methodology, resources and procedures that were applied to project future year traffic for the No-Action conditions are discussed and traffic forecast results are presented.

Chapter 4. Development and Screening of Alternatives

This chapter describes the methodology and procedures for identifying and developing alternatives to improve the multi-modal transportation system of the corridor, and presents a two-stage screening process (initial screening and detailed screening) that was applied to evaluate the alternatives. From the screening process, a Recommended Alternative is identified.

Engineering elements specific to the Recommended Alternative, including roadway design criteria, considerations for wildlife viewing areas, right-of-way requirements, and a concept-level construction cost estimate are described in the last section of this chapter.

Chapter 5. Project Context and Environmental Resources

Human and natural environmental resources in the corridor are identified in this chapter. Socioeconomic characteristics, general land use and zoning, Section 4(f)/6(f) resources, historic resources, utilities, air quality, noise, wildlife, water resources, etc., are described and potential impacts of the project on these environmental resources are identified and discussed.

Chapter 6. Community Outreach and Agency Involvement

In this chapter, the public and agency participation process is presented. Results of the public involvement process including stakeholder interviews and public information open houses are discussed. Input obtained from the public and agencies is documented, and measures addressing and/or responding to public and agency input are described.

Chapter 7. References

This chapter lists a variety of resources that were researched, reviewed and/or referenced during this corridor study process.

Appendices

Additional information related to the corridor study process and/or results are presented as Appendices, including the following:

- **Appendix A**: The Federal Highway Administration (FHWA) *Planning/Environmental Linkages (PEL) Questionnaire* was used to document the specific activities, processes and products of the 56th Avenue corridor study, so that future teams can evaluate the suitability of this current work for inclusion in a future National Environmental Policy Act (NEPA) (1969) process.

- **Appendix B**: Traffic volumes data was collected and summarized for various locations and intersections along the 56th Avenue corridor. All traffic counts were conducted in May 2007.

- **Appendix C**: Traffic analysis reports, generated from the Synchro/SimTraffic traffic analysis software, are included in this appendix. Reports include the input data used for traffic operations analysis, such as roadway/intersection geometry, traffic volumes, and traffic control; and output of Synchro/SimTraffic traffic operations analysis, such as volume/capacity (v/c) ratio, travel delay, and LOS.

- **Appendix D**: Concept-level design plans for the Recommended Alternative were prepared. Design features, such as lane geometry, right-of-way (proposed versus existing), street light pole locations, median, curb and gutter, etc., are presented in the layout drawings.

- **Appendix E**: Pavement section analyses and pavement design for the Recommended Alternative of the 56th Avenue corridor are discussed in this appendix. Pavement design is based on the Metropolitan Government Pavement Engineering Council and the American Association of State Highway and Transportation Officials (AASHTO) design procedures.

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CONTENTS

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

$	U.S. dollar
>	greater than
<	less than
≤	less than or equal to
#	number
%	percent
AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily traffic
AM	Ante Meridiem (before midday)
APCD	Air Pollution Control Division
ASTM	American Society of Testing Materials
A_w	weighted number of crashes
BMP	Best Management Practices
CCD	City and County of Denver
CCR	Colorado Code of Regulations
CDOA	Colorado Department of Agriculture
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CO	carbon monoxide
dBA	decibel (A-weighted scale)
DIA	Denver International Airport
DRCOG	Denver Regional Council of Governments
DWR	Colorado Division of Water Resources
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
FAT	fatal
FCAA	Federal Clean Air Act
FE	federally endangered
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FT	federally threatened
HCM	Highway Capacity Manual
I-#	Interstate # (e.g., I-25)
ID	identification

INJ	injury
kV	kilo-volts
L_{eq}	equivalent sound level
LOS	Level of Service
LUST	Leaking Underground Storage Tank
LWCFA	Land and Water Conservation Fund Act
Max	maximum
MESA	Modified Phase I Environmental Site Assessment
MEV	Million Entering Vehicles
MOE	Measure of Effectiveness
mph	miles per hour
MS4	Municipal Separate Storm Sewer System
MVMT	million vehicle miles of travel
MVRTP	Metro Vision Regional Transportation Plan
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criterion (Criteria)
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
O_3	ozone
OAHP	Office of Archaeology and Historic Preservation
OHWM	Ordinary High Water Mark
OW	Other Water
Pb	lead
PDO	property damage only
PEL	Planning and Environment Linkages
PEM	palustrine emergent
PM	Post Meridiem (after midday)
$PM_{2.5}$	particulate matter less than 2.5 micron size
PM_{10}	particulate matter less than 10 micron size
ppm	parts per million
PSS	palustrine scrub/shrub
REC	Recognized Environmental Condition
RMANWR	Rocky Mountain Arsenal National Wildlife Refuge
RTD	Regional Transportation District
RTP	Regional Transportation Plan
R_w	Weighted Crash Rate

R_{wa}	Weighted Average Crash Rate
R_{wc}	Weighted Critical Crash Rate
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SE	State Endangered
SH	State Highway
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
ST	State Threatened
STIP	State Transportation Improvement Program
SU	single unit (truck)
TAZ	Traffic Analysis Zones
T&E	Threatened and Endangered
TNM	Traffic noise model
TRB	Transportation Research Board
TSM	Transportation System Management
UCM	University of Colorado Museum
UDFCD	Urban Drainage and Flood Control District
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
$\mu g/m^3$	micrograms per cubic meter
v/c	volume to capacity ratio
WB	wheelbase
WHI	Weighted Hazard Index
WL	wetland
Xcel	Xcel Energy

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EXECUTIVE SUMMARY

The 56th Avenue corridor is an approximately 4.5-mile long section of 56th Avenue from Havana Street to approximately 1,050 feet east of Peña Boulevard. Much of the section is located on the boundary between the City and County of Denver (CCD) and Adams County.

Due to its location and a lack of parallel arterial roadways, 56th Avenue serves as a major east-west regional thoroughfare. In addition to its regional function, it serves as an important access route to Denver International Airport as well as providing relief to I-70 during freeway incidents. 56th Avenue also provides important local access, via intersecting local streets and collector roadways, to various land uses along the arterial.

To the west and east, the 56th Avenue corridor is experiencing significant land use development. Major ongoing and planned developments affecting traffic demand in the 56th Avenue corridor include Prairie Gateway, Stapleton, Denver Business Center, the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR), Parkfield, and Gateway/Green Valley Ranch. These developments, as well as general growth in this part of the Denver metropolitan area, will increase traffic demand on 56th Avenue, spurring concerns that without improvements, 56th Avenue will be unable to serve the future transportation needs and effectively support growth.

As a result, this corridor was identified for a detailed corridor study to evaluate existing and future traffic and safety conditions along the corridor, and to develop a set of feasible transportation improvement measures that will enable the corridor to effectively serve future traffic demand.

Previous studies and recent transportation plans in or adjacent to the corridor were thoroughly reviewed, including the adopted regional transportation plan. It was found that all of the studies and plans agreed that capacity improvements, such as widening, are needed for 56th Avenue to serve future transportation needs and effectively support regional and local growth. Project goals and issues were identified based on the literature review, initial field investigations, public involvement efforts, and the study team's local knowledge of the corridor.

Comprehensive data collection and processing efforts were used to help fully understand the issues, and the results were later used for traffic operational and safety analysis, traffic forecasts, environmental evaluation, and alternatives development, evaluation and recommendations. Data included traffic volumes, transportation network inventory, crash history, land use, and various environmental resource areas/locations. The regional travel demand model, developed and maintained by the Denver Regional Council of Governments (DRCOG), was used as the data resource and base model for traffic forecasts.

A detailed engineering analysis indicated that 56th Avenue and most of the study intersections along the corridor currently operate at acceptable Levels of Service, although moderate travel delay and traffic congestion may occur during the peak traffic hours. The analysis also indicated that some sections, intersections, or movements already operate near capacity. Safety analysis using historical crash data indicated that the corridor has experienced lower crash frequency and severity than the statewide average for roadway facilities of similar type; and intersections along the corridor have had relatively low crash frequency and severity compared with the highest accident intersections within CCD.

Traffic forecasts for the 56th Avenue corridor for the future year 2035 (design year) were developed using the Denver Regional Council of Governments (DRCOG) regional travel demand model. The forecasts show that 2035 traffic volumes on most sections of 56th Avenue and on major cross streets will be at least twice the existing (2007) traffic volumes. An operational analysis of the corridor under 2035 No-Action conditions revealed forecast traffic volumes will exceed roadway/intersection capacity, causing substantial traffic congestion and travel delay. Without improvement to 56th Avenue, much of the future travel demand will be diverted to parallel arterial/freeway facilities, such as I-70, thus increasing demand on these facilities.

A number of transportation alternatives were developed to address the deficiencies identified in the corridor. These alternatives included Transportation System Management, improving parallel corridors or constructing a new parallel arterial, and widening 56th Avenue from the existing two lanes to four or six lanes, with or without on-street bicycle lanes. In addition, the No-Action alternative, under which no major improvements were to be implemented, was included as an alternative for comparison. These alternatives were evaluated in a two-step screening process, including the initial screening (based on fatal flaw criteria) and the detailed screening (based on policy, design and construction, environment, and traffic engineering criteria), to identify the Recommended Alternative.

The established project goals and issues, potential environmental impacts, and practicality and feasibility were used as the screening criteria for the initial screening. The initial screening results suggested that only the widening alternatives could potentially achieve the project goals, address issues and also be practical and feasible, while the other alternatives excluding the No-Action alternative were filtered out.

Four widening alternatives and the No-Action alternative were further evaluated in the detailed screening process against a set of established screening criteria grouped into four categories: policy, design and construction, environmental resources, and traffic engineering. The Recommended Alternative proposes to widen 56th Avenue to a six-lane facility divided by a raised median with detached multi-use paths. This alternative also includes a series of necessary roadway and intersection improvement measures, such as auxiliary lanes and new traffic signals. The Recommended Alternative is consistent with the DRCOG fiscally constrained 2035 Regional Transportation Plan (RTP), described in the 2035 Metro Vision Regional Transportation Plan (MVRTP), which includes widening of 56th Avenue between Quebec Street and Tower Road to six lanes.

Recommended Alternative

- Widen 56th Avenue to six lanes
- Raised center median
- Detached multi-use paths

Environmental resources in the corridor were identified and investigated, including socio-economic resources, environmental justice, land use and zoning, air quality, noise, water quality, hazardous materials, Section 4(f)/6(f), historical sites, archeological and paleontological resources, wildlife habitats, vegetation, noxious weeds, wetlands, floodplains, public services and utilities, and visual resources. Analysis of these resources provided the environmental context of the project and was used to evaluate the potential impact on these environmental resources of the Recommended Alternative.

With the expectation that a National Environmental Policy Act (NEPA) (1969) process may be used to evaluate this corridor if federal funding for improvements is obtained, the study team used a "NEPA-like" decision-making process for this corridor study to allow the inclusion of much of this corridor study's information in a subsequent NEPA process. Appendix A, Planning and Environmental Linkages (PEL), documents the relationship of this corridor study to a possible future NEPA process.

1.0 INTRODUCTION

This chapter provides a general overview of the corridor study process. Section 1.1 identifies the study limits and the purpose of the 56th Avenue corridor study; Section 1.2 describes the relationship of this study to a concurrent Environmental Assessment (EA) study of 56th Avenue from Quebec Street to Havana Street; and Section 1.3 introduces the corridor study process including data collection and processing, traffic safety analysis, traffic operations analysis, traffic forecasting, development and screening of corridor improvement alternatives, etc. Previous studies conducted in and/or adjacent to the study area were reviewed and are documented in Section 1.4.

1.1 Purpose of the 56th Avenue Corridor Study

56th Avenue, looking west

The 56th Avenue corridor is located in the northeast part of the City and County of Denver (CCD), Colorado. The approximately 4.5-mile long section of 56th Avenue, from Havana Street on the west to approximately 1,050 feet east of the center of the Peña Boulevard interchange (see Figure 1-1), was the segment of 56th Avenue identified for a corridor study due to the rapidly changing nature of the surrounding area.

As described in Section 1.2 of this report, Havana Street was designated as the western terminus of this corridor study. This designation resulted from a process that identified an adjacent section of 56th Avenue for more detailed planning using the Environmental Assessment process, conforming to the National Environmental Policy Act (NEPA) of 1969. The eastern terminus of this corridor study was determined to be approximately 1,050 feet east of the center of the Peña Boulevard interchange, matching the western terminus of a previously constructed transportation improvement project on 56th Avenue.

Due to its location and a lack of the parallel arterial system in this part of the Denver metropolitan area, 56th Avenue serves as one of the few major east-west regional thoroughfares in this part of the region. In addition to its regional function, it serves as an important access route to Denver International Airport as well as providing relief to I-70 during freeway incidents. 56th Avenue also provides important local access, via intersecting local streets and collector roadways, to various land uses along the arterial.

Between Havana Street on the west and Peoria Street on the east, 56th Avenue is a five-lane urban arterial consisting of two lanes in each direction and one center two-way-left-turn-lane. Between Peoria Street on the west and Peña Boulevard on the east, 56th Avenue is a two-lane two-way urban arterial.

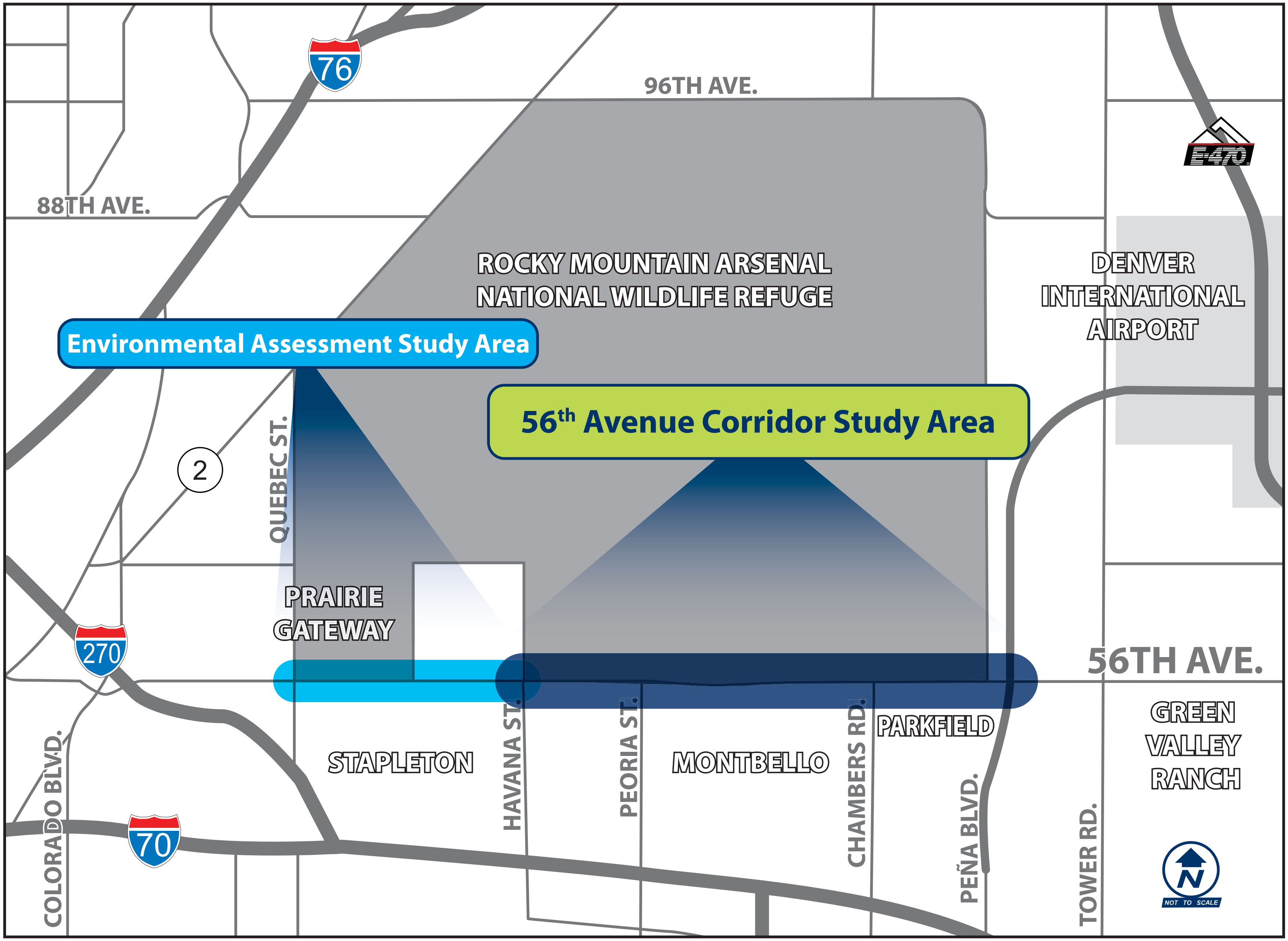
Significant land use developments in and surrounding the study area, including Stapleton, Prairie Gateway, Denver Business Center, Parkfield, Gateway/Green Valley Ranch, and growth occurring north and east of the study area toward the Denver International Airport (DIA), have spurred concerns that 56th Avenue will be unable to serve travel demand generated by growth in the corridor and the surrounding area. Therefore, a detailed corridor study was identified as necessary to evaluate traffic and safety conditions along the corridor and at various key intersections, under both existing conditions and forecast future conditions, and to develop a set of suitable transportation improvement measures that will enable the corridor to effectively serve future travel demand.

Concurrent Studies for 56th Avenue

- Environmental Assessment, Quebec Street to Havana Street
- Corridor Study, Havana Street to Peña Boulevard

1.2 Relationship to 56th Avenue Environmental Assessment

An initial scoping effort for the section of 56th Avenue between Quebec Street on the west and Peña Boulevard on the east was conducted to identify the existing and forecast traffic characteristics of the corridor. The findings are documented in a companion technical memorandum to this corridor study, the "56th Avenue Traffic and Safety Report." From this analysis, it was determined that the section of 56th Avenue between



Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 1 - 1
Study Area

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Quebec Street on the west and Havana Street on the east had the more significant traffic congestion and safety issues of the corridor.

With the concurrence of the Colorado Department of Transportation (CDOT) and Federal Highway Administration (FHWA), the CCD elected to proceed with more detailed planning, using the NEPA EA process, for the Quebec Street to Havana Street section of 56th Avenue (see Figure 1-1), and conduct a "NEPA-like" corridor study of the remaining Havana Street to Peña Boulevard section.

With the expectation that a NEPA process may be used to evaluate this corridor if federal funding for improvements are obtained, the "NEPA-like" decision-making process for this corridor study may allow the inclusion of much of this corridor study's information in a subsequent NEPA process.

Corridor Study Process

- Project Scoping
- Data Collection
- Traffic & Safety Analysis
- Develop & Evaluate Alternatives
- Identify Recommended Alternative
- Analyze Environmental Resources
- Documentation
- Public & Agency Coordination

1.3 Corridor Study Process

The following study process was developed and performed for the corridor study. It should be noted that some of the early steps in the study process were performed as a joint effort with the EA for the segment of 56th Avenue between Quebec Street and Havana Street.

- *Identifying ("Scoping") Project Goals and Issues* for the corridor based on a review of past studies of the corridor and preliminary public and agency "scoping" input. Details of project goals and issues identified through these two steps are discussed in Chapter 2, "Project Goals and Issues."

- *Data Collection and Processing*. Relevant data needed for conducting technical analysis and evaluation of the corridor was collected from various sources. Collected data included, but was not limited to, roadway and intersection inventory, traffic counts, signal timing plans, utilities, right-of-way and property lines, crash data, land use and zoning, environmental resources, and previous studies of or in the vicinity of the corridor. Data collection and processing are discussed in Chapters 3, 4, and 5.

Synchro/SimTraffic is a complete software package for modeling, optimizing, simulating, and optimizing traffic networks.

- *Analysis of Existing Traffic Conditions*. Analysis of existing traffic operations, defined in terms of roadway and intersection capacity, Level of Service (LOS), travel time, delay, etc., was performed following the Highway Capacity Manual 2000 (HCM) (TRB, 2000) analytical procedures. Synchro/SimTraffic software (Trafficware Ltd.) package was used to analyze and simulate traffic operations of the corridor and various key intersections along the corridor during the AM, midday and PM peak hours.

- *Safety Analysis*. A detailed assessment of the corridor safety conditions was conducted using historical crash data in the corridor as furnished by CCD. Crashes during a recent three-year period were categorized by location, type and severity; and each category of crashes was then carefully reviewed. A statistical analysis of crash rates was conducted using the CDOT Highway Safety Improvement Program (HSIP procedures). Calculated crash rates in the corridor were compared with the corresponding statewide average rates of other roadways within the same functional class. Existing conditions analysis is discussed in detail in Chapter 3, "Transportation Setting."

TransCAD combines Geographic Information Systems (GIS) and transportation modeling capabilities in a single integrated platform, providing application modules for routing, travel demand forecasting, public transit, logistics, site location, and territory management.

- *Traffic Forecasts.* Traffic demand in the corridor for future years including the design year (2035) was forecast. The Denver Regional Travel Model, also known as the Compass, developed and maintained by the Denver Regional Council of Governments (DRCOG), was used as the traffic forecasting tool. Current and future planned/scheduled land use developments and transportation improvements within the study area were carefully reviewed. Adjustments to the regional model were made wherever necessary to reflect these changes. TransCAD (Caliper Corporation) was used to run the sub-area regional model with necessary adjustments and to generate traffic forecasts for the corridor.

- *Development of Corridor Improvement Alternatives***.** Based on the existing conditions assessment and traffic forecasts for future years, a set of corridor improvement alternatives was developed. All travel modes, including driving, walking, biking, and public transit, were considered during the development of various alternatives.

Two-stage Evaluation:

- Initial Screening
- Detailed Screening

- *Evaluation of Alternatives.* The evaluation of alternatives was performed in two phases**.** Phase one was an initial screening based on (1) the project goals and issues identified during an earlier stage of the study, (2) environmental impacts, and (3) practicality/ feasibility. Any alternative that (1) did not accommodate the project goals, (2) did not appropriately address project issues, (3) potentially had substantial environmental impacts, or (4) would incur extraordinary cost or complexity in construction and maintenance was eliminated from further analysis. In phase two, alternatives that were retained from the initial screening were assessed against a series of criteria grouped into four categories: policy, design and construction, environmental resources, and traffic engineering. Phase two also included traffic operations analysis using Synchro/SimTraffic modeling and simulation of the future No-Action and the Recommended Alternative scenarios. Detailed procedures of alternative evaluation are described in Chapter 4, "Development and Screening of Alternatives."

- *Identification of Recommended Alternative.* Following the detailed alternatives assessment, the Recommended Alternative was identified and further refined based on public and agency input. A graphical layout of the Recommended Alternative was developed (See Appendix D).

- *Analysis of Potential Environmental Impacts.* Various environmental resources in the corridor were investigated, analyzed, and documented using a NEPA-like procedure. Potential impacts of the Recommended Alternative on each corridor resource were also analyzed and documented. Anticipating a more comprehensive future NEPA process that includes consultation with resource management agencies, this corridor study does not develop or propose mitigation measures.

- *Preparation of Study Report*. A complete technical report documenting the corridor study process, findings, Recommended Alternative and implementation strategy was prepared in a format acceptable to CCD, CDOT and FHWA. The study data was formatted to allow the inclusion of this information in a future NEPA process.

- *Public Involvement and Agency Coordination*. Public and agency consensus was crucial to the success of this project. Public and agency involvement started early and was ongoing throughout the corridor study process. The first public involvement activity on the project was a series of public and agency scoping meetings. In addition, smaller group meetings with stakeholders were also held periodically to complement larger group meetings. Various outreach methods were employed to inform and notify residents of upcoming meetings or hearings.

  Starting from the scoping meeting, stakeholder agencies were involved throughout the corridor study process. Detailed information on public and agency involvement is described in Chapter 6, "Community Outreach and Agency Involvement."

1.4 Previous Studies of 56th Avenue Corridor Needs

Several studies have been completed for projects in and near the study area that contribute to an understanding of the corridor's past and future, as well as stakeholder visions for corridor improvements. These past studies are summarized in Table 1.4-1.

Table 1.4-1
Previous Studies of the 56th Avenue Corridor

Study	Completed	Findings or Recommendations of Interest to Current Study
Rocky Mountain Arsenal Final Environmental Impact Statement	1996	• Recommended a multi-use trail around the perimeter of the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR).
Win-Win Coalition Study East 56th Avenue/ Quebec Street Technical Memorandum	March 1999	• Recommended that East 56th Avenue be widened to four lanes, six lanes where auxiliary lanes may be required. • Also recommended was the inclusion of a median, a 10'-12' hike/bicycle path on the RMANWR side (north) of the right-of-way, and a 5' minimum width, detached sidewalk on the south side of 56th Avenue.
East 56th Avenue Corridor Concept Plan	September 2004	• Proposed a six-lane roadway cross-section on 56th Avenue from Quebec Street to Peña Boulevard. • Supported on-street bicycle lanes and a raised median on 56th Avenue.
The Prairie Gateway and Stapleton Development Projects Regional Planning Taskforce White Paper	2005	• Supported the use of the existing bridge on 56th Avenue (at approximately Dayton Street) as a pedestrian-only, grade-separated crossing. • Supported the development of a pedestrian/bicycle corridor on the north and south sides of 56th Avenue from Quebec Street to Central Park Boulevard, continuing east (on the south side) to Havana Street.
56th Avenue Traffic Study relating to the Prairie Gateway Development Area	October 2005	• Recommended that 56th Avenue be widened to five lanes (two eastbound through lanes and three westbound lanes) by 2007. • Recommendations anticipated that 56th Avenue from Quebec Street to Havana Street would be widened to six lanes by 2025.
Stapleton Business Center North Master Plan	2006	• ProLogis proposes to construct six buildings for distribution warehouse and showroom/warehouse/office uses on a site in the southwest quadrant of 56th Avenue and Havana Street. • Proposed site access includes two limited-movement driveways along 56th Avenue and a new public street connection to 56th Avenue at Dallas Street.
North Stapleton Infrastructure Master Plan, Amendment 1	December 2006	• Addressed infrastructure issues for the implementation of mixed-use development in the Stapleton Redevelopment area north of Interstate 70. • Recommended the widening of 56th Avenue to six lanes from Quebec Street to Havana Street.

Source: Summary compiled by URS Corporation

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2.0 PROJECT GOALS AND ISSUES

An initial scoping process was conducted to identify a "vision" for the 56th Avenue corridor, define the goals and identify issues of the corridor. The scoping process included a review of past studies of the corridor, and formal and informal scoping meetings with representatives of the corridor stakeholders, resource agencies, neighborhood groups and the general public. From this process, a vision for the 56th Avenue corridor was crafted that emphasized the following elements:

Corridor Vision Elements
- Mobility
- Accessibility
- Quality of Life
- Safety

- Multi-modal access.
- Maintain the quality of the corridor's residential communities.
- Keep the corridor safe for all users.

Building on these vision elements, the study team developed a series of goals for 56th Avenue from Havana Street to Peña Boulevard:

- Meet forecast mobility and accessibility needs for users of all surface transportation modes, including pedestrians, bicyclists, cars, buses, and trucks, in the 56th Avenue corridor.
- Preserve the community quality of life.
- Improve traffic safety along the 56th Avenue corridor.

Working from these established corridor goals, the scoping process was then used to help define more specific issues and needs for the corridor that would help the study team define and assess alternative solutions. Corridor issues included:

- *Manage traffic congestion.* Traffic analysis and field investigations indicate that 56th Avenue experiences traffic congestion, especially during the AM and PM peak hours, at various locations and intersections along the corridor. With substantial traffic growth expected in the corridor in the future years, congestion will worsen over time if no improvements are implemented. Traffic congestion increases travel delays, reduces travel reliability, diminishes mobility, and increases the number and severity of traffic conflicts and risks of crashes.

- *Support regional transportation system goals.* The 56th Avenue corridor serves as a major east-west thoroughfare providing regional mobility, especially for trips to and from Denver International Airport (DIA). This corridor also provides local access to various land uses along the corridor. Therefore the Recommended Alternative should improve local and regional access to the Peña Boulevard corridor and DIA, while also improving access to existing and planned activity centers.

Promote Multi-modal Access

- Pedestrian
- Bicycle
- Bus

- *Promote multi-modal use of the corridor and enhance modal interrelationships***.** Driving the need for improvements of the 56th Avenue corridor are the newly constructed, ongoing and planned developments in and around the study area, including Prairie Gateway, Stapleton, Denver Business Center, the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR), Parkfield, and Gateway/Green Valley Ranch. Corridor stakeholders value opportunities to travel between the various activity centers without the use of an automobile. Pedestrian and bicycle facilities including multi-use trails, sidewalks, and on-street bicycle lanes are currently provided or planned at various locations in and around the corridor. Although there is currently no public transit service along 56th Avenue in the study area, local circulator bus service in the nearby Montbello neighborhood is provided by the Regional Transportation District (RTD).

  Improvement alternatives for 56th Avenue must also support or advance the connectivity and function of proposed regional trail and bikeway systems and neighborhood transit service.

3.0 TRANSPORTATION SETTING


56th Avenue at Havana Street—looking east

This chapter documents the existing transportation network, traffic volumes, traffic operations, and safety analysis undertaken to assess existing conditions of the corridor and develop a forecast of future mobility issues. The purposes of these analyses were to provide the study team with a better understanding of current and future accessibility, mobility, and safety conditions in the 56th Avenue corridor, as well as to develop a set of analysis tools to develop, evaluate, and screen alternative transportation solutions.

3.1 Existing Transportation Network

This section documents the current transportation network in the 56th Avenue corridor for all travel modes, including motor vehicles, bicyclists, and pedestrians. Figure 3-1 illustrates the existing roadway network.

56th Avenue


Five-lane section of 56th Avenue west of Havana Street—looking southwest

Functional Classification and Cross-section. 56th Avenue is classified as an urban arterial by the City and County of Denver (CCD). Between Havana Street on the west and Peoria Street on the east, a one-mile section at the west end of the corridor, 56th Avenue is a five lane facility consisting of two travel lanes in each direction and one continuous center two-way-left-turn-lane. Travel lanes in this section are 12-feet wide or wider. Between Peoria Street on the west and Peña Boulevard on the east, 56th Avenue is a two-way two-lane (one travel lane in each direction) facility. Travel lanes in this section are also 12-feet wide or wider.

Auxiliary Lanes. Left-turn lanes are installed on 56th Avenue at Havana Street, Peoria Street (westbound only), and the Peña Boulevard ramps. Right-turn deceleration lanes are provided in the eastbound direction at Chambers Road and the Peña Boulevard southbound ramps, and in the westbound direction at the Peña Boulevard northbound ramps. No acceleration lanes are provided within the corridor.

Two-lane section of 56^{th} Avenue from Peoria Street to Peña Boulevard—looking east

General Vertical and Horizontal Alignment. 56^{th} Avenue has a flat to slightly rolling vertical alignment, generally not exceeding 3% grades. The horizontal alignment is generally tangent (straight) with a few curves, including the reverse curves between Uvalda Street on the west and Crown Boulevard on the east, as shown in the aerial view on the left.

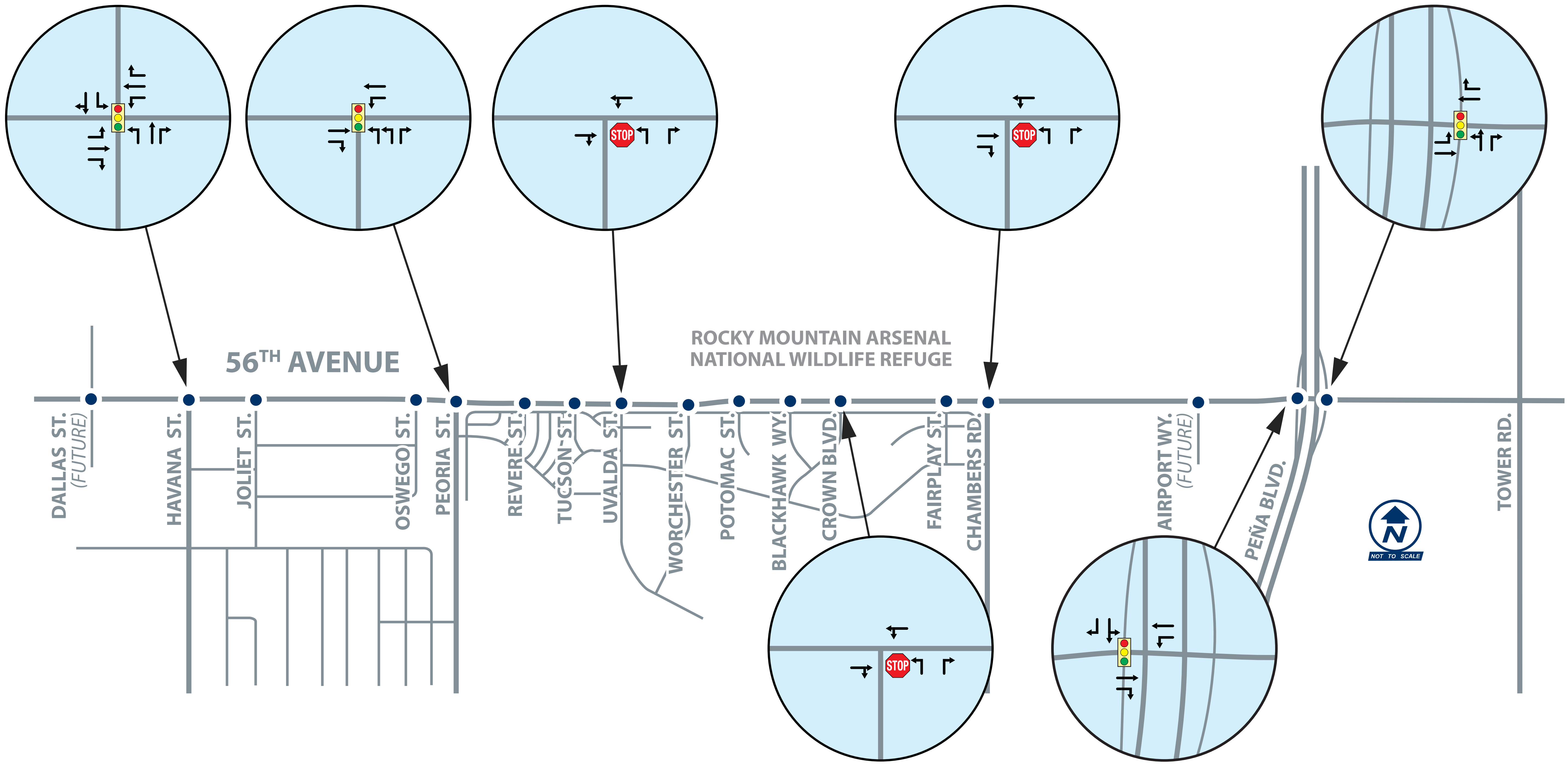
Roadside Treatment. Curb and gutter are installed on both sides of 56^{th} Avenue between Havana Street on the west and Chambers Road on the east. From Chambers Road on the west to Memphis Street on the east, curb and gutter are installed only on the south side of 56^{th} Avenue. An unpaved shoulder of varying width is provided on the northern edge of the road. From Memphis Street on the west to Peña Boulevard on the east, unpaved shoulders of varying widths are provided.

Speed. The posted speed limit on 56^{th} Avenue is 40 miles per hour (mph) between Havana Street on the west and Chambers Road on the east, and 45 mph between Chambers Road on the west and Peña Boulevard on the east.

Intersecting Arterials

Havana Street, the western terminus of the corridor, is a north-south urban arterial. To the south of 56^{th} Avenue, it consists of two travel lanes in each direction; to the north of 56^{th} Avenue, Havana Street is a two-way, two-lane roadway serving as the primary public access to the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR). The posted speed limit on Havana Street is 30 mph.

Peoria Street is a north-south urban arterial one mile east of Havana Street, consisting of two travel lanes in each direction divided by a raised and landscaped median, with 56^{th} Avenue being its northern terminus. The posted speed limit on Peoria Street is 35 mph.



Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 3 - 1
Intersection Geometry and Traffic Control

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Chambers Road is a north-south urban arterial two miles east of Peoria Street, consisting of two travel lanes in each direction divided by a raised median, with 56th Avenue being its northern terminus. The posted speed limit on Chambers Road is 30 mph.


56th Avenue and Peña Boulevard Interchange—looking east

Peña Boulevard, approximately 1.2 miles east of Chambers Road, is a north-south urban freeway with controlled access. Peña Boulevard connects Denver International Airport (DIA) to Interstate 70 (I-70) and E-470. In the study area, Peña Boulevard consists of two travel lanes in each direction.

Intersecting Collectors

Uvalda Street, 0.63 mile east of Peoria Street, and Crown Boulevard, 0.82 mile east of Uvalda Street, are two collector streets that intersect 56th Avenue in the corridor. Both streets provide access for the Montbello residential neighborhood to 56th Avenue. Uvalda Street has two travel lanes in each direction divided by a raised and landscaped median, while Crown Boulevard is a two-way two-lane roadway. Both streets have a posted speed limit of 25 mph.

Intersecting Local Streets

A number of local streets intersect with 56th Avenue between Havana Street and Peña Boulevard, especially from the Montbello residential neighborhood between Peoria Street on the west and Chambers Road on the east. These local streets are two-way two-lane roadways, most of which do not bear pavement markings.

Study Intersections

Intersections of 56th Avenue at arterial and collector roadways, as described above, were selected for detailed analysis, since these intersections frequently reduce the corridor capacity. On the other hand, intersections at local streets usually hinder the corridor traffic flow to a much lesser extent, even though the cross streets could experience substantial delay. Figure 3-1 illustrates the geometry and traffic control of the study intersections, which are briefly described as following:


56th Avenue at Havana Street—looking east

<u>56th Avenue and Havana Street</u>. This is a four-leg (i.e., four approaches), signalized intersection. The eastbound approach of 56th Avenue consists of one left turn lane, one through lane and one right turn lane. The westbound approach of 56th Avenue has one left turn lane, one through lane, and one right turn lane. The northbound approach of Havana Street consists of one left turn lane, one through lane, and one right turn lane. The southbound approach of Havana Street consists of one left turn lane and one shared through/right turn lane.


56th Avenue at Peoria Street—looking east

<u>56th Avenue and Peoria Street</u> is a tee-intersection where Peoria Street intersects 56th Avenue from the south. It is controlled by a traffic signal. The northbound approach of Peoria Street consists of two left turn lanes and one right turn lane; the eastbound approach of 56th Avenue consists of one through lane and one right turn lane; and the westbound approach of 56th Avenue has one left turn lane and one through lane.


56th Avenue at Uvalda Street—looking east

<u>56th Avenue and Uvalda Street</u> is an unsignalized tee-intersection where Uvalda Street intersects 56th Avenue from the south. Uvalda Street is controlled by a stop sign, while 56th Avenue has free-flow traffic. The eastbound approach of 56th Avenue consists of one shared through/right turn lane; the westbound approach of 56th Avenue has one shared left turn/through lane; and the northbound approach of Uvalda Street has one left turn lane and one right turn lane.


56th Avenue at Crown Boulevard—looking east

<u>56th Avenue and Crown Boulevard</u> is an unsignalized tee-intersection where Crown Boulevard intersects 56th Avenue from the south. Crown Boulevard is controlled by a stop sign, while 56th Avenue has free-flow traffic. The eastbound approach of 56th Avenue has one shared through/right turn lane; the westbound approach has one shared left turn/through lane; and the northbound approach of Crown Boulevard consists of one left turn lane and one right turn lane.

56th Avenue at Chambers Road—looking east

56th Avenue and Chambers Road is an unsignalized tee-intersection. Chambers Road is controlled by a stop sign, while 56th Avenue has free-flow traffic. The eastbound approach of 56th Avenue has one through lane and one right turn lane; the westbound approach of 56th Avenue contains one shared left turn/through lane; and the northbound approach of Chambers Road consists of one left turn lane and one right turn lane.

56th Avenue at Peña Boulevard Southbound Ramp—looking southeast

56th Avenue and Peña Boulevard interchange. This is a diamond interchange where Peña Boulevard, the freeway facility, overpasses 56th Avenue, while its northbound and southbound ramps intersect 56th Avenue at two signalized at-grade intersections. The distance between the two ramp intersections is 600 feet. At the southbound ramp intersection, the eastbound approach of 56th Avenue consists of one through lane and one right turn lane; the westbound approach consists of one left turn lane and one through lane; and the southbound approach has one shared left turn/through lane and one right turn lane. At the northbound ramp intersection, the northbound approach consists of one shared left turn/through lane and one right turn lane; the eastbound approach of 56th Avenue has one left turn lane and one through lane; and the westbound approach has one through lane and one right turn lane.

56th Avenue at Peña Boulevard Northbound Ramp—looking north

Pedestrian and Bicycle Facilities

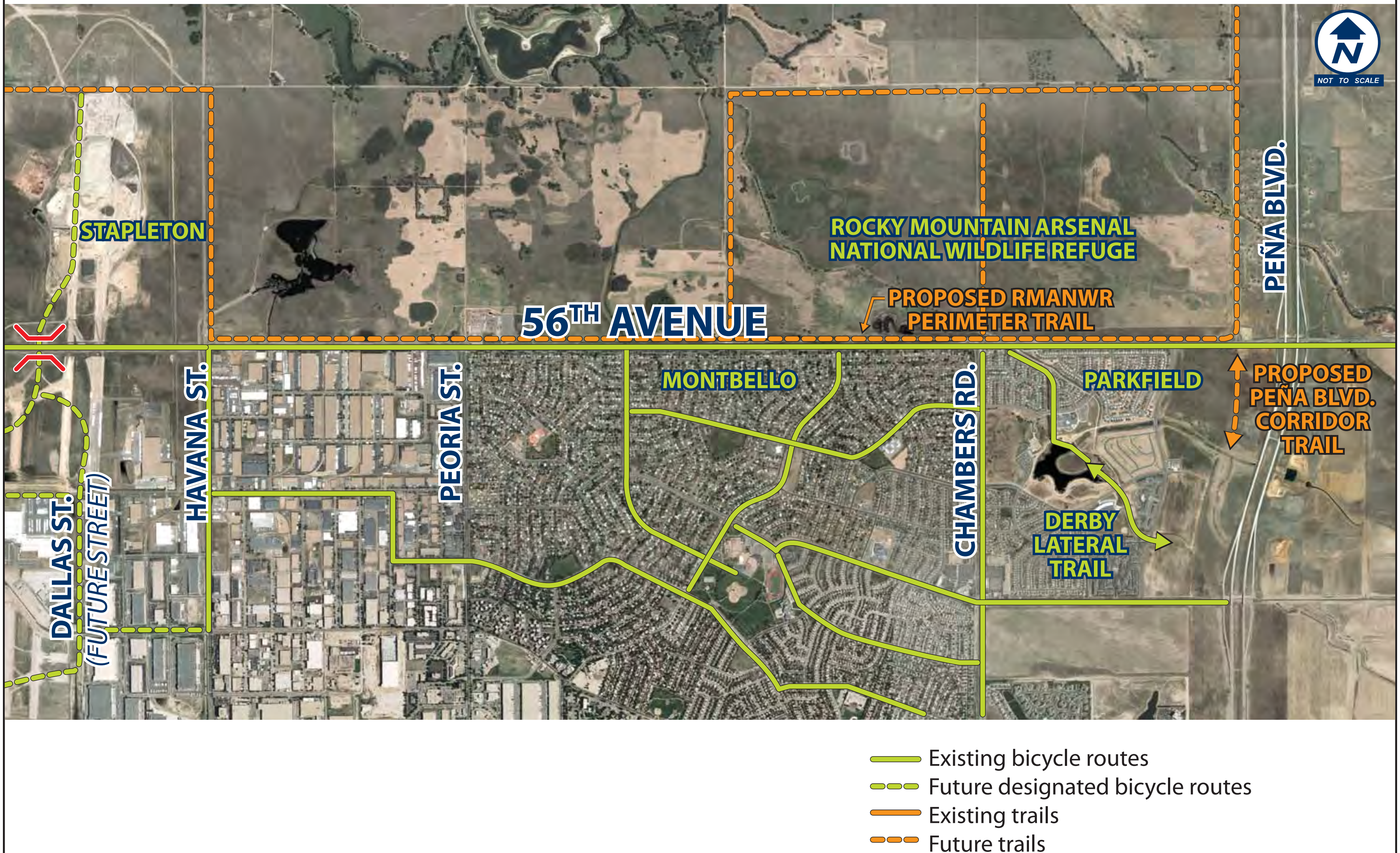
Sidewalks are installed on the south side of 56th Avenue from Havana Street on the west to Memphis Street on the east, including an attached sidewalk from Havana Street to Oswego Street and a detached trail from Oswego Street to Memphis Street (see Figure 3-2). A two-mile section of the detached trail between Peoria Street and Chambers Road meanders through the greenbelt along the Montbello neighborhood. No sidewalk or other pedestrian facilities are installed on the north side of 56th Avenue.

No on-street bicycle facilities, such as bicycle lanes and shared curb lane, or bicycle route signs are provided along 56th Avenue. According to CCD (CCD, 2006), the meandering trail through the greenbelt on the south side of 56th Avenue that extends between Peoria Street and Chambers Road is a designated off-street bicycle route serving both pedestrians and bicyclists. Off-street bicycle routes are also installed on Peoria Street, Chambers Road, and the Highline Canal Trail south of 56th Avenue (CCD, 2006). In addition, multiple neighborhood bicycle routes are designated along local and collector streets in and adjacent to the Montbello neighborhood (CCD, 2006). Figure 3-2 illustrates the above described bicycle facilities in the study area.

A detached trail along 56th Avenue adjacent to the Montbello neighborhood

Bus Service

The Regional Transportation District (RTD) operates several local bus routes, including Routes 43, 44, 45, and 54, in the neighborhoods south of 56th Avenue (see Figure 3-3). Route 54 runs a short distance (less than one quarter (1/4) of a mile) on 56th Avenue between Oswego Street on the west and Peoria Street on the east. In addition, RTD operates one express bus route, Route 47X, through the Montbello residential neighborhood south of 56th Avenue. There are no bus routes that are continuous along 56th Avenue in the study area. The closest park-n-Ride bus station to 56th Avenue is the Montbello Station located in the southwest quadrant of the intersection of Peoria Street and 47th Avenue, approximately 1.1 miles south of 56th Avenue. Figure 3-3 illustrates the bus routes adjacent to 56th Avenue.



Data Source: City and County of Denver and URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 3 - 2
Bicycle Routes and Trails

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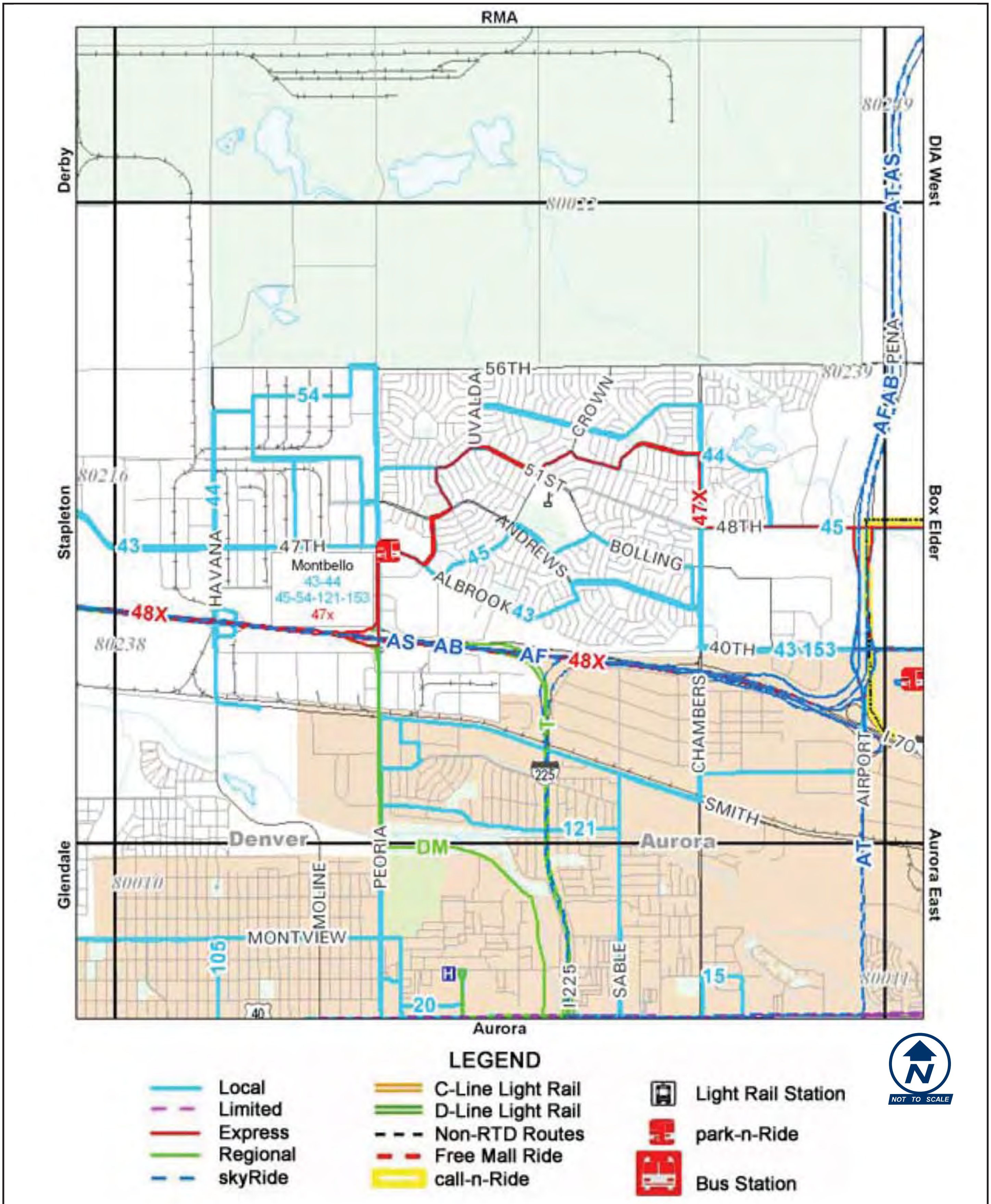

Source: Regional Transportation District

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 3 - 3
Bus Routes

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3.2 Existing Traffic Volumes

To understand and document current traffic demand in the 56th Avenue corridor, daily traffic volume and vehicle classification data were collected on May 1 (Tuesday), 2007 and May 2 (Wednesday), 2007 at the following locations:

- 56th Avenue, west of Peoria Street.
- 56th Avenue, west of Chambers Road.
- 56th Avenue, west of Peña Boulevard southbound ramps
- 56th Avenue, between Peña Boulevard southbound and northbound ramps.
- 56th Avenue, east of Peña Boulevard northbound ramps.
- Peoria Street, south of 56th Avenue.
- Uvalda Street, south of 56th Avenue.
- Crown Boulevard, south of 56th Avenue.
- Chambers Road, south of 56th Avenue.
- Northbound and southbound ramps of the Peña Boulevard interchange.

Existing Traffic Data

- Daily Traffic Volumes
- Vehicle Classification
- Turning Movements for AM, Midday and PM peak periods

In addition, peak hour turning movement counts were collected at the following seven intersections:

- 56th Avenue and Havana Street.
- 56th Avenue and Peoria Street.
- 56th Avenue and Uvalda Street.
- 56th Avenue and Crown Boulevard.
- 56th Avenue and Chambers Road.
- 56th Avenue and Peña Boulevard southbound ramps.
- 56th Avenue and Peña Boulevard northbound ramps.

Along the corridor, traffic volumes are highest on each end, i.e., west of Peoria Street and east of Peña Boulevard.

The daily traffic volumes and AM, midday and PM peak hour turning movement counts, resulting from the May 2007 traffic count program, are shown in Appendix B and illustrated in Figure 3-4. Along 56th Avenue, traffic volumes are highest at each end of the corridor, i.e., close to Peoria Street on the west and east of the Peña Boulevard interchange.

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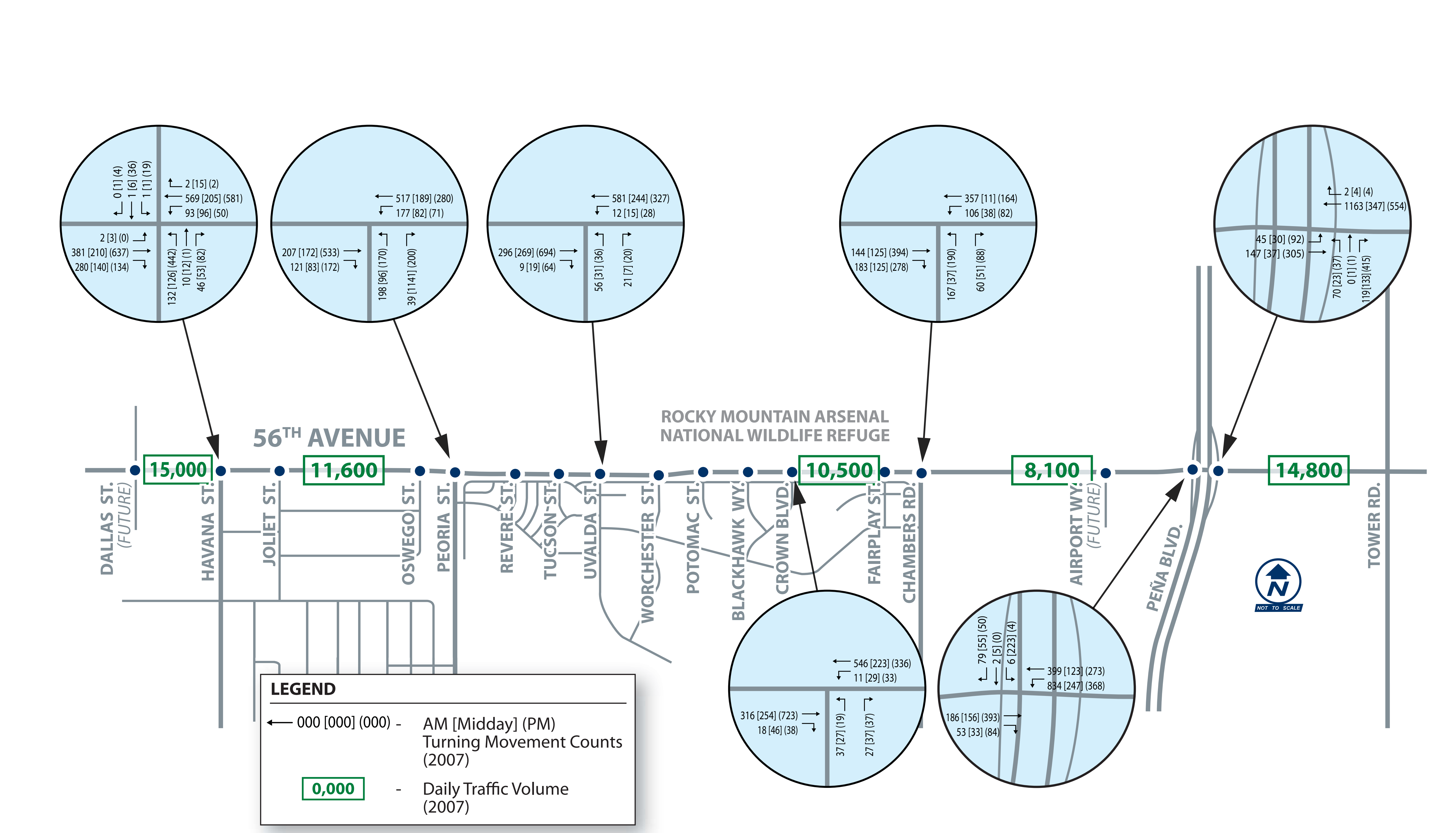

Data Source: Denver Regional Council of Governments. Summary compiled by URS Corporation using the Denver Regional Travel Model.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 3 - 4
Existing (2007) Traffic Volumes

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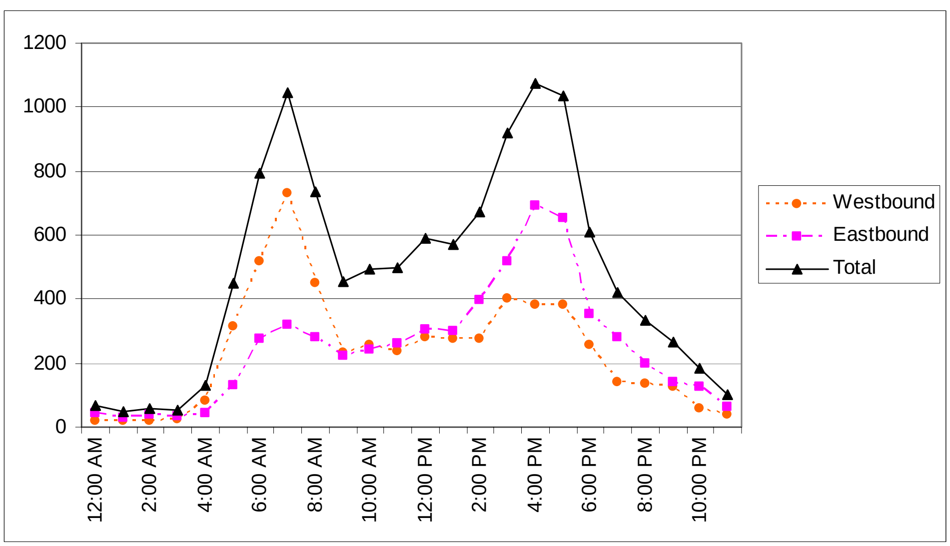
In general, traffic volume along the corridor increases from Airport Way to Peoria Street, picking up substantial traffic from side streets. East of the Peña Boulevard interchange, the east end of the corridor, an increased demand is present to access Peña Boulevard from the east. Figure 3-4 also shows that traffic on 56th Avenue exhibits a strong commuter travel pattern, which is further discussed for multiple traffic count locations as follows.

56th Avenue, West of Peoria Street. The west end of the 56th Avenue corridor exhibits a strong commuter travel pattern as travelers make their way to and from Quebec Street, as illustrated in Figure 3-5. During the AM peak hour there are two times as many westbound vehicles as there are eastbound vehicles. During the PM peak hour the pattern reverses to the opposite direction, where eastbound volume is nearly twice as high as the westbound volume. Midday shows a balanced pattern with approximately equal numbers of westbound and eastbound vehicles. Figure 3-5 also shows the overall two-way demand on 56th Avenue throughout the day. The highest two-way demand on 56th Avenue occurs in the PM peak hour.

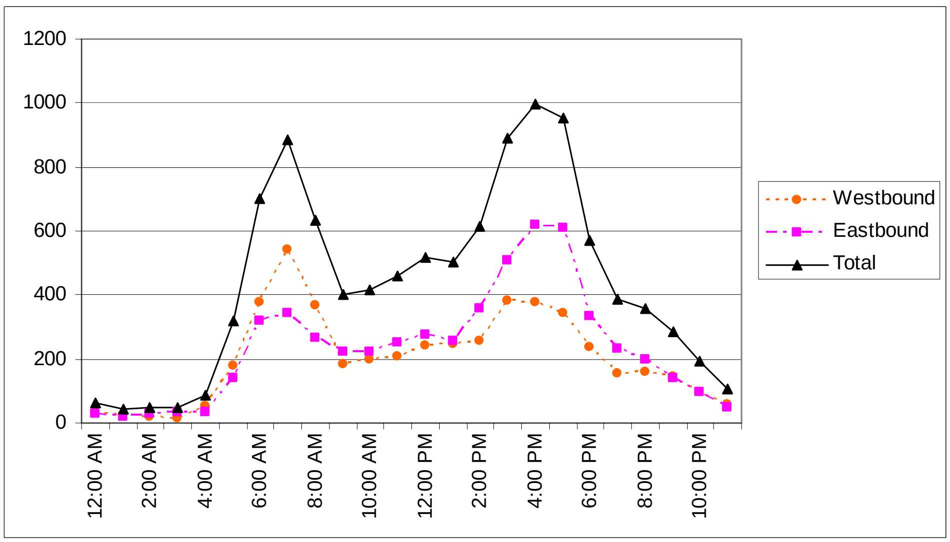
Figure 3-5
Daily Volumes on 56th Avenue, West of Peoria Street



Source: URS Corporation
Note: Data collected 5/01/07 and 5/02/07

56th Avenue, West of Chambers Road. The central portion of the corridor, as illustrated in Figure 3-6, exhibits a commuter pattern similar to that on the west end of the corridor. Traffic patterns show a majority of vehicles travel westbound in the AM peak hour and eastbound in the PM peak hour. As seen in Figure 3-6, the highest bi-directional traffic volume on this section of 56th Avenue occurs during the PM peak hour.

Figure 3-6
Daily Volumes on 56th Avenue, West of Chambers Road



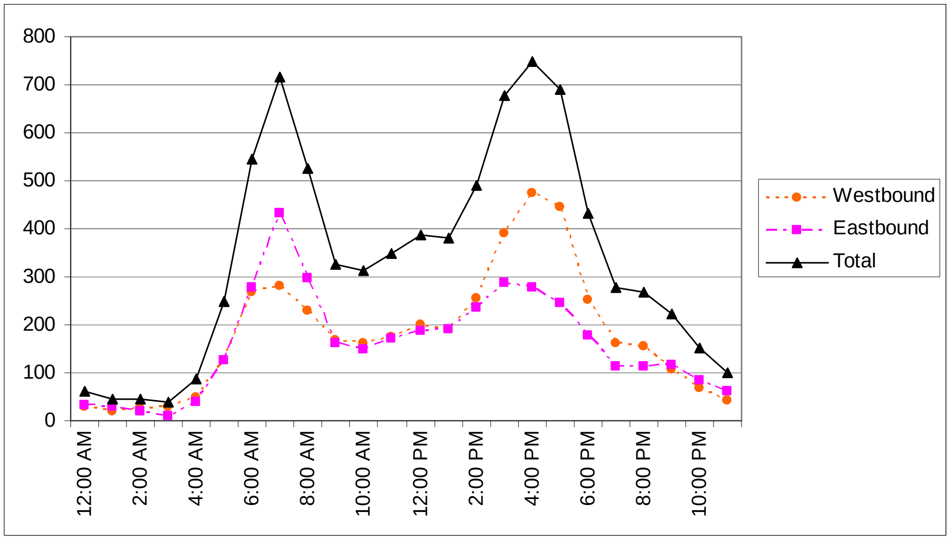
Source: URS Corporation
Note: Data collected 5/01/07 and 5/02/07

56th Avenue, West of Peña Boulevard. This portion of the corridor exhibits a strong commuter demand toward Peña Boulevard, as displayed in Figure 3-7. A majority of vehicles travel eastbound during the AM peak hour with the pattern reversing to westbound during the PM peak hour. During midday, a more balanced pattern with nearly equal amounts of eastbound and westbound traffic is present. Consistent with the rest of the 56th Avenue corridor, the highest two-way demand on this section is during the PM peak hour.

56th Avenue, East of Peña Boulevard. The east end of the 56th Avenue corridor exhibits a strong commuting travel pattern as travelers make their way to and from Peña Boulevard, as illustrated in Figure 3-8.

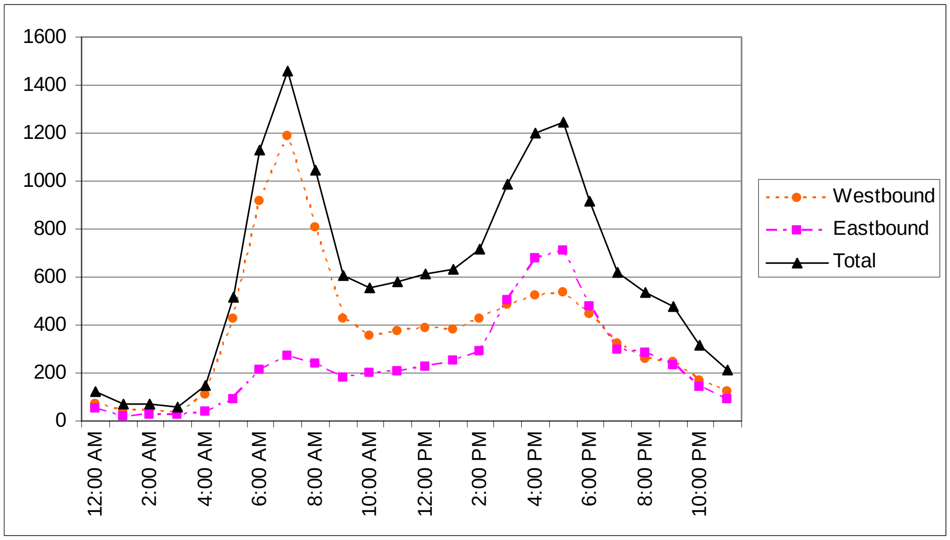
During the AM peak hour there are four times as many westbound vehicles toward Peña Boulevard as eastbound vehicles. During the PM peak hour the pattern reverses, when eastbound vehicles outnumber the westbound vehicles by about 700 to 500. Midday shows westbound vehicles outnumbering eastbound vehicles by about two to one.

Figure 3-7
Daily Volumes on 56th Avenue, West of Peña Boulevard



Source: URS Corporation
Note: Data collected 5/01/07 and 5/02/07

Figure 3-8
Daily Volumes on 56th Avenue, East of Peña Boulevard

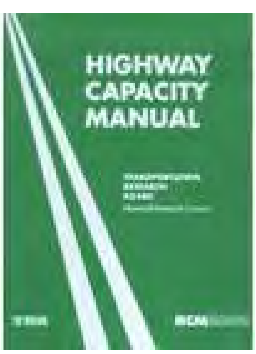


Source: URS Corporation
Note: Data collected 5/01/07 and 5/02/07

Truck Demand. As part of the May 2007 traffic count program, vehicle classification counts were conducted. A vehicle classification count is designed to identify the mix of different types of vehicles (e.g., passenger vehicles, buses, and trucks) that are traveling on the road. Results from vehicle classification counts show a moderate number of trucks counted on 56th Avenue. Large trucks (trucks with five-axles or more) were found to represent about three percent of the total daily vehicles. Overall the daily traffic on 56th Avenue contains is composed of five to 10 percent trucks at various locations.

3.3 Existing Traffic Operations

Traffic engineers have adopted the concept of Level of Service (LOS) to provide a method to describe, evaluate, and compare traffic operations on roadways and/or at intersections. Peak hour traffic flow is scored on a scale ranging from LOS A which represents the most favorable driving conditions, through LOS F, which is the least favorable (congested) condition. LOS D is generally considered to be the minimum acceptable operational condition in the Denver metropolitan area. A number of factors are used for LOS calculations, including traffic volume, roadway/intersection geometry, truck volume, traffic signal spacing, on-street parking, saturation flow rate, and delay. The range of factors may also vary from one type of transportation facility to another, such as a freeway, an arterial street, or an intersection.



The 2000 Highway Capacity Manual (HCM) (TRB, 2000) is the basic reference for roadway and intersection capacity calculations. This manual addresses a broad range of street and highway types, and provides the overall framework for analyzing and reporting traffic operations using the LOS structure. Synchro/SimTraffic, a traffic analysis and simulation software package that implements the HCM 2000 analytical methodology and procedures, was used to evaluate existing traffic operations on 56th Avenue, particularly in terms of capacity and LOS of study intersections.

The resulting peak hour LOS estimates are summarized in Table 3.3-1. As shown in the table, all study intersections in the corridor currently operate at an acceptable LOS ranging from A to D during the AM and PM peak hours. Please refer to Appendix C, Synchro Reports, for detailed capacity and LOS reports resulting from analysis using Synchro.

Table 3.3-1
Intersection Level of Service—Existing Conditions

Intersection of 56th Avenue with	Existing Level of Service (LOS)	
	AM Peak Hour	PM Peak Hour
Havana Street	D	C
Peoria Street	B	B
Uvalda Street	*C*	*D*
Crown Boulevard	*C*	*C*
Chambers Road	*D*	*D*
Peña Boulevard southbound ramps	B	A
Peña Boulevard northbound ramps	C	B

Source: URS Corporation
Notes:
- *Italic*: Indicates an unsignalized intersection
- For an unsignalized intersection, LOS for the worst stop-controlled approach is reported. HCM 2000 does not provide a method to estimate overall LOS for unsignalized intersections.
- For a signalized intersection, LOS of the overall intersection is reported.

3.4 Traffic Safety

To evaluate traffic safety issues, identify high accident locations in the 56th Avenue corridor, and to better understand the corridor accident patterns, crash records for three consecutive years were collected for 56th Avenue from CCD. The most recent data sets available for the corridor were for the years 2003, 2004 and 2005.

Crashes that occurred in the 56th Avenue corridor were analyzed from two aspects: the corridor as a whole and the study intersections. Related statewide arterial crash statistics and citywide intersection crash statistics were also collected from Colorado Department of Transportation (CDOT) and CCD, respectively, to provide a basis for comparing corridor crash experience to citywide and statewide crash experience.

It should be noted that crashes that occurred at the intersection of Havana Street and 56th Avenue were documented in the Environmental Assessment (EA) of 56th Avenue between Quebec Street and Havana Street, and were therefore excluded from this corridor's safety analysis.

Corridor Crash History

Measures of Crash Severity

- Property damage only (PDO)
- Injury
- Fatality

Table 3.4-1 summarizes the severity of crashes that occurred on 56th Avenue during the three-year analysis period. The severity of a crash is reported as one of the following three categories:

- Property damage only (PDO), in which no injury or fatality occurs.
- Injury, in which at least one injury and usually some property damage result from the crash but no fatality.
- Fatal, in which at least one fatality occurs, usually also with injury and property damage.

Table 3.4-1
56th Avenue Crash Totals (2003—2005)

Year	Crash Severity			
	PDO	Injury	Fatal	Total
2003	20	7		27
2004	25	7	1	33
2005	31	15		46
Total	**76**	**29**	**1**	**106**
% of Total	***72%***	***27%***	***1%***	***100%***

Data Source: City and County of Denver. Summary compiled by URS Corporation.
Note: PDO = Property Damage Only.

As shown in Table 3.4-1, there were a total of 106 crashes on 56th Avenue (Havana Street to Peña Boulevard) in the years 2003-2005. Almost three-quarters of the crashes had property damage only. There was one fatal crash in the 2003-2005 reporting period.

Simply reporting the number and severity of a roadway's crash history leads to the question—does the roadway experience more or less crashes than other comparable roadways in Colorado? To answer this question, a statistical method adopted by CDOT was used to compare the frequency and severity of crashes on similar transportation facilities.

In this analysis method, the primary statistic is the Weighted Hazard Index (WHI), which is calculated by considering crash frequency, severities (injuries and fatalities), traffic volume within the roadway section, the length of the roadway section, and a comparison with the crash history of similar roadways. Positive values of WHI (WHI>0) indicate roadway sections that experience a greater crash experience (frequency and severity) than similar statewide roadways. Negative WHI values (WHI<0) indicate sections where the crash experience in terms of frequency and severity is lower than statewide average on similar roadways.

Question:

How does 56th Avenue crash experience compare to similar roadways in Colorado?

The key to this analysis is comparing similar types of roadways. For example, it would not be meaningful to compare 56th Avenue's crash experience against I-70 through CCD. Based on the data provided by CDOT, 56th Avenue is most comparable to CDOT's "Urban Other Principal Arterial" category of statewide roadways. Table 3.4-2 presents the crash experience (number and severity of crashes) for 56th Avenue as well as statewide Urban Other Principal Arterial averages. The table also reports several calculated statistical parameters that were used to compute the WHI, including the Weighted Crash Rate for 56th Avenue (R_w), the statewide average Weighted Crash Rate of Urban Other Principal Arterials (R_{wa}), and the Weighted Critical Crash Rate of 56th Avenue (R_{wc}).

Answer:

56th Avenue crash frequency and severity is lower than similar roadways in Colorado.

Table 3.4-2 shows that the section of 56th Avenue between Havana Street and Peña Boulevard had a negative WHI (-5.62) value for the three years studied. This means that the crash frequency and severity of 56th Avenue is lower than the statewide average for similar roadways. In addition, Table 3.4-2 also indicates that 56th Avenue experienced lower PDO and injury crash rates, respectively, than statewide averages of Urban Other Principal Arterials. 56th Avenue had a higher fatal crash rate than statewide average of similar roadways; however, there was only one fatal crash on 56th Avenue during the three-year period, which does not provide enough crash experience for meaningful statistical analysis.

Table 3.4-2
56th Avenue Statistical Analysis of Crash Experience

	56th Avenue 2003-2005	Statewide Urban Other Principal Arterials 2003-2004
Property Damage Only (PDO) Crashes	76	35,040
Injury (INJ) Crashes	29	12,647
Fatal (FAT) Crashes	1	151
Total Number of Crashes	106	47,838
A_w (Weighted number of crashes)	233	100,087
Million Vehicle Miles of Travel (MVMT)	48.32	10,237
PDO Crash Rate	1.57	3.42
INJ Crash Rate	0.6	1.24
FAT Crash Rate	2.07	1.48
Weighted Crash Rate	4.82 (R_w)	9.78 (R_{wa})
Weighted Critical Crash Rate (R_{wc})	10.44	N/A
Weighted Hazard Index (WHI)	-5.62	N/A

Data Source: City and County of Denver, and Colorado Department of Transportation. Summary compiled by URS Corporation.

Notes:

- PDO & Injury Crash Rates are expressed in crashes per MVMT
- Fatal Crash rate is in crashes per 100 MVMT
- Weighted Crashes: A_w = PDO + (5 x INJ) + (12 x FAT)
- PDO Crash Rate = (PDO) / (MVMT)
- INJ Crash Rate = (INJ) / (MVMT)
- FAT Crash Rate = 100 x (FAT) / (MVMT)
- Weighted Crash Rate: $R_w = A_w/(MVMT)$
- R_{wa} = Statewide Weighted Crash Rate for Urban Other Principal Arterials
- Weighted Critical Crash Rate: $R_{wc} = R_{wa} + 1.5\sqrt{R_{wa}/(MVMT)} - 1/(2 \times MVMT)$
- WHI = R_w - R_{wc}
- N/A = not applicable

Intersection Crash Experience

Figure 3-9 shows the crashes at all intersections on 56th Avenue between Havana Street and Peña Boulevard. A closer look at different intersections indicates that only a small number of crashes occurred at local intersections (where a local street intersects 56th Avenue). Therefore only those intersections where an arterial or collector street crosses 56th Avenue were analyzed in greater detail.

Table 3.4-3 displays the calculated crash rates at the study intersections. To allow for comparison of intersections that have different traffic volumes, a crash rate is computed as "crashes per million entering vehicles." The relatively small number of crashes at these specific locations is not sufficient for more detailed crash analysis.

Table 3.4-3
56th Avenue Intersection Crash Rates

Location	Number of Crashes	Crash Rate (Crashes per MEV)		
		PDO	INJ	Overall
Peoria Street	9	0.3	0.2	0.5
Uvalda Street	4	0.2	0.1	0.3
Crown Boulevard	5	0.1	0.3	0.4
Chambers Road	9	0.5	0.1	0.6
Peña Boulevard	18	0.7	0.2	0.9

Data Source: City and County of Denver. Summary compiled by URS Corporation.
Note: MEV — Million Entering Vehicles
PDO — Property Damage Only.
INJ — Injury

Table 3.4-4 summarizes the crashes by type at various locations in the corridor. Crashes were grouped by the predominant cause of each crash (such as head-on, sideswipe, hitting curb, etc.). The purpose of this type of analysis is to determine if specific improvement(s) can be identified to remedy the most common causes of crashes at these given locations. Again, the relatively small number of crashes at these specific locations is not sufficient for more detailed crash analysis. Still, Table 3.4-4 shows that rear end crashes are the most frequent crash type in the corridor, followed by sideswipes.

Summary

The primary conclusion that can be drawn from this analysis of 2003-2005 crash experience is that the entire corridor experiences below average crash experience frequency and severity when compared against similar facilities in Colorado.

Frequent Crash Types in the 56th Avenue Corridor:

- Rear end
- Sideswipe

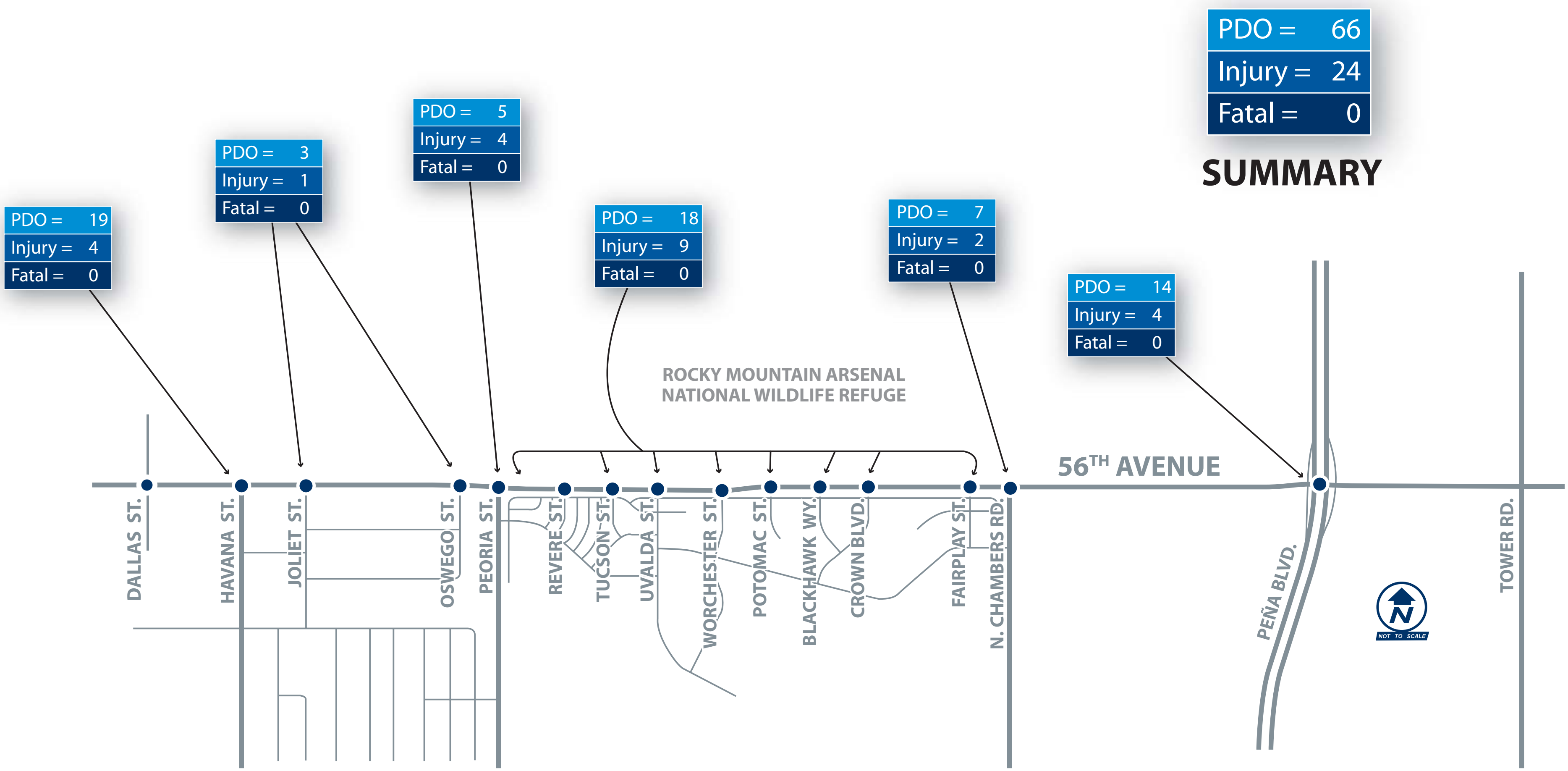
Table 3.4-4
56th Avenue Crash Summary by Type

Crash Type	Signalized Intersection Crashes	Unsignalized Intersection Crashes	Mid-block Crashes	Total
Approach Turn	1	1	0	2
Head On Collision	3	1	1	5
Broadside	1	5	2	8
Overturning	0	2	1	3
Rear end	9	16	11	36
Sideswipe	6	5	8	19
Fence	0	0	2	2
Utility/Light Pole	0	0	2	2
Curb	0	0	3	3
Domestic/Wild Animal	0	0	6	6
Other	7	10	3	20
Total	27	40	39	106

Data Source: City and County of Denver. Summary compiled by URS Corporation

The predominant severity of crash is property damage only. There was only one fatal crash in the corridor during the three-year analysis period. The limited evaluation of crashes by crash type did not form the basis to identify any predominant patterns of crashes in the corridor.

While historical crash data of recent years demonstrates that the corridor experiences lower crash rates than the statewide average of Urban Other Principal Arterials, the community visioning process identified the desire to maintain 56th Avenue as a safe corridor for all users. Among the issues discussed was the desire to bring the corridor



Data Source: City and County of Denver. Summary Completed by URS Corporation.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 3 - 9
Intersection Crash Frequency and Severity (2003 - 2005)

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up to current roadway design standards, and implement appropriate engineering measures that will encourage a reduction in the number and severity of crashes.

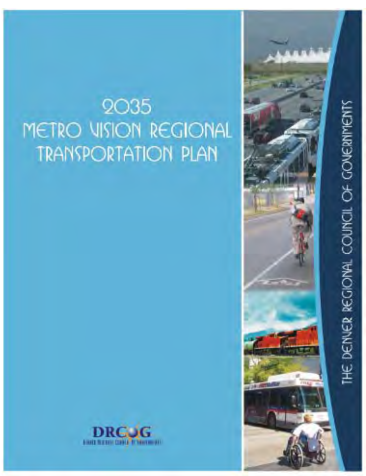
3.5 Traffic Forecasts for No-Action Condition

Travel Demand Forecasting

2035 is the horizon year in the current DRCOG regional travel demand model

A primary purpose of the 56th Avenue corridor study is to identify the long-range transportation needs of the 56th Avenue corridor. To assist in that goal, year 2035 traffic forecasts were developed for the corridor.

Traffic forecasts for the 56th Avenue corridor were developed from the Denver Regional Council of Governments (DRCOG) regional travel demand model, which uses TransCAD software to represent forecast land use and transportation conditions in the nine-county Denver region, including the counties of Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Gilpin and Jefferson.



The initial task of the modeling effort was to establish a baseline transportation network in the model that would serve as the basis for evaluating transportation improvements. The 56th Avenue No-Action model (year 2035) is based on the DRCOG 2035 Metro Vision Regional Transportation Plan (MVRTP) (DRCOG, 2007) excluding major improvements along 56th Avenue. The 56th Avenue corridor was "coded" in its existing configuration of four lanes between Havana Street and Peoria Street and two lanes from Peoria Street to Peña Boulevard. The remaining roadway network of the 2035 travel demand model, including other planned roadway improvements outside of the corridor, were retained in the No-Action model.

There were no changes made to the model's population and employment in the 56th Avenue corridor since it was important to remain consistent with the DRCOG socioeconomic forecast totals.

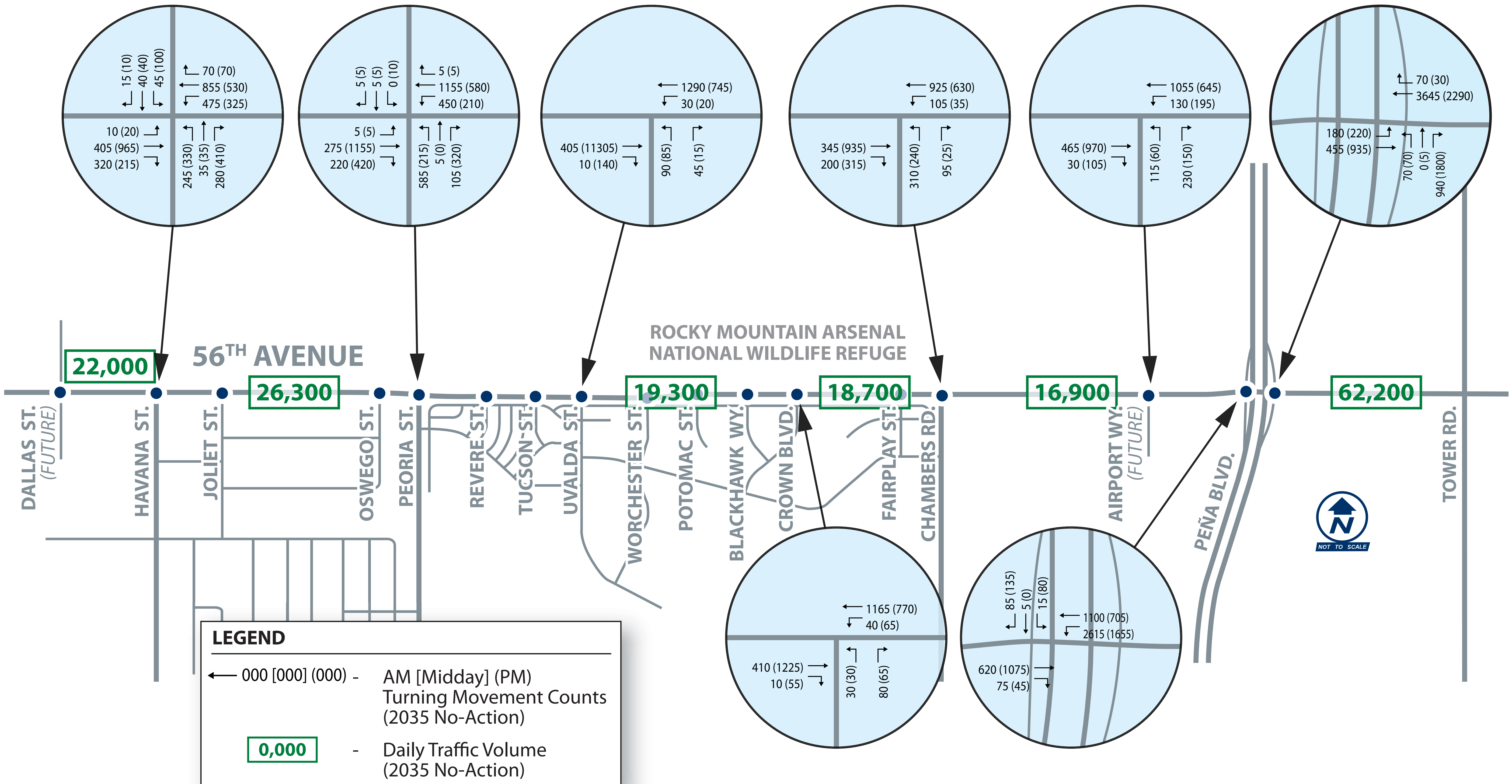
Forecast Traffic Volumes

The 2035 forecast daily volumes for the No-Action condition are shown in Figure 3-10. Comparing the 2035 forecasts to the existing traffic volumes as shown in Figure 3-4, the model shows forecast growth in traffic volume of 120 percent near Peoria Street, 78 percent near Chambers Road, 138 percent west of Peña Boulevard and 320 percent east of Peña Boulevard.

Forecast Traffic Operations

Future year (2035) traffic operations were evaluated for the No-Action traffic condition. In this condition, the corridor was analyzed using the existing roadway geometry (no widening of any sections in the corridor) and the 2035 peak hour traffic forecasts that were developed by the DRCOG travel demand model.

The 2035 peak hour operations for study intersections in the 56th Avenue corridor were evaluated. The resulting forecast of operations is consistent with overall corridor findings, with some intersections operating at undesirable levels. The results are shown in Table 3.5-1. While an undesirable LOS (E or F) for a selected traffic movement at an unsignalized intersection does not directly point to the need for a future traffic signal, it can be an indicator that an intersection warrants continued monitoring.



Data Source: URS Corporation

FIGURE 3 - 10
Forecast Traffic Volumes (2035 No-Action)

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Table 3.5-1
Forecast Intersection Levels of Service (2035 No-Action)

Intersection of 56th Avenue with	2035 Level of Service (LOS)	
	AM Peak Hour	PM Peak Hour
Havana Street	D	**E**
Peoria Street	**E**	D
Uvalda Street	***F***	***F***
Crown Boulevard	*D*	***F***
Chambers Road	C	B
Airport Way	B	B
Peña Boulevard southbound ramps	**F**	**E**
Peña Boulevard northbound ramps	D	**E**

Source: URS Corporation.
Notes:

- *Italic*: Indicates an unsignalized intersection
- **Bold letter E or F**: Indicates an undesirable LOS
- For an unsignalized intersection, LOS for the worst stop-controlled approach is reported. HCM 2000 does not provide a method to estimate overall LOS for unsignalized intersections.
- For a signalized intersection, LOS of the overall intersection is reported.

Conclusions Drawn from the No-Action Analysis

Traffic forecasting and traffic operations analysis were performed to evaluate the forecast 2035 No-Action scenario for the 56th Avenue corridor. The analysis of this scenario provides a comparative basis for developing and evaluating transportation improvement alternatives for the corridor.

Traffic forecasts indicate that the corridor will experience substantial traffic growth by the year 2035. Under the 2035 No-Action scenario, 56th Avenue and most key intersections along the corridor will operate over-capacity, i.e., forecast traffic volumes are greater than or equal to capacity resulting in undesirable levels of traffic congestion and travel delay.

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4.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

This chapter describes the methodology and procedures for identifying and formulating alternatives to improve the multi-modal transportation system of the 56th Avenue corridor. A range of transportation improvement options were developed, screening criteria were developed, and the initial and detailed screening processes were used to identify a Recommended Alternative.

Engineering elements specific to the Recommended Alternative, including considerations for wildlife viewing pullouts adjacent to the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR), and right-of-way requirements, are described in the last section of this chapter. Pavement design is discussed in Appendix E.

The alternatives screening process included consideration of environmental resources in the corridor. The environmental resources investigations and analyses for this study are described in Chapter 5.

4.1 Corridor Alternatives

Significant efforts were made during this study to develop transportation alternatives for the 56th Avenue corridor that address the long-range corridor mobility, accessibility and safety needs, while preserving and enhancing community quality of life.

The transportation alternatives were developed upon the following study efforts and results as described in previous chapters:

- The assessment of the corridor transportation setting, as discussed in Chapter 3, which identified safety conditions and existing traffic operations conditions. This analysis also resulted in the identification of traffic operations deficiencies under the future No-Action conditions.

- Environmental resources evaluation, as described in Chapter 5, which outlines the environmental opportunities and constraints in developing transportation alternatives.

In addition to the above analyses, results from field investigations, public and agency input (detailed information is described in Chapter 6), and full consideration of other planned/scheduled transportation improvements each played a major role in the development and formulation of the full spectrum of reasonable transportation alternatives, as listed below, for the 56th Avenue corridor.

List of Alternatives

- Alternative 1: No-Action.
- Alternative 2: Transportation System Management (TSM).
- Alternative 3: Improve parallel existing facility.
- Alternative 4: Construct new parallel facility.
- Alternative 5: Widen 56th Avenue to four through lanes, Havana Street to Peña Boulevard.
- Alternative 6: Widen 56th Avenue to four through lanes with on-street bicycle lanes, Havana Street to Peña Boulevard.
- Alternative 7: Widen 56th Avenue to six through lanes, Havana Street to Peña Boulevard.
- Alternative 8: Widen 56th Avenue to six through lanes with on-street bicycle lanes, Havana Street to Peña Boulevard.

All widening alternatives, i.e., Alternatives 5 through 8, would include a raised center median and detached sidewalks on the north and south sides of 56th Avenue (in widened sections). The existing sidewalk on the south side of 56th Avenue between Havana Street on the west and Memphis Street on the east would be retained in all of the alternatives.

Table 4.1-1 summarizes for each alternative the essential improvement measures to the 56th Avenue corridor and corresponding changes/ improvements to other sections of 56th Avenue and/or surrounding transportation network. Each alternative is described in detail in the following section. It should be noted that each of alternatives 4–8 also includes appropriate TSM features.

Table 4.1-1
56th Avenue - Havana Street to Peña Boulevard
Improvement Alternatives

<table>
<tr><th>Alternative</th><th>Havana Street to
Peña Boulevard</th><th>Other Corridors</th></tr>
<tr><td>1</td><td>No-Action</td><td>No-Action</td></tr>
<tr><td>2</td><td>TSM</td><td>None</td></tr>
<tr><td>3</td><td rowspan="2">None</td><td>Improve parallel roads</td></tr>
<tr><td>4</td><td>Construct new parallel road</td></tr>
<tr><td>5</td><td>Widen to 4 lanes</td><td rowspan="4">None</td></tr>
<tr><td>6</td><td>Widen to 4 lanes plus
on-street bicycle lanes</td></tr>
<tr><td>7</td><td>Widen to 6 lanes</td></tr>
<tr><td>8</td><td>Widen to 6 lanes plus
on-street bicycle lanes</td></tr>
</table>

Source: URS Corporation.
Note: TSM — Transportation System Management

Description of Alternatives

ALTERNATIVE 1: NO-ACTION

The **No-Action** Alternative excludes any roadway widening improvements on 56th Avenue between Havana Street and Peña Boulevard.

The No-Action alternative is limited to short-term minor restoration types of activities (safety and maintenance improvements, etc.) that maintain continuing operations of the existing roadway. It should be noted that the No-Action alternative assumes the widening of 56th Avenue to six lanes from Quebec Street to Havana Street. An Environmental Assessment (EA) is underway for the 56th Avenue corridor from Quebec Street to Havana Street.

ALTERNATIVE 2: TSM ALTERNATIVE

TSM is an integrated program to optimize the performance of existing infrastructure through the implementation of systems, services, and projects designed to preserve capacity and improve security, safety, and reliability (ITE, 2005). Candidate TSM measures that would apply to the 56th Avenue corridor improvements include:

- Traffic detection and surveillance.
- Arterial management.
- Demand management, such as increased transit service, incentives that encourage carpooling, and guaranteed ride home programs.
- Emergency management.
- Automated enforcement.
- Traffic incident management.
- Roadway weather management.
- Traveler information services.
- Commercial vehicle operations.
- Traffic control, such as traffic signal coordination and installing new traffic signals.
- Freight management.
- Coordination of highway, rail, transit, bicycle, and pedestrian operations.

Excluded from this TSM alternative are major capacity improvements, such as the widening of 56th Avenue to allow for additional through lanes, or major reconstruction of intersections that would increase intersection capacity. No additional right-of-way would be acquired to implement the TSM alternative. Candidate locations for intersection improvements include:

- Havana Street.
- Peoria Street.
- Uvalda Street.
- Crown Boulevard.

- Chambers Road.
- Memphis Street.
- Peña Boulevard.

ALTERNATIVE 3: IMPROVE PARALLEL EXISTING FACILITY

In this alternative, roadway capacity improvements would be made to one or more existing roadways that provide similar local and/or regional access functions as 56th Avenue and that run generally parallel to 56th Avenue for a substantial distance. Roadway sections designated for improvement in this alternative are:

- 96th Avenue/88th Avenue from State Highway (SH) 2 on the west to Tower Road on the east.
- Interstate 70 (I-70) from Quebec Street (SH 35) on the west to Peña Boulevard on the east.

Both of these roadways, as highlighted in Figure 4-1, provide regional east-west connectivity in this part of the Denver metropolitan area. Figure 4-1 also illustrates other generally east-west corridors parallel to 56th Avenue, most of which will be discussed in the following sections. Capacity improvements to these corridors may include, but are not limited to, additional through lanes, auxiliary lanes and interchange/intersection improvements. Additional right-of-way may be required to implement the required improvements.

ALTERNATIVE 4: CONSTRUCT NEW PARALLEL FACILITY

In this alternative, local accessibility and regional mobility would be improved by the construction of a new roadway parallel to 56th Avenue. To provide the best spacing of east-west arterials in this part of the metropolitan area, the designated route for this alternative would be an alignment through the RMANWR. The roadway corridor for this alternative is defined as the 72nd Avenue alignment, between Quebec Street on the west and Peña Boulevard on the east, as highlighted in Figure 4-2. A frontage road (in a new right-of-way) would then connect

72nd Avenue to an interchange with Peña Boulevard. A 150-foot wide corridor (new right-of-way) is defined for assessing environmental impact.

ALTERNATIVE 5: WIDEN 56TH AVENUE TO FOUR THROUGH LANES, HAVANA STREET TO PEÑA BOULEVARD

In this alternative, 56th Avenue would be reconstructed to provide four through lanes from Havana Street to Peña Boulevard. The roadway would include a raised center median (with left-turn lanes at arterial and collector intersections) and detached multi-use paths on both the north and south sides of 56th Avenue. A typical section of 56th Avenue with Alternative 5 improvements is illustrated in Figure 4-3. Additional right-of-way acquisition would be required in the vicinity of the 56th Avenue/Peña Boulevard interchange, as shown on the typical section.

With the raised median, full access to and from intersecting north-south streets would be restricted to the following arterial and collector intersections:

- Havana Street.
- Peoria Street.
- Uvalda Street.
- Crown Boulevard.
- Chambers Road.
- Memphis Street.
- Airport Way.
- Peña Boulevard.

Right-in-right-out-only access to and from all other north-south streets would be provided. Left-turns would not be available at these locations. As a part of the project, local driveway access to the Martinez Army Reserve Center would be closed and a new fourth (north) leg would be added to the Peoria Street intersection to provide access to the Reserve Center. Designated intersections along 56th Avenue for new traffic signals (when warranted) include:

- Uvalda Street.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 1
Select Corridors Parallel to 56th Avenue

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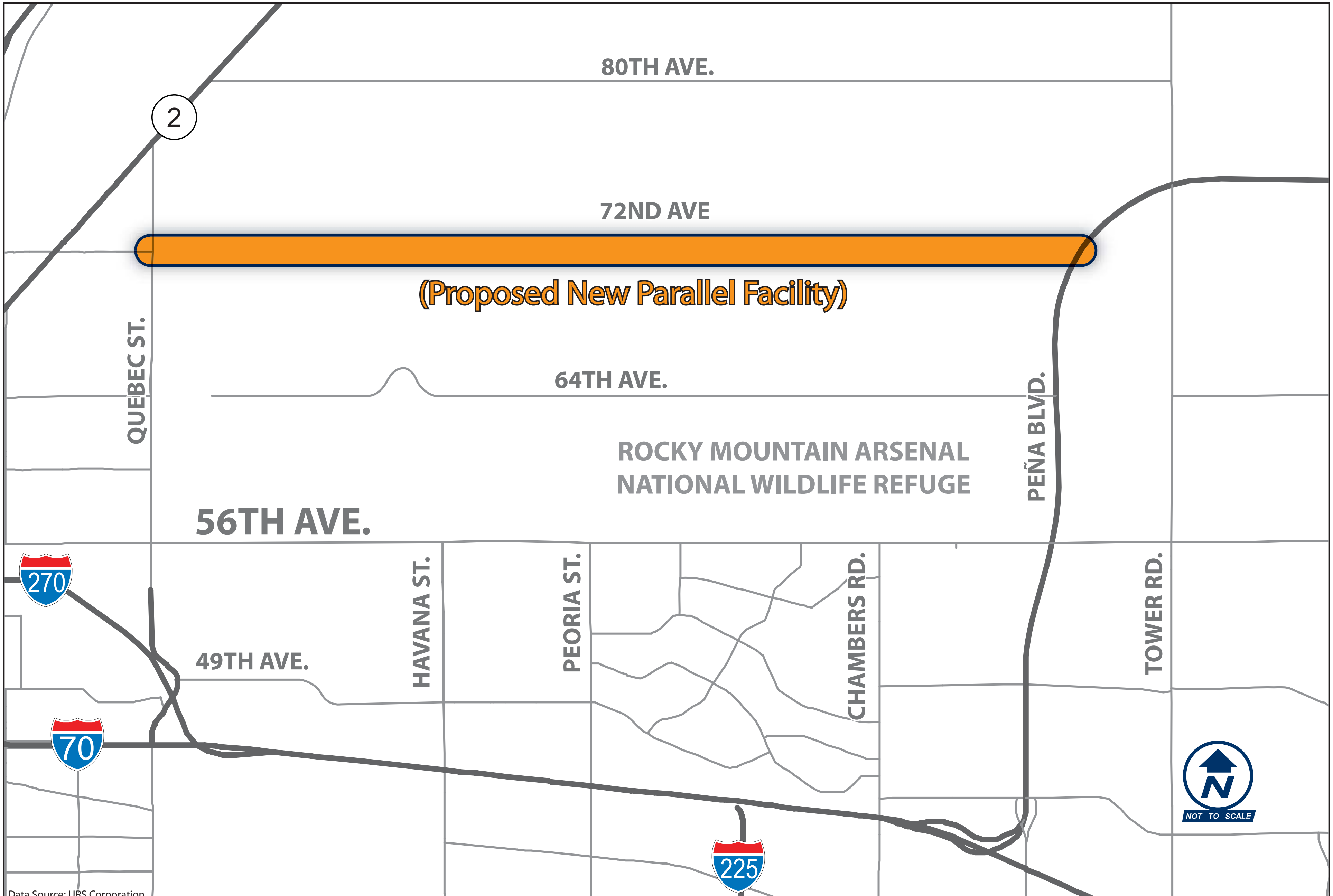

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 2
Alternative 4: Construct New Parallel Facility

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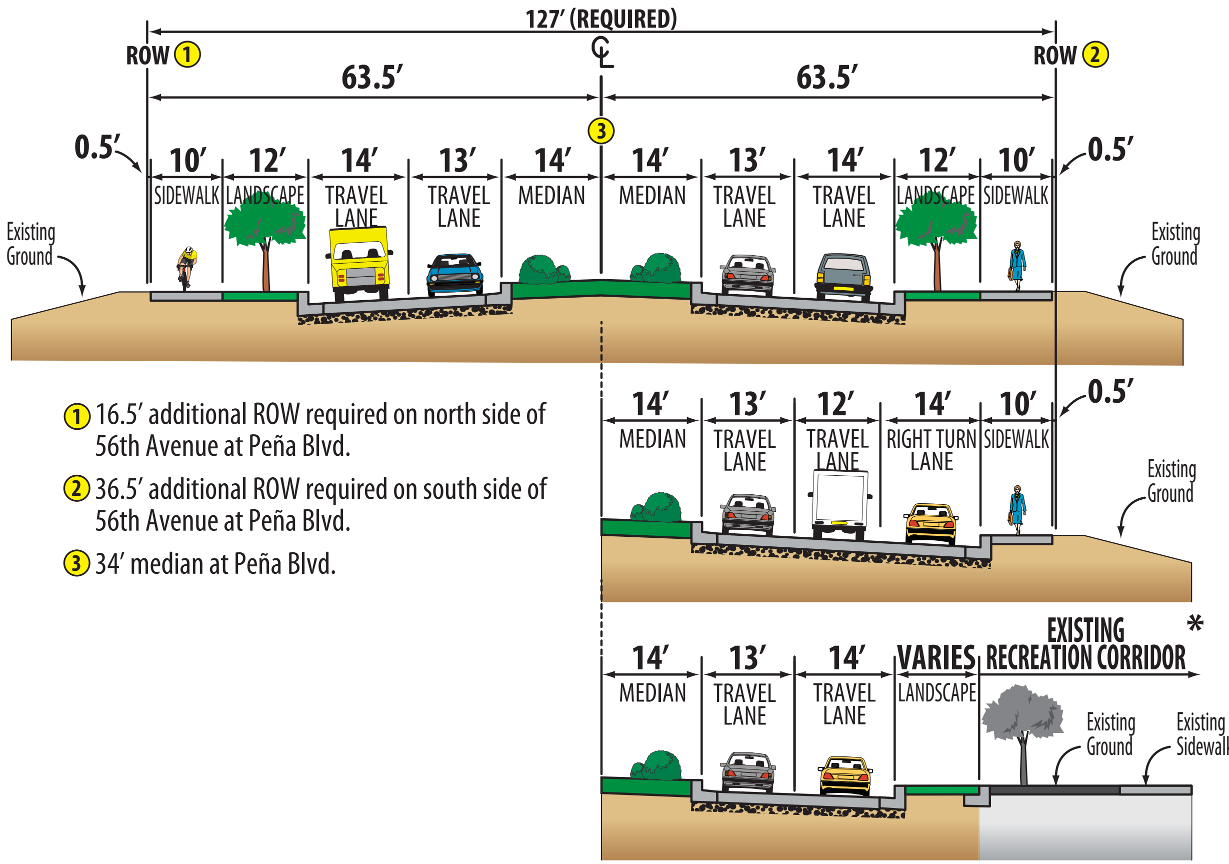
ALTERNATIVE 5: WIDEN TO 4-LANES
HAVANA ST. TO PEÑA BLVD.
TYPICAL SECTION, LOOKING EAST



1. 16.5′ additional ROW required on north side of 56th Avenue at Peña Blvd.
2. 36.5′ additional ROW required on south side of 56th Avenue at Peña Blvd.
3. 34′ median at Peña Blvd.

* Between Peoria St. and Memphis St.

℄ = Center Line
ROW = Right-of-Way
All Distances are measured in feet.

Data Source: URS Corporation

- Crown Boulevard.
- Chambers Road.
- Airport Way.

ALTERNATIVE 6: WIDEN 56TH AVENUE TO FOUR THROUGH LANES WITH ON-STREET BICYCLE LANES, HAVANA STREET TO PEÑA BOULEVARD

Alternative 6 provides the same elements as Alternative 5 with the following modifications: On-street striped bicycle lanes (4-foot in width, excluding gutter pan) would be constructed on each side of 56th Avenue.

A typical section of 56th Avenue with Alternative 6 improvements is illustrated in Figure 4-4.

ALTERNATIVE 7: WIDEN 56TH AVENUE TO SIX THROUGH LANES, HAVANA STREET TO PEÑA BOULEVARD

In this alternative, 56th Avenue would be reconstructed to provide six through lanes from Havana Street to Peña Boulevard. The roadway cross-section would include a raised center median (with left turn lanes) and detached sidewalks on both the north and south sides of 56th Avenue. A typical section of 56th Avenue with Alternative 7 improvements is illustrated in Figure 4-5.

Additional right-of-way acquisition would be required in the vicinity of the 56th Avenue/Peña Boulevard interchange, as shown on the typical section. To avoid any other right-of-way acquisition, the landscape buffer and median would be reduced in width at selected locations as shown in Figure 4-5.

With the raised median, access to and from intersecting north-south streets would be restricted to the following arterial and collector intersections:

- Havana Street.
- Peoria Street.
- Uvalda Street.

- Crown Boulevard.
- Chambers Road.
- Memphis Street.
- Airport Way.
- Peña Boulevard.

Right-in-right-out-only access to and from all other north-south streets would be provided. Left-turns would not be available at these locations. As a part of the project, local driveway access to the Martinez Army Reserve Center would be closed and a new fourth (north) leg would be added to the Peoria Street intersection to provide access to the Reserve Center.

Designated intersections along 56th Avenue for new traffic signals (when warranted) include:

- Uvalda Street.
- Crown Boulevard.
- Chambers Road.
- Airport Way.

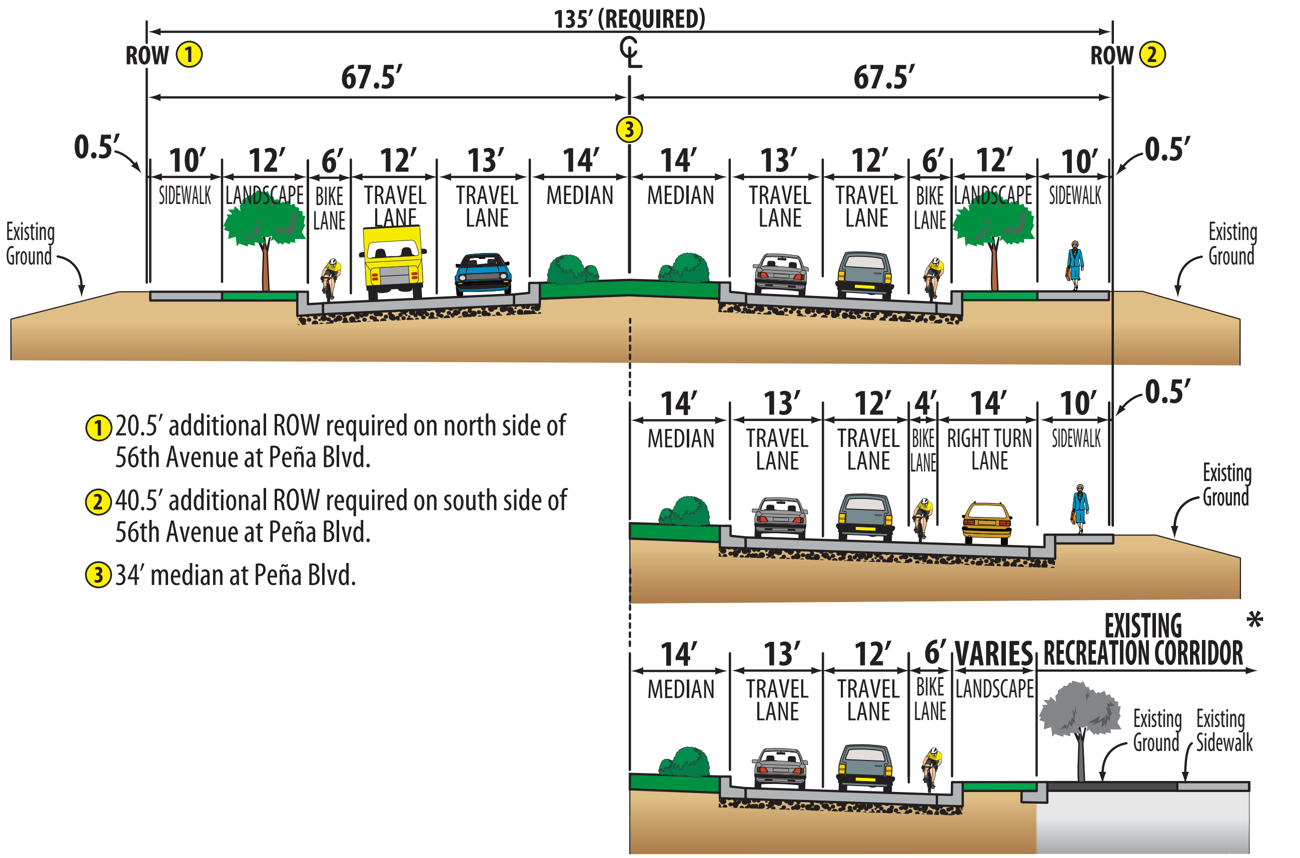
ALTERNATIVE 8: WIDEN 56TH AVENUE TO SIX THROUGH LANES WITH ON-STREET BICYCLE LANES, HAVANA STREET TO PEÑA BOULEVARD

Alternative 8 provides the same design elements as Alternative 7 with the following modifications: On-street striped bicycle lanes (4-foot in width, excluding gutter pan) would be constructed on each side of 56th Avenue.

A typical section of 56th Avenue with Alternative 8 improvements is illustrated in Figure 4-6.

ALTERNATIVE 6: WIDEN TO 4-LANES WITH BIKE LANES HAVANA ST. TO PEÑA BLVD.

TYPICAL SECTION, LOOKING EAST



* Between Peoria St. and Memphis St.

℄ = Center Line
ROW = Right-of-Way
All Distances are measured in feet.

Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 4
A Typical Section for Alternative 6

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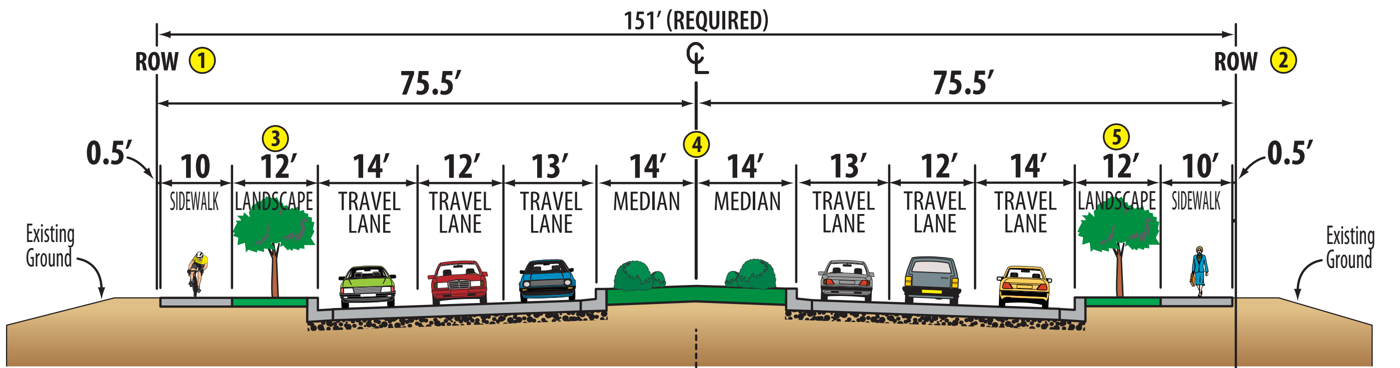
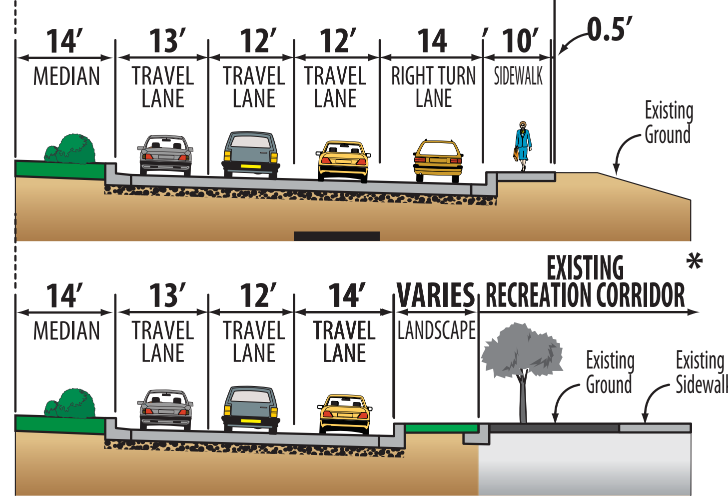
ALTERNATIVE 7: WIDEN TO 6-LANES
HAVANA ST. TO PEÑA BLVD.
TYPICAL SECTION, LOOKING EAST



1. 28.5′ - 37′ of additional ROW required on north side of 56th Avenue at Peña Blvd.
2. 48.5′ of additional ROW required on south side of 56th Avenue at Peña Blvd.
3. No landscape buffer in front of Martinez Army Reserve Center on north side of 56th Avenue east of Peoria St.
   No landscape buffer, Worchester St. to Chambers Rd.
   8′ landscape buffer, Chambers Rd. to Buckley Rd.
4. 21.5′ median, Worchester St. to Chambers Rd.
   25′ median, Chambers Rd. to Buckley Rd.
   34′ median, Peña Blvd.
5. No landscape buffer in front of Xcel Substation on south side of 56th Avenue east of Havana St.



* Between Peoria St. and Memphis St.

℄ = Center Line
ROW = Right-of-Way
All Distances are measured in feet.

Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 5
A Typical Section for Alternative 7

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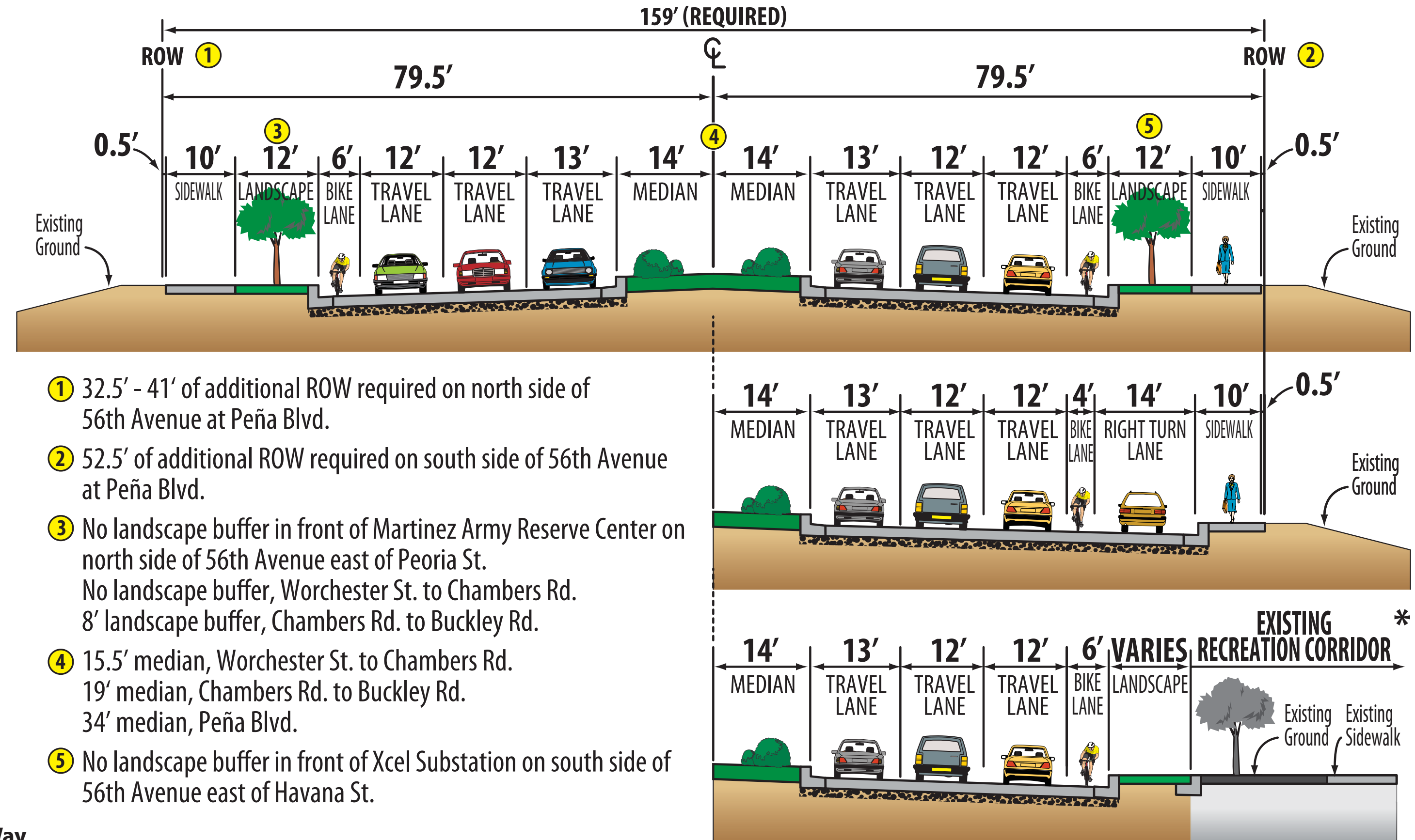
ALTERNATIVE 8: WIDEN TO 6-LANES WITH BIKE LANES HAVANA ST. TO PEÑA BLVD.

TYPICAL SECTION, LOOKING EAST



1. 32.5′ - 41′ of additional ROW required on north side of 56th Avenue at Peña Blvd.
2. 52.5′ of additional ROW required on south side of 56th Avenue at Peña Blvd.
3. No landscape buffer in front of Martinez Army Reserve Center on north side of 56th Avenue east of Peoria St.
   No landscape buffer, Worchester St. to Chambers Rd.
   8′ landscape buffer, Chambers Rd. to Buckley Rd.
4. 15.5′ median, Worchester St. to Chambers Rd.
   19′ median, Chambers Rd. to Buckley Rd.
   34′ median, Peña Blvd.
5. No landscape buffer in front of Xcel Substation on south side of 56th Avenue east of Havana St.

℄ = Center Line
ROW = Right-of-Way
All Distances are measured in feet.

*** Between Peoria St. and Memphis St.**

Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 6
A Typical Section for Alternative 8

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4.2 Alternatives Screening Process

Two-Phase Screening Process

- Initial Screening
- Detailed Screening

A two-phase screening process was designed to evaluate the transportation alternatives. The goal of this process was to identify the Recommended Alternative for future planning and implementation (subject to further environmental studies, if required) as funding becomes available. The two phases of screening are described below:

- **Initial (Fatal Flaw) Screening**. The initial screening is a "fatal flaw" screening process since it identifies and eliminates alternatives with fatal flaws. Specifically during the initial screening, alternatives found to be infeasible, impractical or have "fatal flaw" impacts as measured against the evaluation criteria established for this phase of the screening process were considered as "failed" and therefore eliminated from further consideration.

- **Detailed screening.** Alternatives retained from the initial screening were evaluated against an extensive set of screening criteria, resulting in the identification of the Recommended Alternative. Each alternative was assessed at a higher level of detail than during the initial screening.

4.3 Initial (Fatal Flaw) Screening

The following set of evaluation criteria was established for the initial screening phase to assess the full range of alternatives developed for the 56th Avenue corridor improvements:

- **Project goals and issues**. Alternatives that did not satisfy the project vision, meet goals or address issues that were established for this corridor study as described in Chapter 2 were eliminated as a result from the initial screening, and therefore excluded from further consideration.

- **Environmental impacts**. The potential impacts of transportation alternatives on environmental resources present in the study area were analyzed. An alternative was eliminated during the initial screening if it was found to have major negative impacts on environmental resources and these impacts would be difficult to avoid or mitigate.

- **Practicality and feasibility.** Various factors, such as extraordinary cost, extreme complexity of implementation, outstanding constructability issues, and right-of-way limitations, could render an alternative to be impractical or not feasible during the initial screening. Alternatives considered as impractical or unfeasible were eliminated.

Results of the initial screening are summarized in Table 4.3-1 (Please refer to Table 4.1-1 for a brief description of each numbered Alternative).

Table 4.3-1
Initial (Fatal Flaw) Screening of Transportation Alternatives

Alternative	Screening Criteria		
	Project Goals and Issues	**Environmental Impacts**	**Practical and Feasible**
1	N/A	N/A	N/A
2	**FAIL**	PASS	PASS
3	**FAIL**	PASS	**FAIL**
4	**FAIL**	**FAIL**	**FAIL**
5	PASS	PASS	PASS
6	PASS	PASS	PASS
7	PASS	PASS	PASS
8	PASS	PASS	PASS

Source: URS Corporation.
Note: N/A — not applicable

Initial Screening Criteria

- Must effectively achieve project goals and address project issues
- Must avoid, minimize or mitigate impacts on environmental resources
- Must be practical and feasible

The application of screening criteria against each alternative, especially those that were eliminated as a result, is summarized in the following paragraphs.

- Alternative 1—the No-Action Alternative—is used as the comparative basis throughout the alternatives evaluation process, especially for detailed screening. Therefore it is kept for the next screening process, although it may not satisfy all the initial (fatal flaw) screening criteria.
- Alternative 2—the TSM Alternative—will not improve roadway capacity, and therefore does not meet the project goals, one of which is to define solutions to meet forecast travel demand in the future year 2035; nor does it effectively address project issues, in that it is not sufficient to relieve future traffic congestion caused by lack of roadway capacity. Therefore this alternative was eliminated from further evaluation.
- Alternative 3, which improves parallel roads while leaving 56th Avenue unimproved (except for minor measures similar to the No-Action Alternative), was eliminated due to the following considerations:
  - It does not satisfy the project goal to define solutions for 56th Avenue to meet forecast travel demand.
  - It does not address the project issues to manage traffic congestion and for 56th Avenue to support regional transportation system goals.
  - Due to the lack of parallel arterials to 56th Avenue, this alternative is considered impractical.
- Alternative 4, which consists of constructing a new parallel road to 56th Avenue, was eliminated during initial screening due to the following considerations:
  - Similar to Alternative 3, Alternative 4 does not meet the project goals, nor does it effectively address the project issues.

  - The only feasible location to construct a new parallel road is through the RMANWR, which will have major negative environmental impacts.
  - This alternative will incur very high costs that are beyond the range of expected funding, and therefore is considered unfeasible.

- Alternatives 5 through 8 are considered to meet project goals, effectively address project issues, have no substantial negative impacts on environmental resources, and be practical and feasible. Therefore these four alternatives were retained for detailed screening.

4.4 Detailed Screening and Recommended Alternative

Categories of Screening Criteria

- Policy
- Design & Construction
- Environmental Resources
- Traffic Engineering

Alternatives 5 through 8, along with Alternative 1 — No-Action, were evaluated during the detailed screening process to identify the Recommended Alternative.

Screening Criteria

A set of screening criteria, grouped into four categories, as described below, was established to evaluate Alternatives 5 through 8 as well as the No-Action Alternative:

- **Policy**
  - *Conformance with the Denver Regional Council of Governments (DRCOG) 2035 Metro Vision Regional Transportation Plan (MVRTP)*, which was adopted by the DRCOG Board in December 2007 (DRCOG, 2007). The 2035 MVRTP updated the previous DRCOG Metro Vision 2030 Plan (DRCOG, 2005). The 2035 MVRTP envisions 56th Avenue to be a six-lane divided urban principal arterial while continuing to serve as a major regional east-west thoroughfare in the year 2035.

- *Provision for multi-modal access*. The improved 56th Avenue should provide for convenient and effective multi-modal access for all surface transportation travelers and modes including pedestrians, bicyclists, passenger vehicles, freight and mass transit. Multi-modal transportation infrastructure and effective connection to the regional transportation network must be included in the Recommended Alternative.
- *Consistency with on-street bicycle lane practices of the City and County of Denver (CCD).* CCD is in the process of adopting a policy on bicycle facility planning and design of arterial roadways, especially for on-street bicycle lanes, based on current practices in CCD. Bicycle facilities proposed for the improved 56th Avenue need to be consistent with the CCD on-street bicycle lane practices. Generally, high posted speed limits (> 40 mph), more than four travel lanes, and large truck volumes are some of the factors that would make off-street bicycle facilities more preferable than on-street bicycle lanes or shared lanes.

Roadway design criteria adopted by CCD are consistent with federal and state design criteria

- **Design and Construction**
  - *Design criteria*. A viable alternative needs to meet current CCD practices, policies, and standards for roadway design.
  - *Probable construction cost*. Construction costs were estimated for each alternative.
  - *Required right-of-way*. Required right-of-way of each alternative was estimated.
- **Environmental Resources**

  A three-step process was used to evaluate each alternative's impact on corridor environmental resources. First, all possible environmental resources were inspected to identify the resources that exist in the 56th Avenue corridor, as discussed in Chapter 5; second, each environmental resource existing in the corridor was analyzed against the alternatives to evaluate whether it will be affected by the alternatives in similar ways and to similar extents; third, only those environmental resources that will be impacted to different degrees by alternatives were kept as the screening criteria. The differentiating resources are discussed as follows:

- *Environmental Justice*. As discussed in Section 5.1, environmental justice refers to social equity in sharing the benefits and burdens of specific projects or programs. In order to meet the federal requirements of environmental justice Executive Order (EO) 12898, a transportation alternative must avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations.
- *Noise Receptors*. Probable traffic noise conditions caused by each transportation alternative were evaluated.
- *Section 4(f)/6(f)*. Section 4(f)/6(f) legislation, as established under the United States (U.S.) Department of Transportation Act of 1966 (49 U.S. Code (USC) 303, and 23 USC 138), provides protection for publicly owned parks, recreation areas, historic sites, wildlife and/or waterfowl refuges from conversion to other uses. This evaluation identified the RMANWR, the existing and proposed trails and/or bicycle routes in the study area, and the greenbelt land along 56th Avenue adjacent to Parkfield and Montbello neighborhoods as Section 4(f)/6(f) properties in the corridor study area. Historic sites and wildlife habitats were assessed as separate criteria.
- *Historic sites.* Potential impact of each alternative on Highline Canal Lateral, the only historic site that might be affected by transportation improvements in the corridor study area, was considered.

- *Wildlife habitat.* The impact on prairie dog colonies was considered.

- **Traffic Engineering**
  - *Roadway congestion*. The main measure of effectiveness (MOE) used to assess roadway congestion for this evaluation is volume to capacity ratio (v/c).
  - *Travel speed* is an important MOE for corridor mobility since it represents the average speed across a length of roadway and considers delay, deceleration and acceleration times.
  - *Intersection operations.* The primary MOE for traffic operational conditions at intersections is the Level of Service (LOS) as defined in the Highway Capacity Manual (HCM) (TRB, 2000).
  - *Effect on Parallel Corridors.* This criterion was applied to assess how an alternative will affect corridors parallel to 56th Avenue, such as I-70, by providing additional capacity and reducing traffic diverted to parallel corridors.

Traffic Analysis–Future Conditions

Detailed traffic operational analysis, using the Synchro/SimTraffic software package, was performed for the forecast 2035 build conditions for Alternatives 5 through 8. The forecast 2035 No-Action condition was also analyzed and is documented in Section 3.5.

For this planning-level analysis, on-street bicycle lanes were assumed to have a very limited effect on traffic operations. Therefore only Alternatives 5 and 7 were specifically analyzed. Alternative 6 (same as Alternative 5, but with on-street bicycle lanes) was considered to have similar traffic operations as Alternative 5, and Alternative 8 (same as Alternative 7, but with on-street bicycle lanes) was considered to have similar traffic operations as Alternative 7.

Traffic Volumes

The summary of average daily traffic (ADT) forecasts for each alternative in the future year 2035, as presented in Table 4.4-1, shows that Alternative 7 averages the highest forecast ADT along the length of the corridor. The No-Action (Alternative 1) condition averages the lowest forecast ADT. As the capacity along the corridor increases, regional mobility improves, allowing more traffic to use the corridor on a daily basis.

Table 4.4-1 indicates that due to insufficient roadway capacity, as with Alternatives 1 and 5, 56th Avenue will not be able to serve the full travel demand, which is most closely represented by the forecast daily volumes under Alternative 7. Consequently under Alternatives 1 and 5, the excess travel demand that cannot be served by 56th Avenue will be diverted to parallel corridors. The DRCOG Regional Travel Demand Model was used to quantify this diversion of traffic under Alternatives 1 and 5 as compared to Alternative 7. These results are exhibited in Table 4.4-2 for select roadways parallel to 56th Avenue. Figure 4-1 illustrates locations of the parallel corridors. It was assumed that Alternative 7 fully serves the future travel demand, and therefore no trips will be diverted to other parallel roadways.

There is forecast demand for six-lanes on 56th Avenue—alternatives that provide for less than six lanes require that motorists that would prefer to use 56th Avenue must be diverted to other roadways.

Table 4.4-1
Average Daily Traffic (ADT) Forecast (2035)

Segment of 56th Avenue	ADT (Vehicles per Day)		
	Alternative 1 (existing lanes)	Alternative 5 (4-lanes)	Alternative 7 (6-lanes)
Havana Street to Peoria Street	26,300	40,200	47,200
Peoria Street to Uvalda Street	28,000	42,900	52,300
Uvalda Street to Crown Boulevard	19,300	35,000	43,800
Crown Boulevard to Chambers Road	18,700	32,800	41,000
Chambers Road to Airport Way	16,900	27,900	34,000
Airport Way to Peña Boulevard southbound ramps	19,300	30,000	36,000
Peña Boulevard southbound ramps to northbound ramps	46,200	52,700	56,200
East of Peña Boulevard northbound ramps	62,200	66,200	67,900

Source: Data developed by URS Corporation based on the DRCOG Regional Travel Demand Model.

Table 4.4-2
Diverted Daily Volumes to Parallel Facilities (2035)

Roadway	Daily Traffic Forecast (2035)				
		Alternative 1 (existing lanes)		Alternative 5 (4-lanes)	
	Alternative 7 (6-lanes)	Diverted Trips[1]	% of Diversion[2]	Diverted Trips[1]	% of Diversion[2]
East 56th Avenue	42,900	-21,300	-50%	-6,200	-14%
Parallel Corridors[3]					
E-470	31,900	650	3%	50	1%
East 120th Avenue	30,800	310	1%	120	2%
East 96th Avenue	30,300	880	4%	210	3%
East 47th-49th Avenue	16,700	1,530	7%	0	0%
I-70	270,000	3,280	15%	510	8%
Colfax Avenue	40,500	360	2%	200	3%
Total[4]	–	7,010	32%	1,090	17%

Source: Data developed by URS Corporation based on the DRCOG Regional Travel Demand Model.
Note: 1 — Trips diverted from 56th Avenue to other parallel roads.
2 — for 56th Avenue, (% of diversion) = (diverted trips) / (total trips on 56th Avenue shown for Alternative 7) * 100%; for parallel corridors, (% of diversion) = (diverted trips from 56th Avenue to the specific parallel road) / (total diverted trips from 56th Avenue) * 100%.
3 — Select parallel corridors that are or will be arterial/freeway facilities and will carry substantial traffic volumes diverted from 56th Avenue if it is at or over capacity.
4 — total volume diverted to the listed parallel corridors is only a portion of the total volume diverted from 56th Avenue because another portion will be diverted to other roadways not listed in this table.
% — percent

The analysis of the diversion of travel demand to other corridors because of traffic congestion on 56th Avenue shows that 50% of the motorists that would prefer to use 56th Avenue must divert to an alternative route in the No-Action (Alternative 1) scenario. Even with improvement to four lanes (Alternative 5) between Havana Street and Peña Boulevard, 15 percent of motorists that would prefer to use 56th Avenue would need to use an alternate route when only four lanes are provided between Havana Street and Peña Boulevard. Parallel routes carrying most of the diverted traffic include I-70, 96th Avenue and 120th Avenue.

Travel Speed and Traffic Congestion

Average travel speed on 56th Avenue between Havana Street and Peña Boulevard was calculated using the Synchro 6.0 network developed for each alternative. Free flow speed on each roadway link, link travel time, and intersection delay were among the parameters used to calculate the average travel speed, as summarized in Table 4.4-3.

Table 4.4-3
56th Avenue Average Travel Speeds (2035)

Alternative	AM Peak Hour	PM Peak Hour	Average
Alternative 1: No-Action	25.3 mph	24.0 mph	24.6 mph
Alternative 5: Widen to Four Lanes	28.9 mph	25.5 mph	27.2 mph
Alternative 7: Widen to Six Lanes	27.9 mph	29.6 mph	28.7 mph

Source: URS Corporation.
Note: mph = mile per hour

Compared with a two-lane or four-lane alternative, a six-lane alternative will provide for more desirable travel speeds and accommodation of higher traffic demands.

Average travel speeds, as shown in Table 4.4-3 above, under various scenarios during the peak traffic periods demonstrate the ability of a specific transportation alternative to increase the corridor mobility of 56th Avenue. The following observations were made based on travel speed analysis:

- Of the three alternatives analyzed for the future year 2035, Alternative 7 forecasts the highest average travel speed during peak traffic periods (28.7 mph). The No-Action conditions forecast the lowest average travel speed (24.6 mph). In general, the results show higher travel speeds for alternative(s) that have more travel lanes and wider roadway cross-sections.

- It is noted that under the No-Action conditions, although 56th Avenue serves approximately 50 percent of the traffic volumes traveling under the Alternative 7 conditions, the average travel speed is still lower than under the Alternative 7 conditions. Similarly, under Alternative 5, with an ADT volume about 15 percent lower than under Alternative 7, the average travel speed is lower. Therefore Alternatives 1 and 5 experience longer travel delays and more severe traffic congestion than Alternative 7, even though they each serve substantially lower traffic volumes.

Forecast traffic volume results in over-capacity conditions in the No-Action alternative

As discussed in Section 5.4.1, roadway congestion was represented by link-based v/c ratios. Link capacities were derived from the signal timings along the corridor in the Synchro analysis networks for each alternative. A weighted overall v/c ratio of the corridor was calculated for the peak direction during each peak hour based on the length of each analyzed section. An overall v/c ratio for both peak hours combined was also calculated. These forecast v/c values for each alternative are shown in Table 4.4-4. The following observations were made based on traffic congestion analysis for different alternatives in the future year 2035:

- The results show that for the average of AM and PM peak hours, both Alternative 5 and Alternative 7 are forecast to operate at capacity (0.9<v/c≤1.0). No-Action conditions are forecast to be over capacity (v/c>1.0).
- As discussed previously, under the No-Action conditions 56th Avenue serves 50% of the traffic it would serve under Alternative 7. Assuming no parallel corridors to divert traffic, 56th Avenue would experience extreme traffic congestion and likely a complete breakdown in operations during peak traffic periods under the No-Action conditions. A similar situation would also occur under the Alternative 5 conditions, though to a lesser extent.

Table 4.4-4
56th Avenue Volume-to-Capacity Ratios (2035)

Alternative	AM Peak Hour v/c	PM Peak Hour v/c	Average v/c
Alternative 1: No-Action	1.18	0.93	1.06
Alternative 5: Widen to Four Lanes	0.89	1.01	0.95
Alternative 7: Widen to Six Lanes	0.96	0.93	0.94

Source: URS Corporation.
Note: v/c — volume to capacity ratio

Intersection Traffic Operations

For each alternative, traffic operations of study intersections on 56th Avenue during the AM and PM peak hours were analyzed using the Synchro/Simtraffic networks developed for the future year 2035. Intersection LOS is summarized in Table 4.4-5 for the AM peak hour and in Table 4.4-6 for the PM peak hour. For the purpose of this study, LOS D or better is considered as an acceptable LOS, while LOS E or F is considered an undesirable level of service.

For analyzing future conditions, LOS D is considered acceptable, while LOS E and LOS F are undesirable

Table 4.4-5
Havana Street to Peña Boulevard Alternatives
2035 AM Peak Hour Level of Service

Intersection of 56th Avenue and:	Level of Service		
	Alternative 1	Alternative 5	Alternative 7
Havana Street	D	B	B
Peoria Street	**E**	B	B
Uvalda Street	**F**	D	D
Crown Boulevard	D	C	D
Chambers Road	C	C	C
Airport Way	B	A	B
Peña Boulevard SB ramps	**F**	D	C
Peña Boulevard NB ramps	D	B	B

Source: URS Corporation
Note: Bold letters "**E**" or "**F**" represent an undesirable LOS

Table 4.4-6
Havana Street to Peña Boulevard Alternatives
2035 PM Peak Hour Level of Service

Intersection of 56th Avenue and:	Level of Service		
	Alternative 1	Alternative 5	Alternative 7
Havana Street	**E**	**F**	**E**
Peoria Street	D	**E**	D
Uvalda Street	**F**	D	C
Crown Boulevard	**F**	B	B
Chambers Road	B	B	B
Airport Way	B	A	A
Peña Boulevard SB ramps	**E**	C	D
Peña Boulevard NB ramps	**E**	D	B

Source: URS Corporation.
Note: Bold letters "**E**" or "**F**" represent an undesirable LOS

The following observations were made based on intersection LOS analysis during the AM and PM peak hours in 2035, as reflected in Tables 4.4-5 and 4.4-6:

- Under the No-Action Alternative, two intersections, Uvalda Street and Crown Boulevard, were analyzed as unsignalized. All the other intersections were assumed to be signalized by 2035.
- Under the No-Action conditions, three intersections are forecast to operate at undesirable LOS (E or F) during the AM peak hour, while the remainder are expected to experience an acceptable LOS (D or better). Traffic operations degrade during the PM peak hour, with five of the eight study intersections forecast to operate at an undesirable LOS (E or F). Long intersection delays and congestion are expected to occur during both peak periods.
- Under Alternative 5 (four-lane section from Havana Street to Peña Boulevard), all eight study intersections are forecast to operate at an acceptable LOS (D or better) during the AM peak hour. During the PM peak hour, two intersections are forecast to operate at an undesirable LOS (E or F), while the other six intersections are expected to experience an acceptable LOS.
- Under Alternative 7 (six-lane section from Havana Street to Peña Boulevard), all eight study intersections are forecast to operate at an acceptable LOS (D or better) during the AM peak hour. During the PM peak hour, all but one intersection are forecast to operate at an acceptable LOS. The only exception is the intersection of 56th Avenue at Havana Street, which is forecast to operate at LOS E during the PM peak hour.
- Various intersection improvement measures were formulated and evaluated for Alternative 7 to eliminate the LOS deficiency at Havana Street during the PM peak hour. However none of them was found to be feasible or justified due to right-of-way restrictions, safety effects, or cost-effectiveness. For the same reasons, no

further intersection improvement measures were added for Alternative 5 to improve all intersections to an acceptable LOS (D or better).

Evaluation of Alternatives

Using the established criteria as described in Section 4.4.1, Alternatives 5 through 8 as well as Alternative 1 (No-Action) were evaluated in order to identify the Recommended Alternative. Table 4.4-7 summarizes the detailed screening process. All the alternatives were assessed against each criterion, respectively, and each was assigned a score of "+", "0", or "-" as the measure of impact of the alternative on a specific criterion. The basis of scoring an alternative against each criterion is listed under Table 4.4-7.

The scores of an alternative against the evaluation criteria provide the comparative foundation to identify the Recommended Alternative. It should be noted, however, the scores were not simply added together for an alternative to compare with the sum of another alternative since all the criteria do not weigh equally in influencing identification of the Recommended Alternative.

As the result of the described evaluation process, Alternative 7 was identified as the Recommended Alternative for the following reasons:

- It is consistent with the DRCOG 2035 Plan.
- It provides for multi-modal transportation in the corridor with continuous pedestrian and bicycle facilities as well as enhanced public transit services. It is consistent with the CCD bicycle facility practices by providing an off-street bicycle/pedestrian trail that will run parallel to 56th Avenue.
- It conforms to the CCD design standards for urban arterials in relation to roadway and sidewalks widths.

Recommended Alternative

- Widen 56th Avenue to six lanes
- Raised center median
- Detached multi-use paths

Table 4.4-7
Detailed Screening of Alternatives

	Description		Policy			Engineering & Construction			Environmental Resources					Traffic Engineering			
Alternative	Havana Street to Peña Boulevard	Other Corridors	Conformance with DRCOG 2035 Plan	Provides for Multi-modal Access	Consistency with City on-street bike lane practices	Design Criteria	Probable Construction Costs	Right-of-Way Required	Environmental Justice	Noise Receptors	Section 4(f) / 6(f)	Historical Sites	Wildlife Habitat	Roadway Congestion	Intersection Operations	Travel Speed	Effect on Parallel Corridors
1	No-Action	No-Action	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-
2	Limited intersection improvements	None															
3	None	Improve parallel roads															
4	None	Construct new parallel road															
5	Widen to **4** lanes	None	-	0	+	+	0	0	0	0	0	0	0	0	0	0	0
6	Widen to **4** lanes plus on-street bike lanes	None	-	+	+	+	0	0	0	0	0	0	0	0	0	0	0
7	Widen to **6** lanes	None	+	0	+	+	0	0	-	-	0	-	0	0	0	0	+
8	Widen to **6** lanes plus on-street bike lanes	None	+	+	-	+	0	0	-	-	0	-	0	0	0	0	+

Policy

Conformance with DRCOG 2035 Plan

+	Consistent with plan for six-lanes on 56th Avenue
-	Not consistent with plan for six-lanes on 56th Avenue

Multi-modal access

+	Provides on- and off-street facilities for bikes and pedestrians
0	Provides off-street facilities for bikes and pedestrians
-	Provides some, but not continuous, off-street facilities for bikes and pedestrians

Consistency with City on-street bike lane practices

+	Meets current City practice of providing off-street facility on major arterials
-	Either no off-street facilities provided or inconsistent with current City practices (the City does not currently install bike lanes on major arterials)

Engineering & Construction

Design Criteria

+	Meets current City standards for roadway and sidewalk widths
-	Does not meet current City standards for roadway and sidewalks widths

Probable Construction Cost

+	No cost
0	$0 - $30 million
-	> $ 30 million

Construction cost excludes right-of-way cost, design and construction engineering. Concept-level construction cost estimates range from $23.2 million to $28.6 million.

Right-of-Way Required

+	No right-of-way required
0	5 acres or less of right-of-way required
-	More than 5 acres of right-of-way required

For the alternatives, right-of-way requirement varies from 2.4 to 3.9 acres.

Environmental Resources

Environmental Justice/Noise Impacts

+	No additional homes requiring mitigation
0	0 - 100 homes requiring mitigation
-	> 100 homes requiring mitigation

Section 4(f) / 6 (f) (Historic resources not included)

+	No effect on greenbelt adjacent to Parkfield and Montbello
0	Limited effect on greenbelt adjacent to Parkfield and Montbello
-	Greater effect on greenbelt adjacent to Parkfield and Montbello

Historical Sites

+	No effect on Highline Canal Lateral
0	Limited effect on Highline Canal Lateral
-	Greater effect on Highline Canal Lateral

Wildlife Habitat (Prairie Dog Relocations)

+	No prairie dog relocation is required
0	20 acres or less of prairie dog relocation is required
-	More than 20 acres of prairie dog relocation is required

There are 19.6 acres of wildlife habitat in the existing street right-of-way. For the alternatives, relocation requirement varies from 11.8 to 18.2 acres.

Traffic Engineering

Roadway Congestion (volume/capacity ratio)

+	Under capacity (v/c < 0.9)
0	Near capacity (0.9 < v/c < 1.0)
-	Overcapacity (v/c > 1.0)

Intersection Operations (level of service [LOS])

+	All signalized intersections operate at LOS D or better in 2035
0	Most signalized intersections operate at LOS D or better in 2035
-	Most signalized intersections operate less than LOS D in 2035

Travel Speed

+	> 35 mph
0	25 - 35 mph
-	< 25 mph

Effect on Parallel Corridors

+	Daily Traffic Diversion < 10%
0	Daily Traffic Diversion 10% - 20%
-	Daily Traffic Diversion > 20%

- The probable construction cost of Alternative 7 is estimated to be less than $30 million, which is considered feasible and within the range of available funding.
- The complete implementation of Alternative 7 will require a relatively small amount of additional right-of-way, i.e., five acres or less, along the approximately 4.5-mile long corridor. Section 4.5 of this report describes right-of-way requirements for Alternative 7 in more detail.
- It will have very limited effect on the greenbelt on the south side of 56th Avenue, adjacent to Parkfield and Montbello neighborhoods.
- Improvements will have no direct impacts to the RMANWR north of 56th Avenue.
- The construction requires 20 acres or less of prairie dog relocation along the corridor.
- It provides roadway capacity that meets the future travel demand and satisfactory intersection operations along 56th Avenue, where most signalized intersections are forecast to operate at a LOS D or better during peak traffic periods in year 2035.
- It will effectively increase corridor travel speed, reduce delay, relieve traffic congestion, and therefore improve the quality of life for travelers on the corridor.
- Corridor users will benefit from the traffic safety benefits of creating additional separate paths for pedestrians and cyclists, and improving the roadway to current design standards.
- Under Alternative 7, the average travel speed on 56th Avenue (posted speed limit is 40 mph) is predicted to be about 29 mph during the peak traffic periods. Even though this suggests that moderate travel delays and traffic congestion are expected in the corridor during peak traffic periods, Alternative 7 is forecast to perform better than other alternatives.

- It generates minimum diversion of traffic to parallel corridors, and therefore minimizes the resulting impacts to traffic volume, traffic congestion, and overall traffic operations on some parallel corridors.

It was recognized that Alternative 7 has potential negative impacts on several environmental resources, including environmental justice, noise receptors, historical sites, and wildlife habitats including prairie dog colonies. However these negative impacts can be mitigated and/or minimized through careful planning, design, and construction, and may be inspected more closely in a future National Environmental Policy Act (NEPA) study. As discussed in this section, the identification of the Recommended Alternative was based largely on traffic operational factors.

The process of developing and screening alternatives and identifying the Recommended Alternative was reviewed during the general public involvement, described in Chapter 6, and by the Federal Highway Administration (FHWA), Colorado Department of Transportation (CDOT), and CCD. Consistent with this level of corridor planning, the findings were not formally reviewed by environmental resource agencies.

4.5 Recommended Alternative Engineering Elements

After the identification of the Recommended Alternative, several engineering elements specific to the Recommended Alternative were refined. These elements are discussed in the following sections. Please refer to Appendix D for a scaled plan view layout, and Appendix E for pavement section analyses and preliminary pavement design of the Recommended Alternative.

Design Criteria

Design criteria are used to ensure a roadway is designed to current standards. The criteria apply to elements of the roadway such as grades, curvature, intersection alignment, facility widths, cut and fill side slopes, and design vehicles. A few design criteria specific to 56th Avenue are provided in Table 4.5-1.

The design criteria were developed using various sources including design guidelines, policy, and standards from the American Association of State Highway and Transportation Officials (AASHTO), FHWA, CDOT, and CCD. CCD provided guidance as to which criteria should be applied.

Table 4.5-1
Geometric Design Criteria

Design Element	Design Criteria	
Design Speed	45 mph[1]	50 mph[2]
Posted Speed	40 mph[1]	45 mph[2]
Maximum Grade (Mid-block)	7%	
Maximum Grade (Intersection Approach 200 feet)	2%	
Minimum Grade	0.7%	
Travel Lane Width	11' Minimum 12' Desirable	
Raised Median Width (Flowline to Flowline)	28' Maximum 4' Minimum	
Left Turn Bay Storage Length	95% Queue	
Minimum Sidewalk Width	8'	
Landscape Buffer Width	5' Minimum 8' Minimum with Trees 12' Desirable	
Maximum Side Slopes	3:1 Cut Slopes 3:1 Fill Slopes	
Design Vehicle	WB-50 Arterial Intersection[3] WB-40 Collector Intersection[3] SU Local Intersection	

Source: American Association of State Highway and Transportation Officials, Colorado Department of Transportation, and the City and County of Denver.

Notes:
1. Havana Street to Chambers Road
2. East of Chambers Road
3. WB-40 and WB-50 are both intermediate semi-trailers with different dimensions

mph — mile per hour
WB — wheelbase
SU — single unit (truck)

Wildlife Viewing Areas

In an effort to provide increased accessibility to the RMANWR, opportunities for creating vehicle pullouts and parking for wildlife viewing areas and access to the area trail system were considered. Funding for the pullouts and wildlife viewing areas has not been identified at this time. It should be noted that pullouts design and locations will need to be approved by CCD and will require a collaborative effort among all the stakeholders.

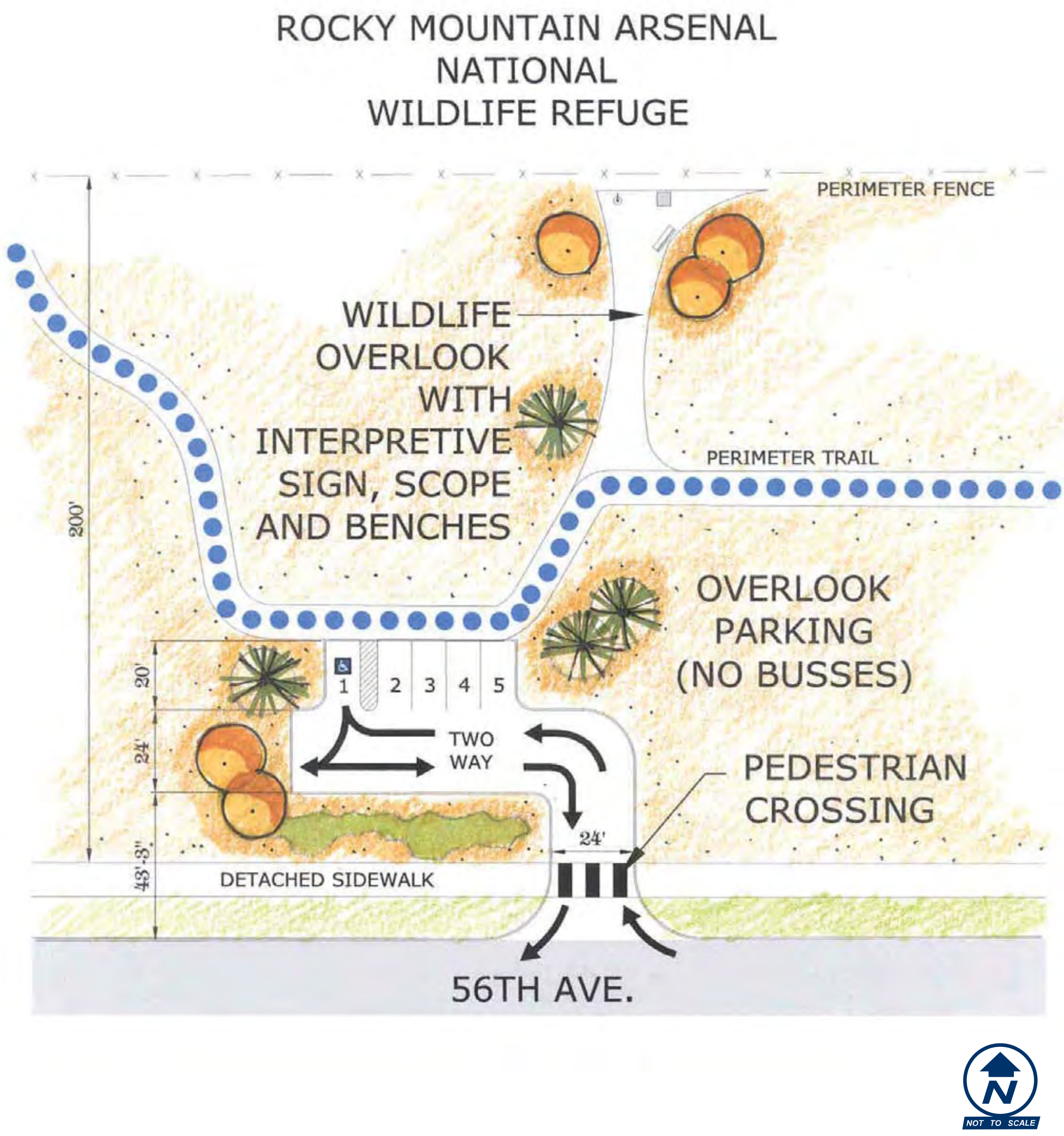
Concept-level alternatives for these wildlife viewing areas are illustrated in Figures 4-7, 4-8 and 4-9. As shown, the viewing area could be provided with a small parking area, pedestrian and bicycle trail access, interpretative signing, telescopes, and seating areas. Potential locations for these viewing areas include:

- North leg of 56th Avenue/Peoria Street (Martinez Army Reserve Center).
- Havana Pond between Joliet Street and Peoria Street.
- Mid-block location between Uvalda Street and Crown Boulevard.
- East of Chambers Road overlooking the Parkfield Wetlands.

Right-of-Way

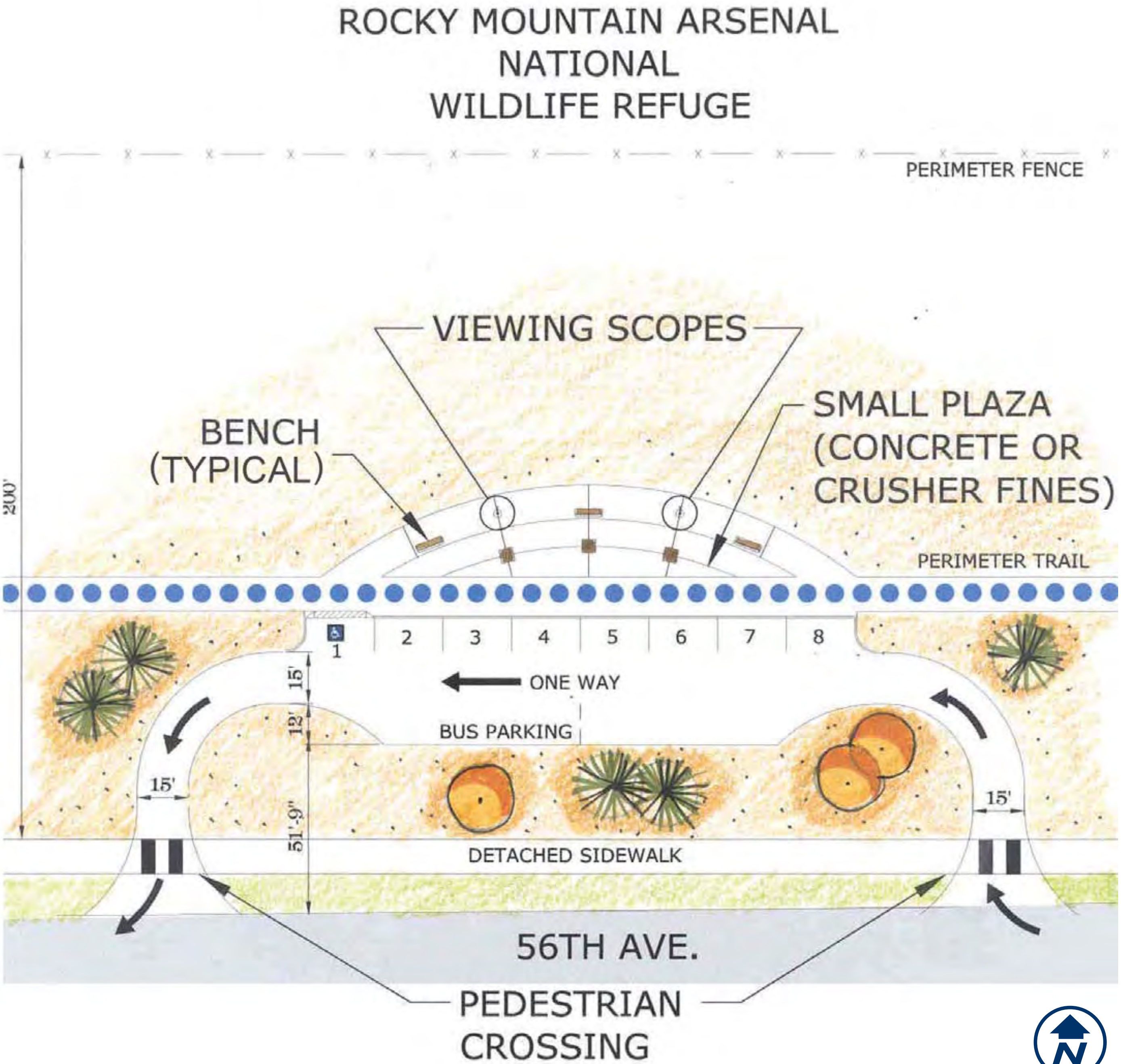
The existing right-of-way of 56th Avenue from Havana Street to Peña Boulevard varies in width from 80 feet at Peña Boulevard to 212 feet between Peoria Street and Potomac Way, as illustrated in Figure 4-10. Property adjacent to the existing right-of-way is controlled by four different entities. As shown on Figure 4-10, property to the north of 56th Avenue is within Adams County and is controlled by the U.S. Army Reserve (in the vicinity of the Martinez Army Reserve Center) and the Rocky Mountain Arsenal National Wildlife Reserve. Properties south of 56th Avenue are in CCD and adjacent property is privately held or is owned by CCD and is maintained by the CCD Department of Parks and Recreation. From the Buckley Road alignment east to Peña Boulevard, the property outside the 80 feet of existing right-of-way is controlled by the CCD Department of Aviation.

No privately owned property will be acquired to implement the proposed improvements. Right-of-way required for the construction of the proposed improvements will largely be acquired north of the existing roadway. Right-of-way for the improvements will be contained within the 100-foot dedication of right-of-way that occurred with the legislation establishing the Rocky Mountain Arsenal National Wildlife Reserve. Negotiations for the additional dedication of right-of-way adjacent to the Martinez Army Reserve Center were ongoing as of early 2008.



Source: URS Corporation and PKM Design Group, Inc.

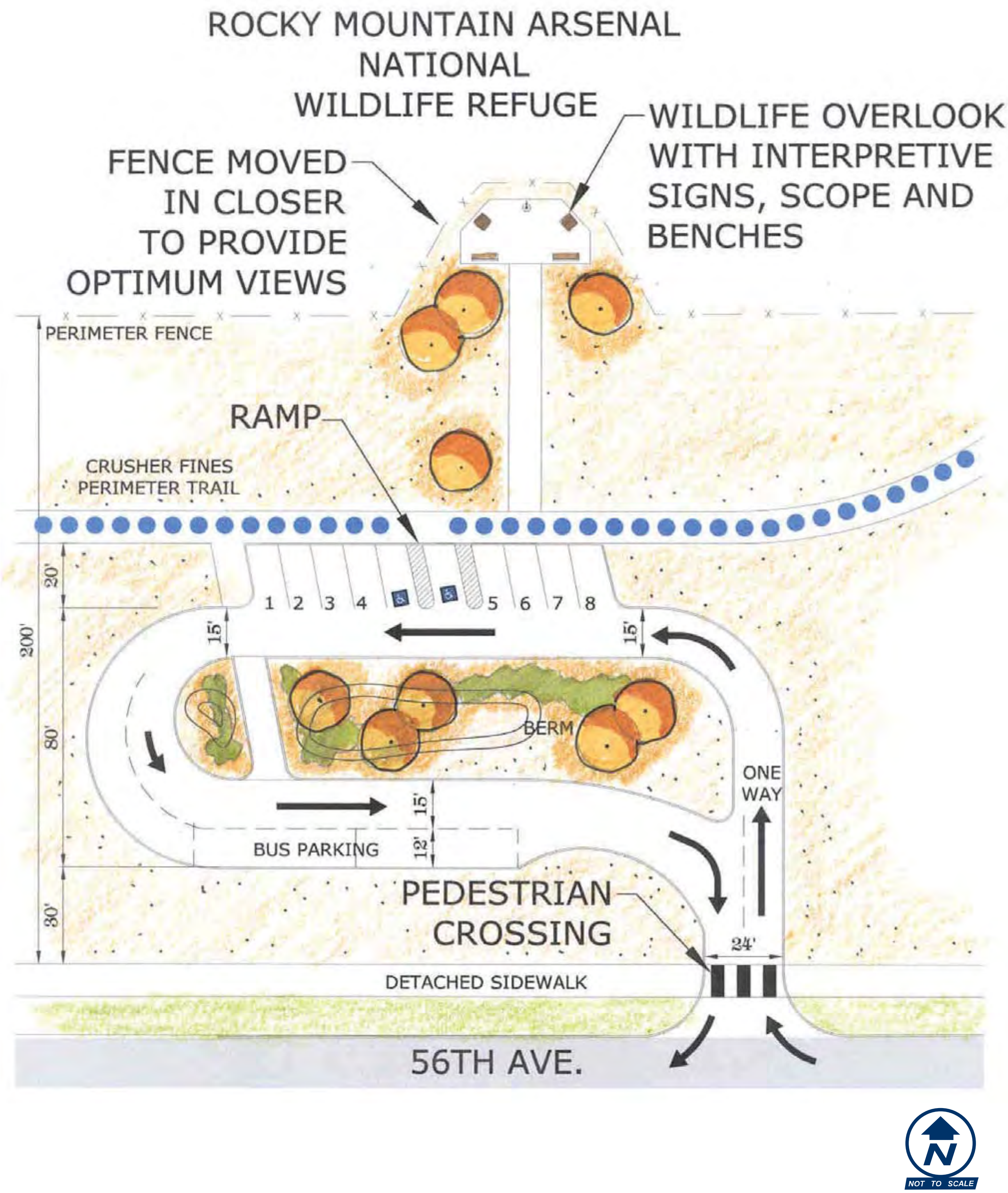
FIGURE 4 - 7
Wildlife Pullout Option 1



Source: URS Corporation and PKM Design Group, Inc.

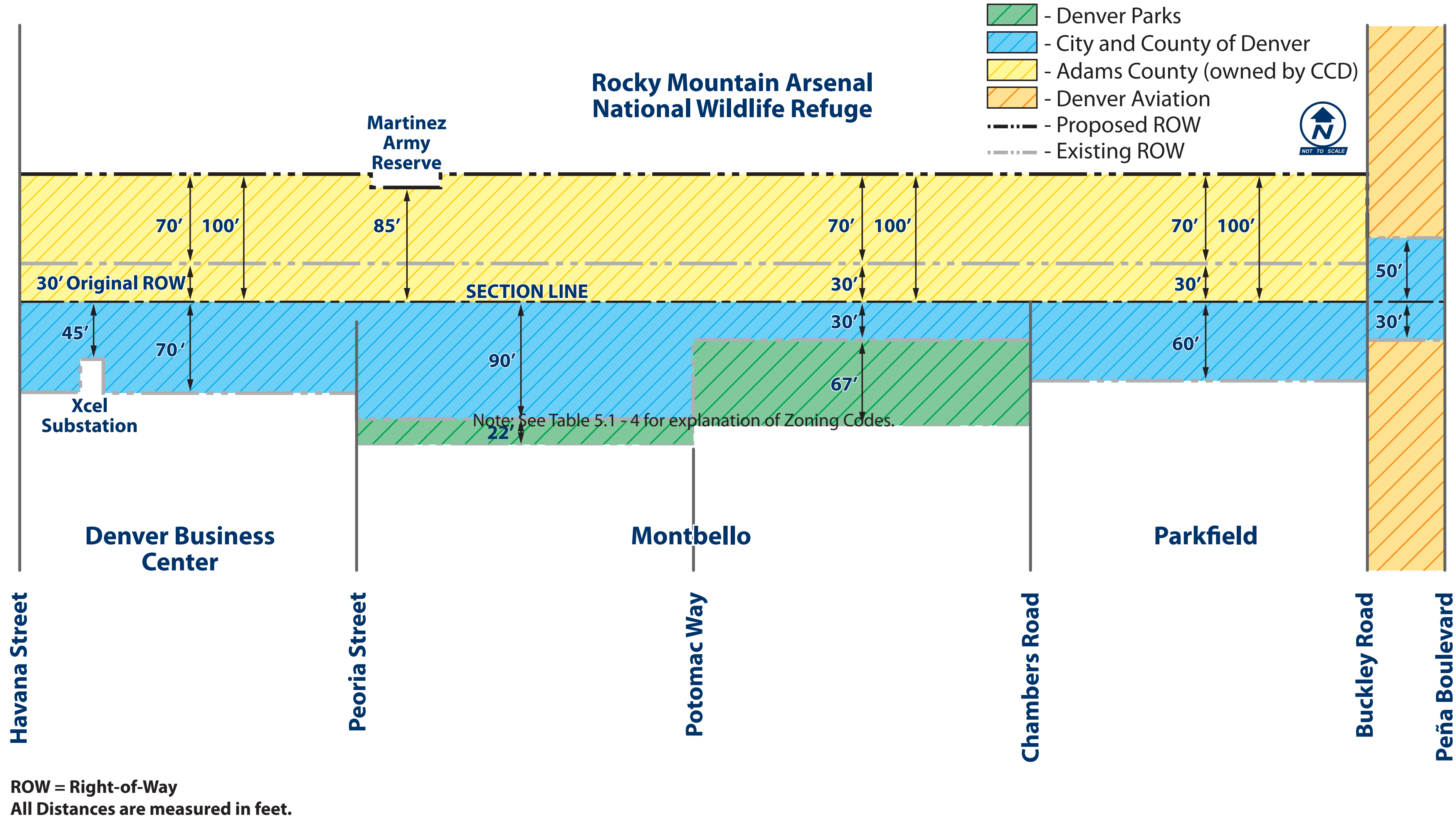
56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 8
Wildlife Pullout Option 2



Source: URS Corporation and PKM Design Group, Inc.

FIGURE 4 - 9
Wildlife Pullout Option 3



Data Source: City and County of Denver, Adams County and URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 4 - 10
Existing Right-of-Way

URS
DENVER THE MILE HIGH CITY

Concept-Level Construction Cost

A concept-level construction cost estimate for the Recommended Alternative was prepared based on the 2007 CDOT and CCD cost data. Cost estimate results were summarized in Table 4.5-2.

Table 4.5-2
Concept-Level Construction Cost Estimate for the Recommended Alternative

Item No.	Item	Cost
A-1	Removal of Curb and Gutter [1]	$86,000
A-2	Removal of Asphalt Mat	$501,000
A-3	Unclassified Excavation	$849,000
A-4	Embankment Material	$665,000
A-5	Aggregate Base Course	$825,000
A-6	Concrete Pavement	$6,230,000
A-7	Fence [2]	$264,000
A-8	Concrete Sidewalk [3]	$742,000
A-9	Curb and Gutter	$1,076,000
A-10	Median Cover Material / Landscape [4]	$3,810,000
A-11	Traffic Signals [5]	$1,500,000
A	**Subtotal**	**$16,548,000**
B	Drainage	$993,000
C	Signing and Striping	$248,000
D	Lighting	$496,000
E	Construction Signing & Traffic Control	$1,655,000
F	Mobilization	$662,000
G	**Total of Construction Bid Items (A+B+C+D+E+F)**	**$20,602,000**
H	Contingencies (Construction Items)	$5,151,000
I	Art Requirement	$258,000
J	Utilities	$500,000
K	**Total Construction Cost [6] (G+H+I+J)**	**$26,511,000**

Source: URS Corporation. Estimated based on 2007 CDOT and CCD Cost Data
Notes:

1. Existing curb and gutter on south side of 56th Avenue will be removed and replaced to allow for flexibility in profile.
2. Fence is for the frontage of the Rocky Mountain Arsenal National Wildlife Refuge (east of Havana Street).
3. Existing sidewalks in the Montbello and Parkfield neighborhoods will remain.
4. Areas of median and landscape buffer will be landscaped. Cost is included in median cover material.
5. Signals assumed at Peoria Street, Uvalda Street, Crown Boulevard, Chambers Road and Peña Boulevard ramps. Havana Street is included in the Environmental Assessment section for cost estimate purpose. Airport Way (future intersection) signal is assumed to be funded by developers.
6. Typical section used for quantity calculations is shown in Figure 4-5.

As shown in Table 4.5-2, the total estimated construction cost for the Recommended Alternative is approximately $26.5 million (2007 dollars). It should be noted that the estimated cost excludes any right-of-way cost, engineering, and construction management services.

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5.0 PROJECT CONTEXT AND ENVIRONMENTAL RESOURCES

Environmental resources that exist in and along the corridor including socioeconomic characteristics, general land use and zoning, public services and utilities, air quality, noise, wildlife, water resources, etc., are described and potential impacts of the project on these environmental resources are identified and discussed. For the convenience of the reviewer, resources were grouped into two categories: Human Environmental Resources and Natural Environmental Resources.

Selected environmental topics are discussed in other chapters of this document. Traffic and safety are described in Chapter 3, right-of-way is discussed in Chapter 4 as an engineering element of the Recommended Alternative, and public involvement is described in Chapter 6.

It should be noted that for all environmental resources discussed in this report, coordination with external agencies for concurrence in resource assessments was not conducted as a part of the corridor study. It was anticipated during this planning process that coordination with external agencies may occur during a future National Environmental Policy Act (NEPA) process.

5.1 Human Environmental Resources

A variety of human environmental resources were investigated along the 56th Avenue corridor. Analyzed resources include socioeconomic data, environmental justice, general land use and zoning, Section 4(f)/6(f), historic sites, air quality, noise, hazardous materials, and utilities.

Socioeconomic Characteristics

The socioeconomic study area for this corridor study was delineated as a half-mile band centered on 56th Avenue, from one-half mile west of

Havana Street to one-half mile east of Peña Boulevard. Since the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR), located north of 56th Avenue between Havana Street and Buckley Road, is an undeveloped federally-owned property, this facility was excluded from the socioeconomic studies.

Stapleton Redevelopment
Looking north from 23rd Avenue.
Source: Forest City Enterprises, Inc.

Montbello neighborhood at left.
Looking west over 56th Avenue

The socioeconomic study area incorporates parts of three neighborhoods in the City and County of Denver (CCD): Stapleton, Montbello, and Parkfield (see Figure 1-1). West of Havana Street, the Stapleton neighborhood is undergoing redevelopment into mixed use residential, commercial and industrial development. The area between Havana Street and Peoria Street is the western part of the Montbello neighborhood, and can be characterized as light industrial in nature, with substantial undeveloped, vacant areas. There are no residences west of Peoria Street within the 56th Avenue corridor. Industrial buildings exist on the south side of 56th Avenue.

From Peoria Street on the west to Chambers Road on the east, Montbello is a long-established residential neighborhood, with very little commercial and industrial development. It is a mix of single-family homes and multi-unit structures. Historically a minority neighborhood, it is currently racially diverse.

In the study area between Chambers Road and Peña Boulevard south of 56th Avenue is the Parkfield neighborhood. The eastern half of this neighborhood is still under development. The currently developed area is largely residential, with little industrial and commercial development.

Current Social and Economic Information

Socioeconomic data for the year 2005 was obtained from the Denver Regional Council of Governments (DRCOG). The study area includes portions of 12 Traffic Analysis Zones (TAZs) within the CCD.

Social and economic data is presented in Table 5.1-1. This table contains the population, total number of households, and average household size for each TAZ within the study area boundary. For the entire study area, 8,855 people are estimated to live in 2,686 households. The average household size is 3.30.

Parkfield neighborhood on the upper left. Looking southwest over 56th Avenue

Table 5.1-1
Study Area Socioeconomic Characteristics (2005)

Neighborhood	Traffic Analysis Zones	Population	Number of Households	Average Household Size
Stapleton	40407	0	0	0
Subtotal	*n/a*	*0*	*0*	*0*
Montbello	40408	2,877	748	3.85
	40409	2,386	856	2.78
	40410	2,414	676	3.57
	40429	6	2	3.00
Subtotal	*n/a*	*7,683*	*2,282*	*3.37*
Parkfield	40411	753	259	2.91
	40412	337	116	2.91
	40413	30	10	3.00
	40414	38	14	2.71
	41321	10	4	2.50
	41322	4	1	4.00
Subtotal	*n/a*	*1,172*	*404*	*2.90*
RMANWR	31103	0	0	0
Subtotal	*n/a*	*0*	*0*	*0*
Total	n/a	8,855	2,686	3.30
City and County of Denver	n/a	554,636	239,235	2.32

Source: DRCOG TAZ data 2005, and U.S. Census Bureau, 2007. Summary compiled by URS Corporation
Note: n/a — not applicable

No residences are located in the Stapleton neighborhood within the study area boundary. All of the existing residential areas in Stapleton are south of Interstate 70 (I-70).

Portions of four TAZs within the Montbello neighborhood are located inside the study area boundary, with a population of 7,683, 2,282 households and an average household size of 3.37.

In the portion of the Parkfield neighborhood in the study area, approximately 1,172 people are estimated to live in 404 households. The average household size is 2.90.

For comparison, census data from CCD was reported. CCD has a population of 554,636 in 239,235 households, with an average household size of 2.32. The study area, with the exception of unpopulated neighborhoods within the study area boundary, has a higher average household size than CCD as a whole.

Future Social and Economic Information

According to DRCOG, from 2005 to 2035 the study area will experience a population growth of 38% with the number of households increasing by 60%

Land use development is projected in the area between Havana Street and Peña Boulevard, with 56th Avenue serving as the major arterial for residential, commercial and industrial communities along the corridor. The ongoing transformation of the Rocky Mountain Arsenal to a National Wildlife Refuge, the development of Commerce City's Prairie Gateway site, and the connection to Denver International Airport (DIA), all contribute to the significance of 56th Avenue as a major transportation corridor.

Population, household, and employment data for the year 2035 was also obtained from DRCOG, using TAZ projections. Using this data, approximately 12,240 people will live in the study area in 4,302 households in the year 2035. The number of people employed in the study area in 2035 is projected at 4,296. Table 5.1-2 displays the 2005 and 2035 population, household, and employment numbers and percentages over a period of 30 years.

Table 5.1-2
Study Area Socioeconomic Characteristics (2035)

Data Type	2005	2035	% Change
Population	8,855	12,240	38%
Number of Households	2,686	4,302	60%
Employment	4,469	4,296	(4%)[1]

Source: DRCOG TAZ data 2005 and 2035. Summary compiled by URS Corporation.
Note: 1 — Negative change in percentage from 2005 to 2035.

Environmental Justice

Environmental justice refers to social equity in sharing the benefits and burdens of specific projects or programs. Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, mandates that federal agencies consider environmental justice in decision-making. The key objectives of transportation planning in relation to the requirements of the environmental justice EO 12898 are to:

- Avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations.
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.

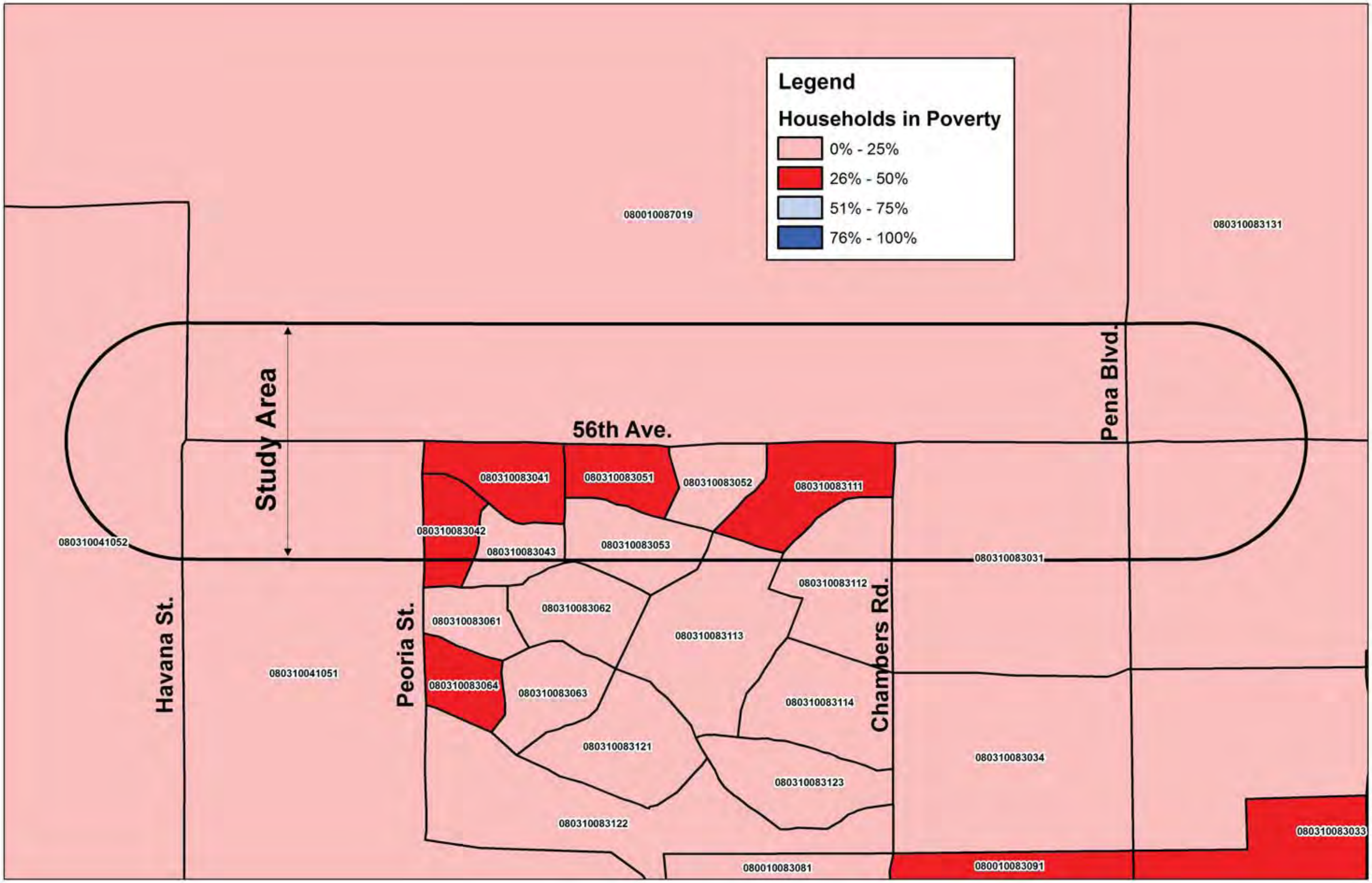
Environmental justice data, as summarized in Table 5.1-3, was compiled by the United States (U.S.) Census Bureau, and was obtained from the 2000 census. This table contains the median household income (in U.S. dollars), percent of the population in poverty, and percent minority for each Census Block within the study area boundary. The poverty level is defined as the percentage of the population earning below 30 percent of the median income (see Figure 5-1). The percent minority data is self-reported. Within the entire study area the median income is $49,054, the poverty level is 12.0%, and minorities are 72.1% of the total population. Figure 5-2 displays a map of minority populations by Census Block Group within the study area boundary.

The Montbello neighborhood is a historically racially diverse neighborhood. The average of these Census Block Groups yields a median household income of $44,469, a poverty level of 18.6%, and an 87.0% minority population. All nine Census Block Groups within the study area in the Montbello neighborhood contain a higher percentage of minority populations and a greater percent of the population in poverty than CCD as a whole. The overall median household income of the Montbello neighborhood is higher than CCD as a whole. The Montbello neighborhood may be considered an environmental justice population.

Table 5.1-3
Study Area Environmental Justice Characteristics

Neighborhood	Census Block Group	Median Household Income ($)	Percent in Poverty	Percent Minority
Stapleton	080310041052	0	0	0
	080310041051	0	0	0
Total	*n/a*	*0*	*0*	*0*
Montbello	080310083041	39,107	25.5	83.1
	080310083042	44,000	29.1	90.6
	080310083043	41,563	8.8	98.0
	080310083051	37,500	26.6	82.0
	080310083052	43,833	15.0	86.7
	080310083053	47,500	21.7	85.5
	080310083111	44,708	25.2	80.6
	080310083112	46,833	7.8	90.9
	080310083113	55,179	8.0	83.8
Total	*n/a*	*44,469*	*18.6*	*87.0*
Parkfield	080310083031	53,639	5.3	57.1
Study Area Total	n/a	49,054	12.0	72.1
City and County of Denver	n/a	41,767	15.2	17.1

Source: U.S. Census Bureau, 2007. Summary compiled by URS Corporation.
Note: $ = U.S. dollar



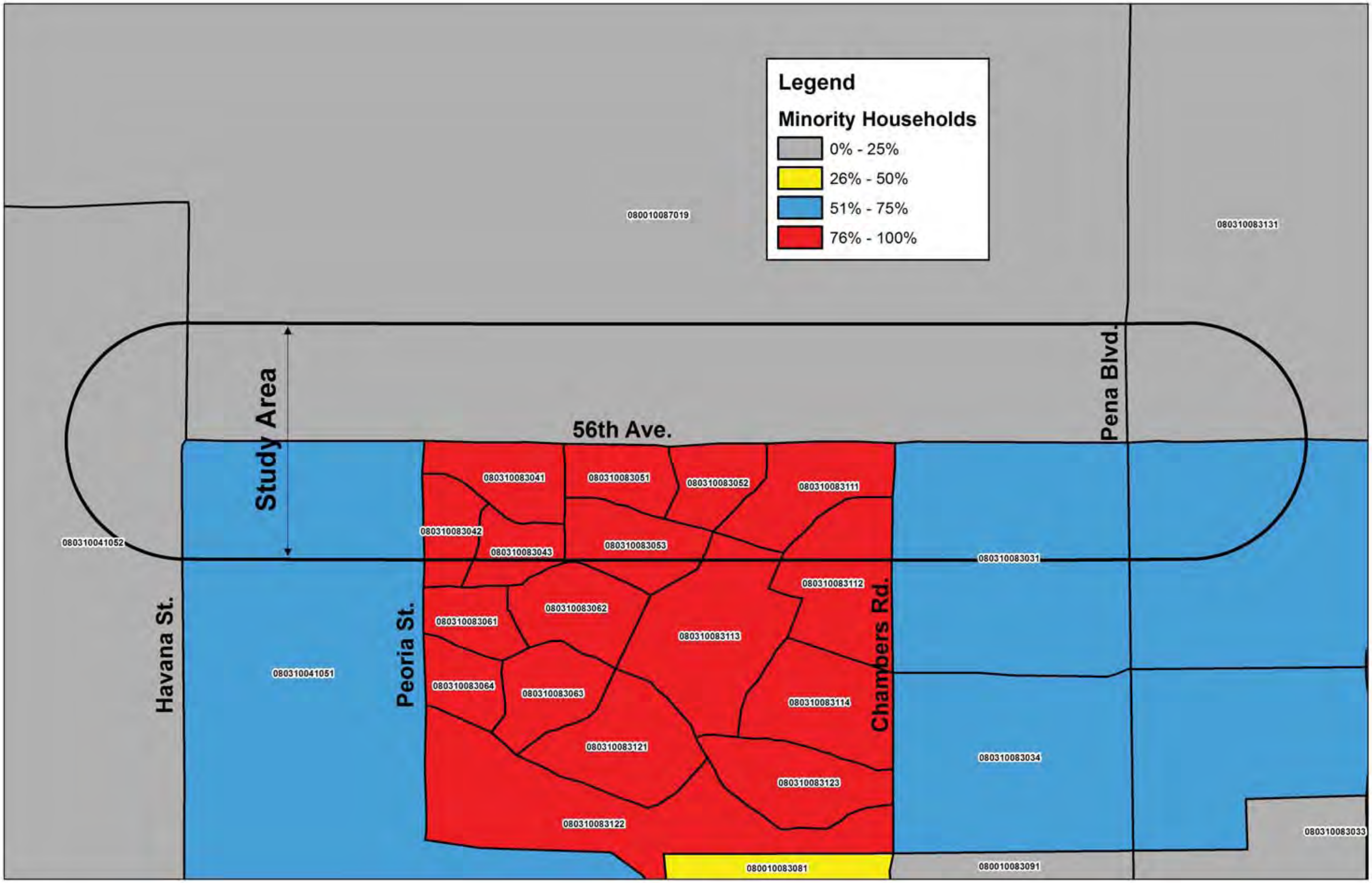
Source: US Census Bureau, 2007

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 1
Households in Poverty

URS

DENVER
THE MILE HIGH CITY



Source: US Census Bureau, 2007

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 2
Minority Households

URS
DENVER THE MILE HIGH CITY

The Montbello and Parkfield neighborhoods may both be considered as environmental justice populations. Whether they actually qualify may be determined during a future NEPA process

The Parkfield neighborhood contains one Census Block Group within the study area. The average median household income for this neighborhood is $53,639, the poverty level is 5.3%, and this neighborhood contains a 57.1% minority population. Residents of this neighborhood within the study area have a higher median household income and lower poverty levels than CCD as a whole. However, the percentage of minority population in Parkfield is more than three times greater than that of CCD as a whole. Therefore the Parkfield neighborhood may be considered an environmental justice population.

No direct right-of-way impacts are anticipated for these neighborhoods. However, there maybe other direct impacts, such as increased noise. There may also be positive effects, such as safer and easier access to 56th Avenue. Whether these areas qualify as environmental justice populations and, if they do, whether the impacts to them are disproportionately high or adverse would be determined in future studies. These studies will use the appropriate state and federal methodologies, guidance, and regulations.

Land Use and Zoning

This section identifies the existing land use and zoning patterns in the 56th Avenue corridor, future land use, and how land use will be impacted by the proposed transportation improvements in the corridor. Since the 56th Avenue corridor straddles Denver and Adams counties, land use and zoning information for both counties is presented.

To varying degrees, regional and local agencies are addressing how land use and transportation goals play a significant role in the growth and quality of the Denver metro area. Many detailed sub-area and redevelopment plans now articulate specific goals and policies aimed at optimizing the integration of land use with proposed and existing transportation improvements. Current land use was determined from site visits and county zoning maps (CCD, 2007; and Adams County, 2007). Future land use for the CCD side of the corridor was identified utilizing Blueprint Denver, CCD's integrated land use and transportation plan (CCD, 2000).

Adams County provided a land use map that showed future designations of use. Both local municipal plans were supplemented by the DRCOG Metro Vision Plan 2035 to conceptualize future land use (DRCOG, 2007).

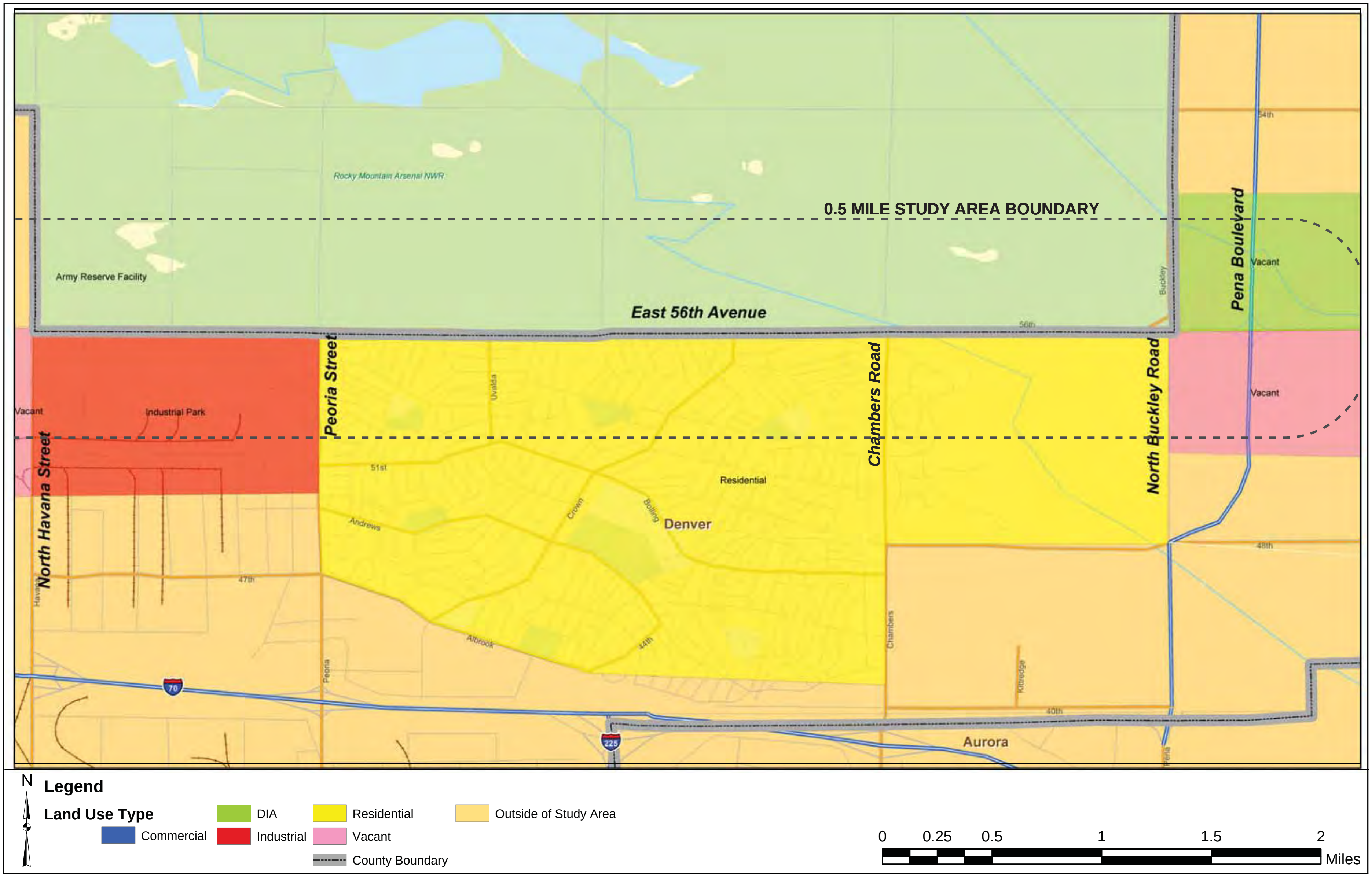
Existing Land Use and Zoning

CCD generally lies to the south of the 56th Avenue corridor. Between Havana Street and Peoria Street, there is a large industrial complex on the CCD side of the corridor (see Figure 5-3). A small portion of this complex, between Oswego Avenue and Peoria Street, is zoned as light industrial (I-O) (see Figure 5-4). This area is intended to be an employment area with offices and light industrial uses that are compatible with residential uses. This area acts as a buffer between the residential area to the east and the more intensive industrial area to the west. A list of the CCD zoning codes is presented in Table 5.1-4.

Adams County lies to the north of the corridor. From Havana Street to just west of Peña Boulevard, the north side of the corridor is owned by the United States of America (see Figures 5-3 and 5-4) as part of the RMANWR, and is therefore not zoned by the county. This area is mainly undeveloped, with some small two-track roads and monitoring stations located throughout the area. The U.S. Army Reserve's Martinez Center is located at the northeast corner of the intersection of 56th Avenue and Peoria Street (see Figure 5-3).

Future Land Use and Zoning

The south side of the corridor between Havana Street and Chambers Road is defined by CCD as an area of future stability (CCD, 2000). Future plans do not anticipate altering this community. The area from Chambers Road to Peña Boulevard, and even further east to Tower Road, is defined as an area for future change. Encompassing approximately 4,500 acres, the "Gateway" area is one of CCD's new development areas. The portion of the Gateway area south of the



Data Source: City and County of Denver, Adams County and URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 3
General Existing Land Use

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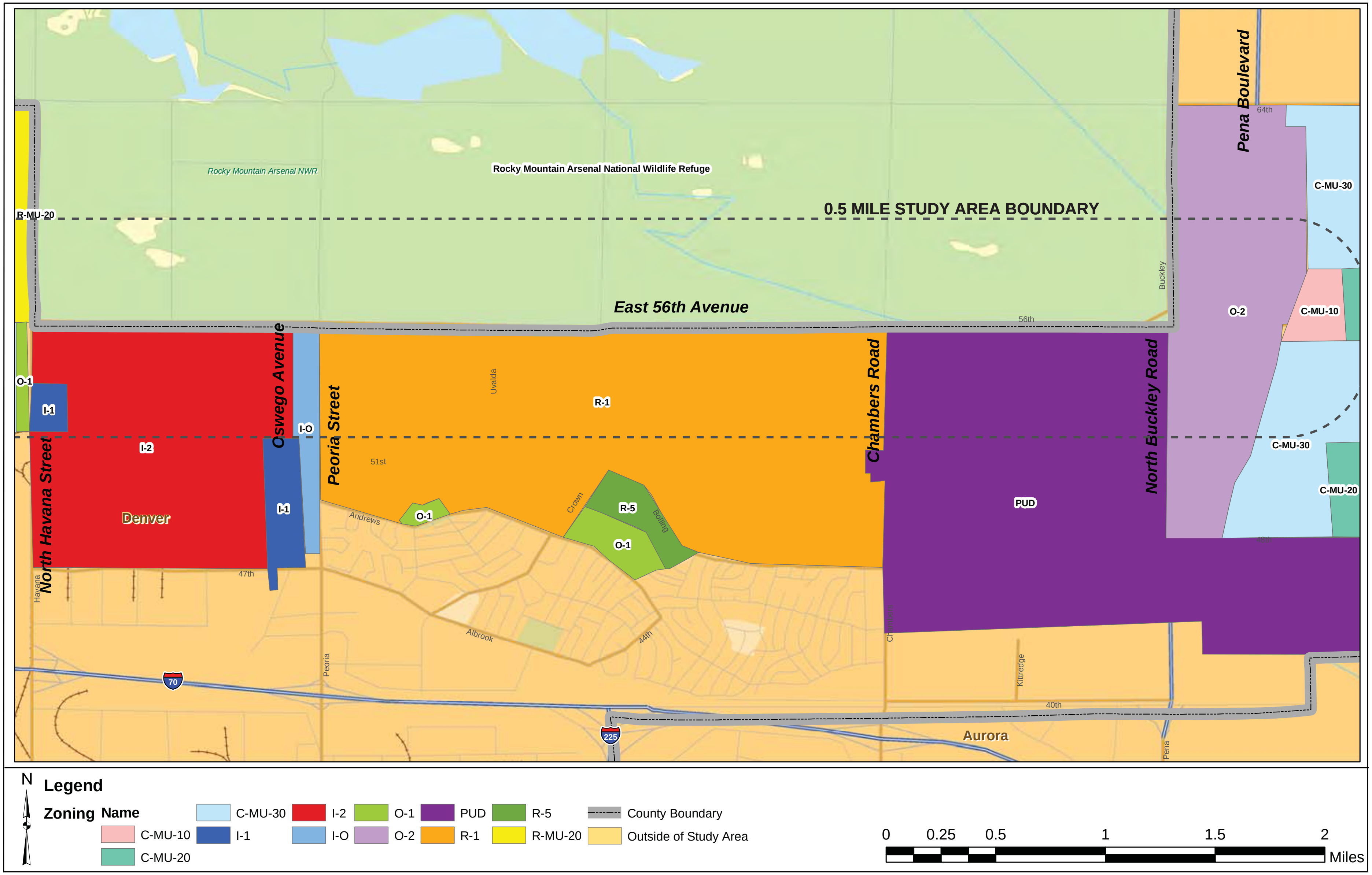
DENVER THE MILE HIGH CITY



Note: See Table 5.1 - 4 for explanation of Zoning Codes.

Data Source: City and County of Denver, Adams County and URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 4
Existing Zoning

corridor is anticipated to become a mixed-use community, providing services for residential development and the integration of Parkfield and Montbello neighborhoods.

Adams County planning reflects the planned future use of the Rocky Mountain Arsenal as a wildlife refuge.

The Recommended Alternative is consistent with existing and future land use plans for the project area.

The Recommended Alternative for the 56th Avenue corridor is consistent with existing and future land use plans for the project area. It would increase mobility in the study area, allowing for better access to, and from, the future development areas in and adjacent to the corridor, DIA, and current commercial, industrial, and residential properties.

Table 5.1-4
CCD Zoning Codes Applicable to the 56th Avenue Corridor

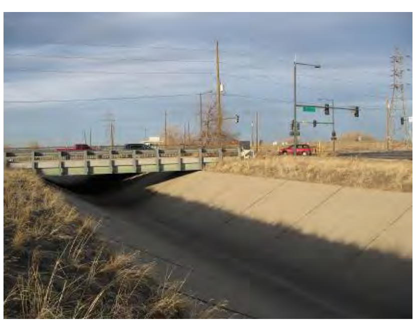
Zoning	Description
C-MU-10	Mixed-use commercial. Most restrictive of the commercial mixed-use districts.
C-MU-20	Mixed-use commercial. Allows for a mix of commercial, residential, and industrial uses along or near arterials or high traffic streets.
C-MU-30	Mixed-use commercial. Provides for a wide range of commercial, office, retail, industrial, and residential areas with flexibility to respond to development trends.
I-1	General Industrial District. Intended to be an employment area containing industrial uses which are more intensive than those permitted in the I-O zone.
I-2	Heavy Industrial District. Intended to be an employment area containing uses which are the most intensive of the industrial zones.
I-O	Light Industrial/Office District. Intended to be an employment area containing offices, and light industrial uses which are compatible with residential uses. These areas usually act as a buffer between residential areas and heavy industrial areas.
O-1	Open Space District. Allows airports, recreational uses, parks, cemeteries, reservoirs, community correctional facilities, and other public and semi-public uses housed in buildings.
O-2	Open Space/Agriculture District. Allows large tracts of open land utilized for agriculture or ranching activities, airports and under special conditions, oil and gas production.
OS-1	Open Space District. Intended for publicly and privately owned parks, open space, natural habitats, golf courses, and a limited range of other uses.
PUD	Planned Unit Development. A form of development characterized by a unified site design for clustering buildings and providing common open-space, density increases, and a mix of building types and land uses.
R-1	Single-Unit Detached Dwellings, Low Density. Residential housing with room-renting allowed to one or two persons allowed.
R-5	Institutional District. Allows colleges, schools, churches and other institutional uses.
R-MU-20	Residential Mixed-use District. Primarily residential, allowing either single or multiple-unit dwellings along heavily traveled streets, development may be either residential or mixed-use, combining residential with neighborhood-serving retail, office, or service uses.

Source: City and County of Denver, City Zoning Code 2007

The land use analysis considered future comprehensive land use and zoning plans from the CCD, Adams County, Commerce City, and DRCOG. Public input was also incorporated into the conclusions for this section.

Historic Resources

If funding is provided for the project from the Federal Highway Administration (FHWA), or if any federal permit is required, such as a Section 404 permit from the U.S. Army Corps of Engineers (USACE), the federal agency is required, under Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) and implementing regulations (36 Code of Federal Regulations (CFR) 800), to determine if this activity has the potential to impact historic properties within the area of potential effects. As set forth at Section 101(b)(c) of the NHPA, the federal agency must consult with the Colorado State Historic Preservation Office (SHPO), local governments, organizations, and individuals to ensure that historic properties are taken into consideration at all levels of planning and development.



Highline Canal Lateral

The study team completed a historic resource reconnaissance survey and a literature and records search for the 56th Avenue corridor. The reconnaissance survey produced a single historic resource, a section of the Highline Canal Lateral (5AM261), which is also referred to as the "Arsenal Lateral." According to the July 2002 High Line Canal Future Management Study Report (High Line Canal Partners, 2002) this lateral has been abandoned. The section of the lateral extending 200 feet to either side of 56th Avenue was observed during the reconnaissance survey. The section on the north side of the study area is overgrown with weeds and does not appear to have been maintained in some time. A deposit of household items has been dumped on the access road along the north side of the canal. A modern pipeline has been constructed in the lateral itself. Concrete riprap lines portions of the lateral. The lateral has been piped under 56th Avenue. On the southeast side of 56th Avenue, the lateral has been upgraded and is in fair condition. It is believed that this portion of the lateral, while no longer used for irrigation purposes, has been improved to handle urban drainage.

A new residential development has recently been constructed on the south side of 56th Avenue, and the lateral may have been improved as part of the drainage system related to that development. A small retention pond is located to the southeast of the lateral. The Highline Canal Lateral (5AM261) has been determined officially eligible for nomination to the National Register of Historic Places (NRHP). The conveyance system is no longer important in its role for the regional economy and the setting no longer conveys the feeling of its period of significance. Modification of this section has affected the integrity as an irrigation system that is significant in local agriculture.

In summary, it appears that no significant historic properties are located within the study area. Therefore no historic properties will be impacted by the Recommended Alternative. The SHPO coordination and Section 106 process will be initiated once this document is refreshed and the NEPA process is initiated.

Archaeological Resources

Section 106 of the NHPA of 1966 (as amended) applies to the historic properties, listed on or eligible to be listed on the NRHP, which may be impacted by this project. To conduct a consultation with the SHPO, Section 106 must be followed. The regulations for implementing Section 106 are found at 36 CFR 800, Protection of Historic Properties, and were most recently amended August 5, 2004. The amendments would not affect the implementation of this project.

Between Havana Street and Peña Boulevard, six previous cultural resources investigations have occurred. These include an investigation for the Buckley Transportation Corridor, archaeological surveys for Denver International Airport, historic resources surveys for Denver International Airport, archaeological surveys on Rocky Mountain Arsenal, a survey for a fiber optic line, and a survey along Chambers Road between 40th Avenue and 56th Avenue. A file search for the 56th Avenue corridor was completed at the Colorado Office of Archaeology and Historic Preservation (OAHP) in August 2007.

As a result of these surveys, four sites and 14 isolated finds have been documented in or near the corridor. The previously recorded archeological resources include: two farms (5DV2298 and 5DV2299) situated south of 56th Avenue on either side of Peña Boulevard, five historic isolated finds (5AM943, 5AM948, 5AM959, 5AM960, and 5AM969) located north of 56th Avenue between Havana Street and Chambers Road, one railroad segment (5DV9116.1), one prehistoric camp (5DV9137), and nine isolated finds (5AM9082 through 5DV9089 and 5DV9136) located west of Peña Boulevard both north and south of 56th Avenue. The railroad segment (5DV9116.1) is a remnant of the Colorado Eastern Railroad and is listed as field eligible for the National Register of Historic Places (NRHP). The remaining sites and isolated finds have all been determined not eligible for the NRHP.

During the anticipated NEPA process, a survey for archeological resources will be conducted for the corridor, and the impacts of the Recommended Alternative to archeological resources, if any, will be further evaluated and documented.

Paleontological Resources

Paleontology is the study of plant and animal life of past geologic time, including their evolutionary history, and their paleoecological interrelationships. The Historical, Prehistorical, and Archaeological Resources Act (Colorado Revised Statute 24-80-401ff, State Antiquities Act) protects all fossils on state-owned lands and lands controlled by any subdivision of state government.

The requirement to inventory fossils on federally-owned lands or on federally-funded projects is not explicit for the most part, but inventories may be required on Bureau of Land Management-administered lands by regulations pertaining to the Federal Land Policy and Management Act of 1976 (43 U.S. Code (USC) 1732).

Fossil collection on United States Forest Service-administered lands is regulated under 36 CFR 261.9(i), which prohibits "excavating, damaging, or removing any vertebrate fossil or removing any paleontological resource for commercial purposes without a special use authorization."

The FHWA considers protection of fossils on FHWA-funded projects a NEPA issue, but the extent of work required to protect the resource is based on the degree of protection afforded by each state's laws.

The staff paleontologist of Colorado Department of Transportation (CDOT) completed a paleontological assessment for the corridor in November 2007 through a geologic map and literature search and informal field check. The geologic unit mapped (Lindvall, 1983) within the study area is an unnamed Holocene and Pleistocene eolian (windblown) sand unit. Within the study area, the unnamed eolian sand unit is largely semi-vegetated or otherwise obscured by residential and industrial development in an area of gently rolling topography. This unit is sporadically exposed in the deeper portions of a wetlands-bearing ditch that runs along the south boundary of the RMANWR between Uvalda Street and Chambers Road. The bedrock unit underlying the unnamed eolian sand unit is the Late Cretaceous and Paleocene Denver and Arapahoe Formations (undivided) (*ibid*).

Although no records were found of fossil localities in the unnamed eolian sand unit within the study area, unnamed Holocene and late Pleistocene eolian sand deposits have produced camel, pronghorn antelope, black-tailed prairie dog, Richardson's ground squirrel, and extinct peccary remains in Denver and Aurora (Hunt, 1954; Lewis, 1970).

The Denver Formation has produced Late Cretaceous leaves, dinosaur remains, and very rarely, mammal teeth, as well as early Paleocene leaves and mammal, reptile, and amphibian bones and teeth in the Denver Basin (Cannon, 1906; Brown, 1962; Middleton, 1983; Carpenter and Young, 2002; Johnson *et al*., 2003; Hutchison and Holroyd, 2003; Eberle, 2003). Two invertebrate fossil occurrences in the Denver Formation were published (Cross, 1889; Cannon, 1893; Brown, 1943), and a third one has been recorded recently adjacent to State Highway 86 east of Kiowa, at University of Colorado Museum (UCM) fossil locality 91278. The published invertebrate fauna consists of a few, poorly preserved fresh-water snails; the UCM 91278 fauna includes as yet unidentified fresh-water snails and clams (unpublished UCM and CDOT fossil locality data).

Subsurface excavation associated with any future construction project(s) within the corridor could impact scientifically important paleontological resources presently buried in unnamed eolian sand unit outcrop. With limited subsurface data available and lacking final design plans, it is impossible at this time to determine if there will be significant impacts to this unit. Further investigation would be necessary during the anticipated NEPA process to fully determine the potential impacts on paleontological resources.

Section 4(f)/6(f)

Section 4(f) legislation, as established under the U.S. Department of Transportation (USDOT) Act of 1966 (49 USC 303, and 23 USC 138), provides protection for publicly owned parks, recreation areas, historic sites, wildlife and/or waterfowl refuges from conversion to other use. This section discusses parks, recreation areas, and refuges in the study area. No eligible historical sites were identified in the study area.

Within the study area there are several recreational opportunities. The RMANWR is located on the north side of 56th Avenue between Havana Street and Peña Boulevard. Used to produce chemical weapons during the 1940s and 50s, the site was designated as a wildlife refuge in 1992 and is now managed by the U.S. Fish and Wildlife Service (USFWS). The RMANWR is open to the public several days a week. Activities on the RMANWR include hiking, wildlife viewing, seasonal fishing, and nature tours. As a dedicated national wildlife refuge, the RMANWR is anticipated to be a Section 4(f) property.


The greenbelt on the south side of 56th Avenue between Peoria Street and Chambers Road

From Peoria Street to Chambers Road, there is a landscaped area, known locally as the greenbelt, on the south side of 56th Avenue. A bicycle and pedestrian path is located within this area, which is maintained by CCD Parks and Recreation Department. There are no other recreational facilities, such as playground equipment, playing fields, etc., within the greenbelt. According to the agreement (Trustee's Deed) between the Colorado National Bank of Denver and CCD made in October 1971, this area shall be used solely and exclusively for public recreation purposes. Based on current use, operation, and maintenance, this area is anticipated to be a Section 4(f) property.


A bicycle route sign on Peña Boulevard

According to the Denver Bike Map (CCD, 2006) there are two existing bicycle routes within the study area. First is the previously mentioned off-street bicycle route in the landscaped area on the south side of 56th Avenue. Second, an on-street bicycle route, located on Peña Boulevard, crosses the study area. This on-street route is not anticipated to be Section 4(f) property.

There are also several proposed bicycle routes within the study area. The RMANWR is planning a perimeter trail around the refuge. The southern edge of this trail would parallel 56th Avenue from Havana Street to Peña Boulevard (CCD, 2006). An off-street bicycle route would be the multi-use paths located on either side of 56th Avenue. Another would follow the First Creek Trail, adjacent to Tower Road, and cross 56th Avenue between Peña Boulevard on the west and Tower Road on the east. Finally, there are several neighborhood routes within the Montbello community that extend to 56th Avenue.

No impacts to the RMANWR are anticipated, as no right-of-way is required and construction near the property would be minimal. There would be no impact to the on-street bicycle route on Peña Boulevard, as Peña Boulevard overpasses 56th Avenue.

There would be impacts to the greenbelt south of 56th Avenue due to the proposed right-turn lane at Chambers Road. The amount of impact would be approximately four feet wide and 300 feet long along 56th Avenue. Impacts would be to the grassy area and handicap ramp; the bicycle and pedestrian trail would not be impacted.

In 2005, when Congress enacted the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), a new subsection was added to Section 4(f). This subsection authorizes the FHWA to approve a project that results in a *de minimis* impact to a Section 4(f) resource without the evaluation of avoidance alternatives typically required. A *de minimis* use is recommended when the use of the resource is minimal or "trivial," and does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f). Based on the estimated impacts to the greenbelt, this Section 4(f) impact is recommended for a *de minimis* determination, after the appropriate coordination with the FHWA, CCD, and the public.

Section 6(f) of the 1965 Land and Water Conservation Fund Act (LWCFA) (16 USC 4601-4) provides funding for acquiring property and developing public recreational facilities, and also protects the loss of that property to other uses. The LWCFA requires that any Section 6(f) property be replaced by recreation property of equal value and usefulness. There are no Section 6(f) properties located within the study area.

Air Quality

As required by the Federal Clean Air Act (FCAA) of 1970, the U.S. Environmental Protection Agency (EPA) established national ambient air quality standards (NAAQS) for the following air pollutants (termed "criteria" pollutants): ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), PM_{10} (particulate matter 10 micrometer in diameter and smaller), $PM_{2.5}$ (particulate matter 2.5 micrometer in diameter and smaller), and lead (Pb). The NAAQS represent safe levels that allow for avoidance of specific adverse health and welfare effects associated with each pollutant. The Colorado Department of Public Health and Environment (CDPHE) has adopted the NAAQS, so there are no ambient air quality standards specific to Colorado.

The EPA has delegated authority to the CDPHE to administer many of the requirements of the FCAA. The Air Pollution Control Division (APCD) at the CDPHE oversees air quality policies. If the level of any pollutant in an area exceeds the NAAQS, then it is designated by the EPA as a nonattainment area for that pollutant. The geographic boundaries of nonattainment areas are determined by the EPA in consultation with the CDPHE. Nonattainment areas are required to prepare implementation plans for attaining the standard for each pollutant. Once an area has attained the NAAQS, a maintenance plan must be prepared to ensure that the standard will be maintained. After the maintenance plan is approved by the EPA, the area is re-designated as an attainment/ maintenance area.

Under the FCAA regulations, transportation plans, programs and projects that would cause or contribute to an air quality violation cannot be approved or funded by metropolitan planning organizations or the USDOT, and therefore need to be in a conforming plan. Three pollutants of concern for the Denver metropolitan area are CO, PM_{10}, and O_3, all of which can result directly or indirectly from motor vehicle emissions. The Denver metropolitan area is currently designated as in attainment/maintenance for CO and PM_{10}, but considered to be in nonattainment for ozone, based on 2007 data.

Pollutants of Concern

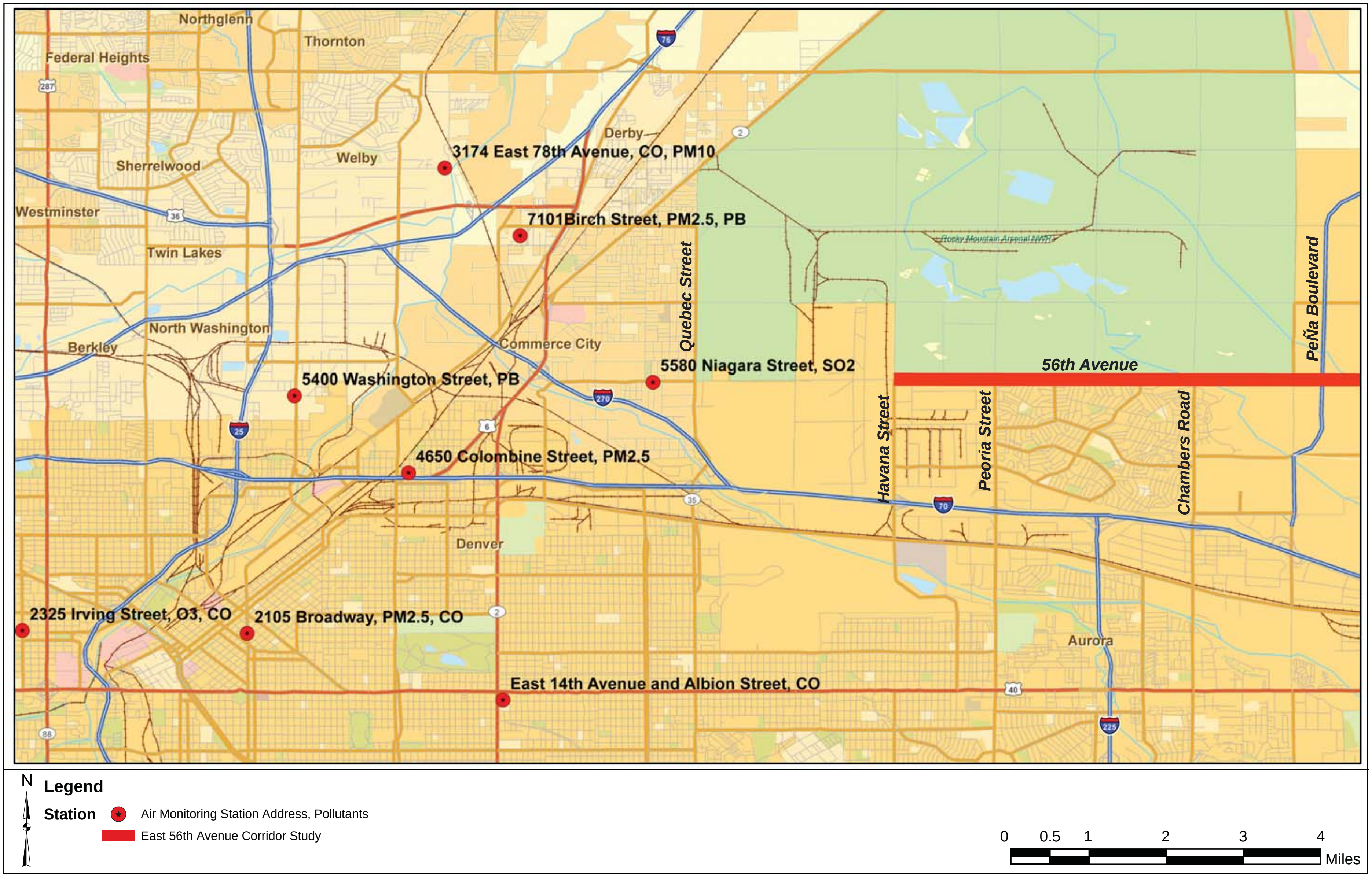
- Carbon Monoxide
- Particulates
- Ozone

The two main contributors to air pollution in the vicinity of the study area are industrial facilities and traffic. There is an industrial area west of the study area, along 56th Avenue between Quebec Street and Spruce Street. The corridor has moderate traffic levels. The main east-west corridor in the region is I-70, which is located approximately 1.5 miles south of 56th Avenue. There is heavy traffic on three north-south arterial streets that intersect 56th Avenue: Havana Street, Chambers Road, and Peña Boulevard. Therefore, the local industrial air pollution impacts are mostly on the west end of the study area, while traffic-related air pollution is concentrated on the south side of the study area. The sources of regional air pollution are mostly to the west of the study area.

The APCD operates a network of ambient air quality monitoring stations within the Denver/Boulder metropolitan area (see Figure 5-5). The results from air quality stations closest to the projects are summarized in Table 5.1-5. Since each station only monitors for certain pollutants, stations used in this analysis were selected at increasing distances from the study area until all of the pollutants of concern (CO, PM_{10}, and O_3) were covered. Data for $PM_{2.5}$ was also collected at three of the stations and is also included for reference.

The only criteria pollutants that exceeded the NAAQS standard at these stations were O_3 in 2003 at the 2325 Irving Street Station and $PM_{2.5}$ in 2005 at the 4650 Columbine Street Station. However, since the $PM_{2.5}$ standard is based on a three-year average, this did not result in a violation of the standard.

The widening of 56th Avenue between Quebec Street and Tower Road to six lanes, which includes the section of this corridor study, is included in the fiscally constrained element of the DRCOG 2035 Metro Vision Regional Transportation Plan (MVRTP) (DRCOG, 2007) and subject to the



Data Source: Colorado Department of Health and Environment, URS Corporation and Pinyon Environmental Engineering Resources, Inc.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 5
Air Monitoring Stations

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Table 5.1-5
Summary of Ambient Monitoring Levels for Air Quality Monitoring Stations near the 56th Avenue Corridor

Monitoring Station[1]	Averaging Time	NAAQS Standard	2002	2003	2004	2005	2006
Carbon Monoxide (ppm)							
Denver-2325 Irving Street	1-hour (2nd Max) 8-hour (2nd Max)	35 9	4.6 2.7	4.5 3.2	4.9 3.4	3.4 2.1	3.5 3.0
Denver-14th and Albion	1-hour (2nd Max) 8-hour (2nd Max)	35 9	6.0 3.1	6.5 3.3	6.8 3.4	3.6 2.4	3.9 2.5
Denver-2105 Broadway	1-hour (2nd Max) 8-hour (2nd Max)	35 9	7.4 3.7	14.9 4.5	8.7 4.1	4.3 2.5	4.6 3.1
Welby-3174 E. 78th Avenue	1-hour (2nd Max) 8-hour (2nd Max)	35 9	4.4 2.6	5.2 3.0	4.0 2.8	3.3 2.2	3.8 2.5
PM_{10} ($\mu g/m^3$)[2]							
Welby-3174 E. 78th Avenue	24-hour (2nd Max) Annual Arith Mean	150 50	122 35.2	98 32.9	71 28.6	64 29.4	82 27.8
$PM_{2.5}$ ($\mu g/m^3$)[2]							
Denver-2105 Broadway	24-hour (98th percentile) Annual Arith. Mean	35 15	25.7 10.25	26.2 10.41	22.2 9.0	29.4 9.82	24.3 8.99
Denver-4650 Columbine Street[3]	24-hour (98th percentile) Annual Arith Mean	35 15	No Data	No Data	13.2 14.6	**37.40** 10.14	34.80 8.98
Commerce City-7101 Birch Street	24-hour (98th percentile) Annual Arith Mean	35 15	25.8 10.16	27.7 10.3	18.9 9.49	24.2 10.17	26.3 9.85
Ozone (O_3) (ppm)							
Denver-2325 Irving Street	1-hour (Max) 8-hour (4th Max)	0.12 0.08	0.092 0.073	0.096 **0.085**	0.078 0.066	0.087 0.074	0.087 0.072

Source: EPA, 2007c.
Notes: 1 — Station locations are shown in Figure 5-5.
2 — if a monitoring station has more than one monitor for a pollutant, the highest reading among the monitors was used.
3 — $PM_{2.5}$ monitoring data are not available at this station during 2002 and 2003.
$\mu g/m^3$ = micrograms per cubic meter
Max = maximum
ppm = parts per million
Numbers in **BOLD** exceed NAAQS Standards

Colorado Department of Transportation (CDOT) and FHWA oversight. Funding for widening 56th Avenue from Quebec Street to Havana Street is identified in the 2008–2013 State Transportation Improvement Program (STIP). The study area is in an attainment/maintenance area for CO and PM_{10}, and in a nonattainment area for O_3 (CDPHE, 2007). The project is subject to a conformity analysis because it involves FHWA oversight and the Denver metropolitan area is an attainment/ maintenance area for NAAQS pollutants. According to CDOT, air quality conformance of this plan was conducted and approved by FHWA. Carbon monoxide hot spot analyses were performed for two signalized intersections, Havana Street and Peoria Street, which have a forecast

Level of Service (LOS) D or worse for the Recommended Alternative or No-Action alternative during the AM and/or PM peak hours. The results, as displayed in Table 5.1-6, indicate that none of the intersections are expected to exceed the 8-hour carbon monoxide standard. It should be noted that only those intersections with a LOS worse than C were analyzed.

Table 5.1-6
Carbon Monoxide Hot Spot Analysis Results (2035)

Intersection of 56th Avenue and:	Level of Service (LOS)[1]				8-hour Carbon Monoxide (ppm)[2]			
	No-Action		Recommended Alternative		No-Action		Recommended Alternative	
	AM	PM	AM	PM	AM	PM	AM	PM
Havana Street	D	E	D	C	4.29	4.29	4.42	-
Peoria Street	E	D	B	C	3.97	4.03	-	-

Source: URS Corporation and Pinyon Environmental Engineering Resources, Inc.

Notes: 1 — Hot Spot analysis is required for intersections with a LOS of D or worse
2 — the 8-hour maximum for carbon monoxide is 9 ppm.
AM/PM = morning/evening rush hours
ppm = parts per million

The greatest impact of this project to PM_{10} is expected to occur during construction. Since this a temporary impact, it is not considered part of the analysis. Permanent impacts to PM_{10} would result from changes in traffic volume and congestion. The Recommended Alternative, described in Chapter 4 of this report, would add capacity to 56th Avenue, increase traffic volume, and relieve congestion. These changes in volume and congestion are expected to offset each other concerning impacts to PM_{10}, so that traffic-related changes to PM_{10} would be insignificant.

Although motor vehicle emissions in the study area may increase, they would not result in any violations of the NAAQS; therefore, no direct project air quality mitigation is necessary. However, since the construction of the project will require submittal of an Air Pollution Emission Notice and Application for Construction Permit from the CDPHE APCD, preparation of a Fugitive Dust Control Plan will be required.

Adherence to this plan will reduce air pollution resulting from construction.

As a conclusion, the Recommended Alternative is expected to result in increased traffic volume and decreased congestion. Based on hot spot analyses for carbon monoxide and qualitative analysis of PM_{10} data, no exceedances of the NAAQS are expected as a result of this project.

Noise

The CDOT Noise Analysis and Abatement Guidelines (CDOT, 2002) establish noise abatement criteria and design requirements for noise mitigation. The CDOT guidelines are consistent with those of the FHWA (23 CFR 772) and have been approved by the FHWA for use on federal-aid projects in Colorado. The guidelines state that noise mitigation should be considered for any receptor or group of receptors where forecasted traffic noise levels, using future traffic volumes and roadway conditions, equal or exceed CDOT Noise Abatement Criteria (NAC), which are shown in Table 5.1-7. The guidelines also state that noise mitigation should be considered for any receptors where forecasted noise levels for future conditions are greater than existing noise levels by 10 decibels of A-weighted scale (dBA) or more. This standard is referred to hereafter as the Increase Criterion.

An analysis of existing traffic noise conditions was performed along 56th Avenue from Havana Street to approximately 1,050 feet east of Peña Boulevard, in accordance with the CDOT guidelines. Noise levels were measured in September 2007 at five locations, designated as M1 through M5 as shown in Figures 5-6 through 5-12, the 66 dBA noise contour displayed in which will be discussed later in this section. The measured levels ranged from 53 to 66 dBA, as displayed in Table 5.1-8.

Table 5.1-7
CDOT Noise Abatement Criteria
(Based on FHWA Noise Abatement Criteria, 23 CFR 772)

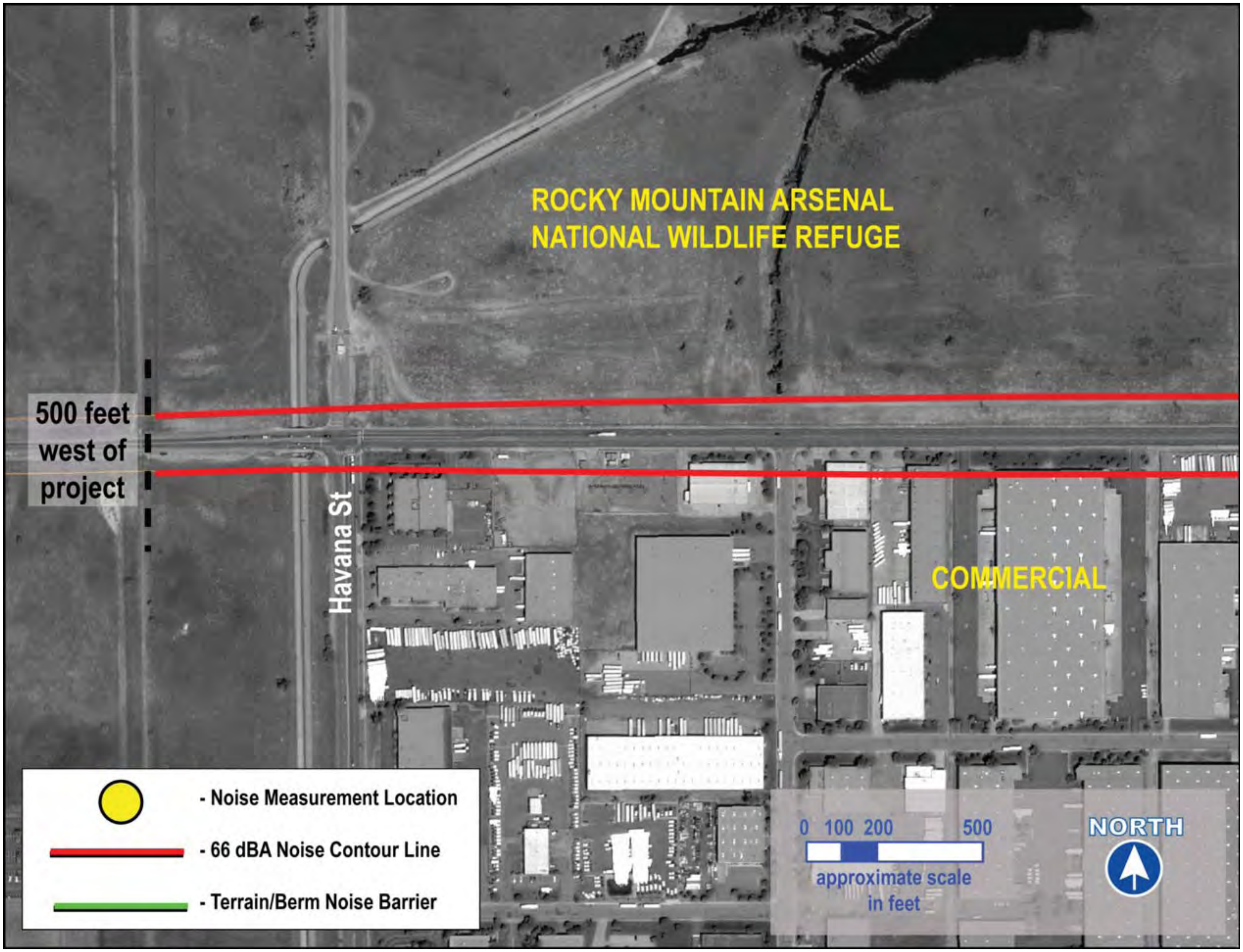
Activity Category	L_{eq} (1), (2) (dBA)	Description of Activity Category
A	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	71 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: CDOT
Notes: L_{eq} = equivalent sound level
(1) Hourly A-weighted equivalent level for the noisiest hour of the day in the design year
(2) CDOT noise impact criteria are 1 dBA lower (more stringent) than FHWA values in 23 CFR 772, to identify noise levels that "approach" the FHWA criteria.

Table 5.1-8
Measured Noise Levels (dBA)

Location	Neighborhood	Description	Measured Noise Level (20 minute L_{eq}, dBA)
M1	Montbello	Direct line of sight to 56th, 83 feet from centerline of 56th eastbound lane, 88 feet from northbound Potomac Way lane.	60.3
M2	Montbello	Behind first row of houses (line of sight to 56th obscured), approximately 250 feet from centerline of 56th eastbound lane.	53.8
M3	Montbello	Direct line of sight to 56th, 60 feet from centerline of eastbound 56th, just west of Fairplay Street intersection.	59.8
M4	Parkfield	Partially blocked line of sight to 56th, 89 feet from centerline of eastbound 56th, near west Randolph Place cul-de-sac.	54.1
M5	Parkfield	Direct line of sight to 56th, 30 feet from centerline of eastbound 56th, just east of Laredo Street intersection.	65.9

Source: URS Corporation and Hankard Environmental Inc.
Date Measured: September 2007.
Note: L_{eq} = equivalent sound level



Data Source: URS Corporation and Hankard Environmental Inc.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 6
66 dBA Noise Level Contour for Existing Conditions (1)

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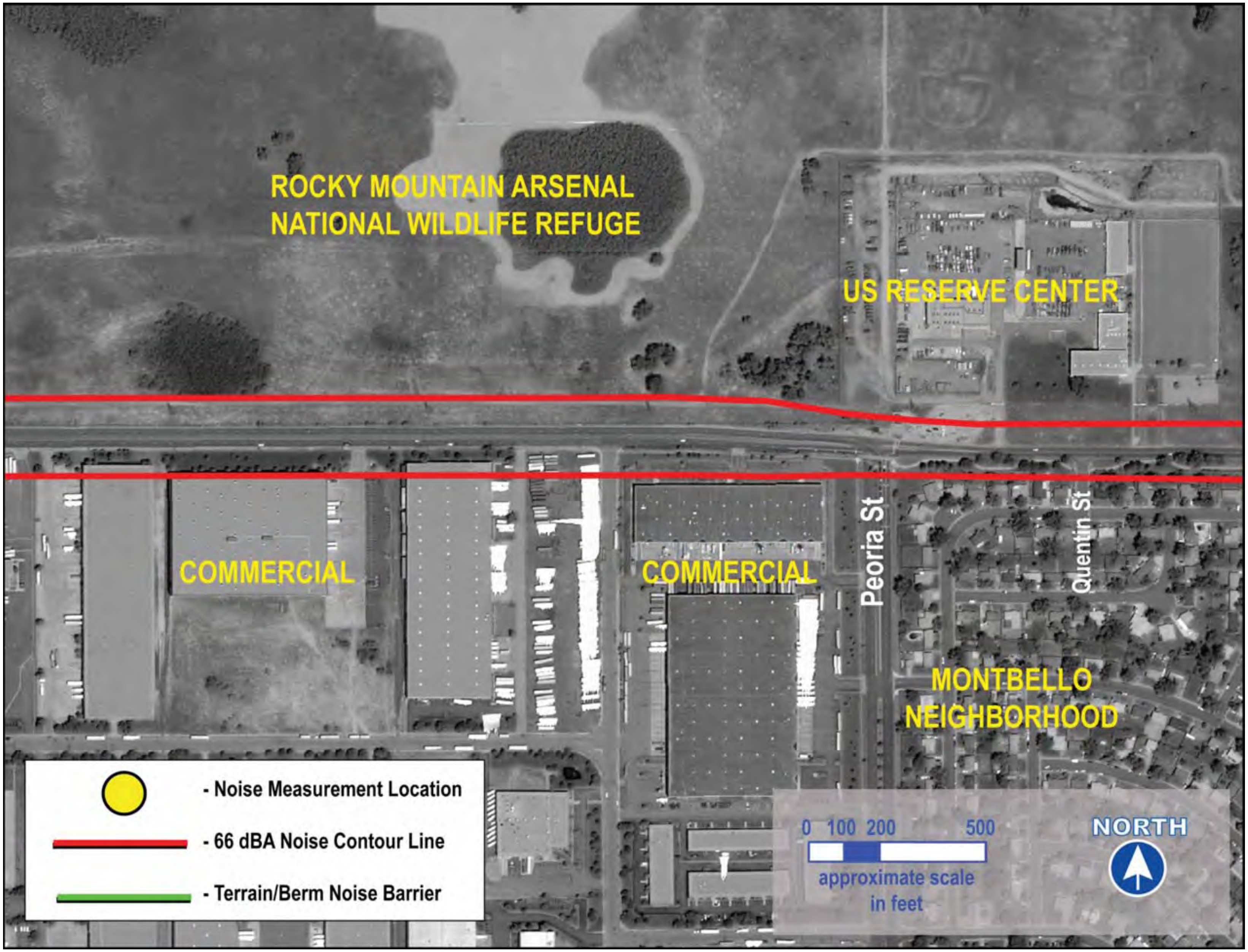

Data Source: URS Corporation and Hankard Environmental Inc.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 7
66 dBA Noise Level Contour for Existing Conditions (2)

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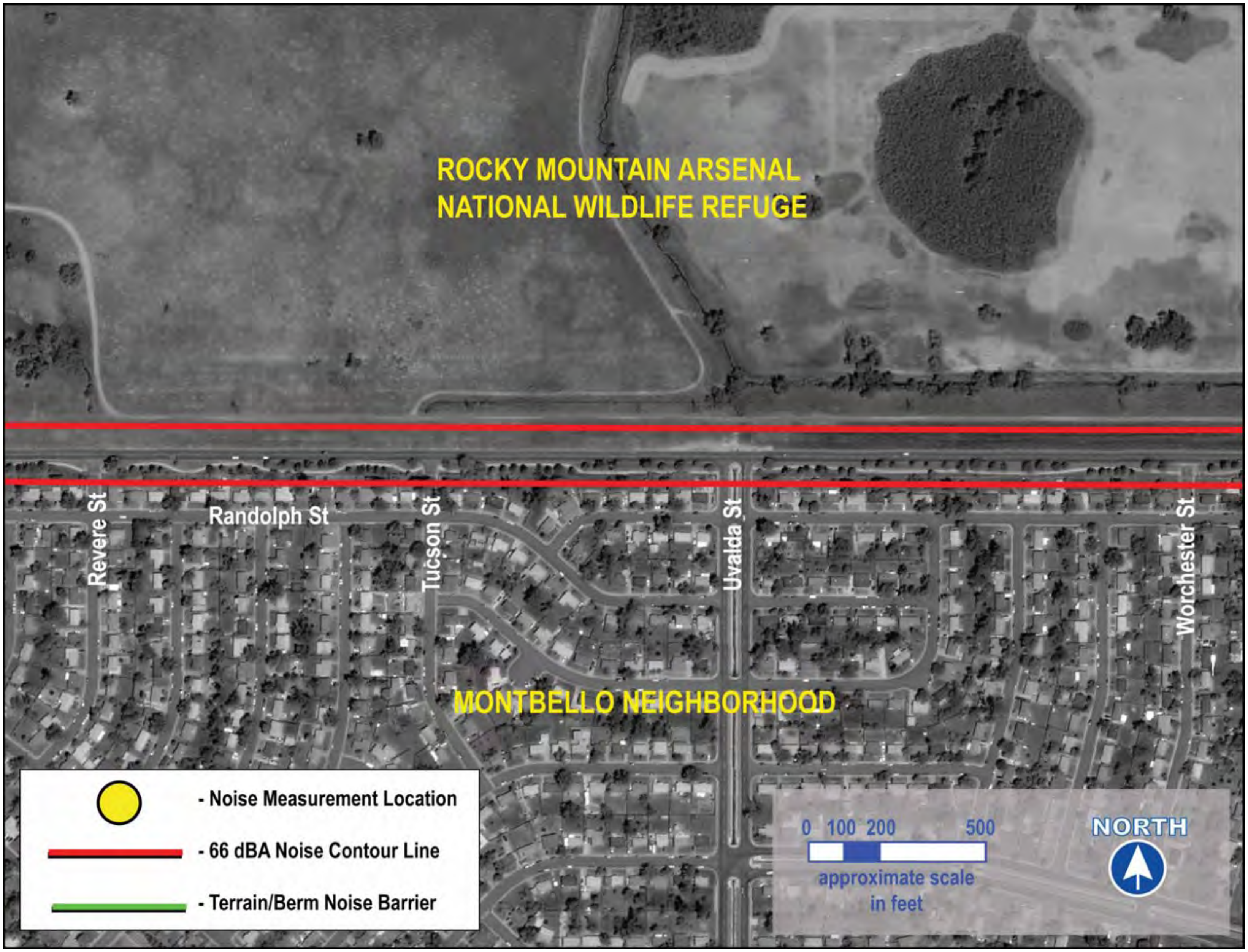
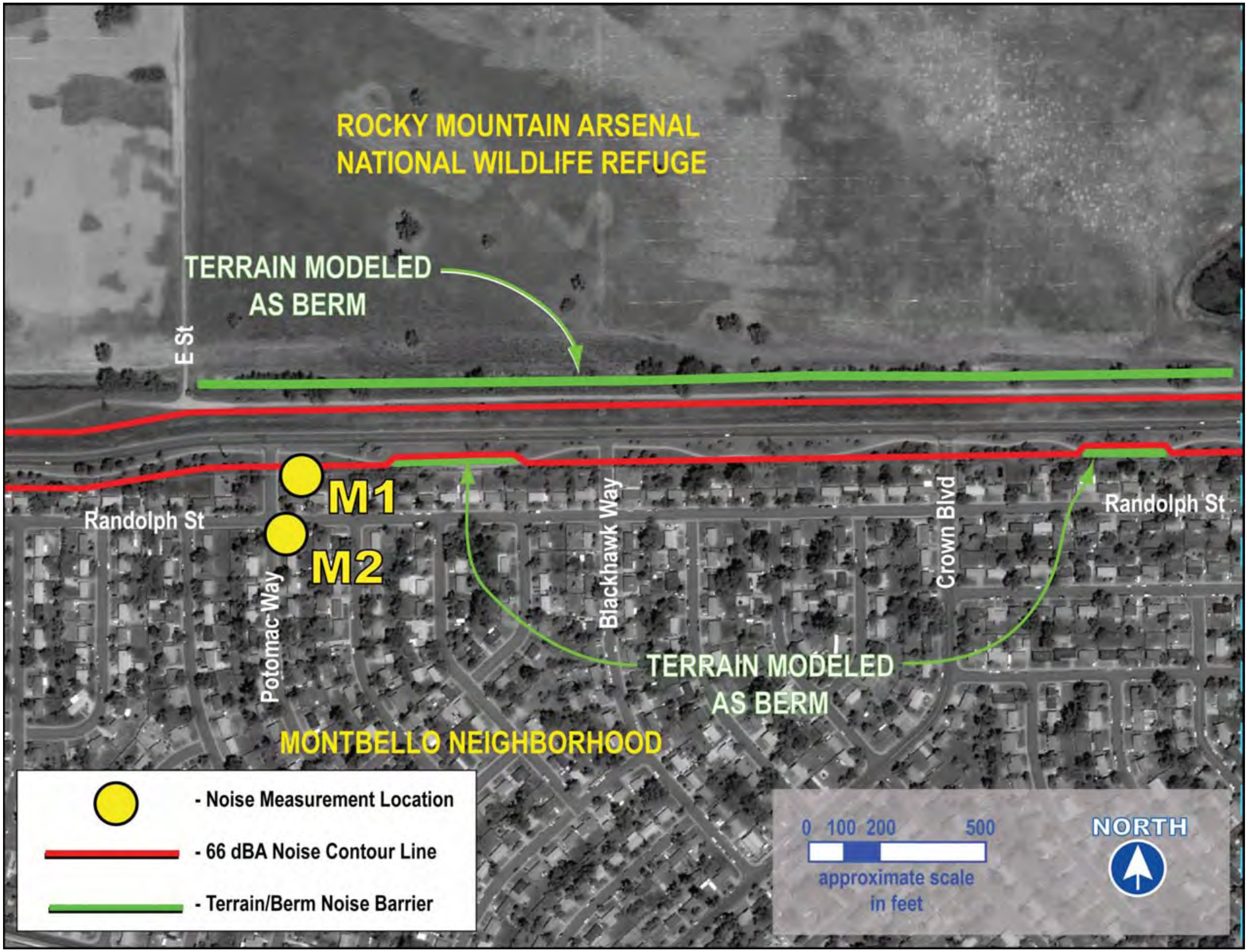


Data Source: URS Corporation and Hankard Environmental Inc.

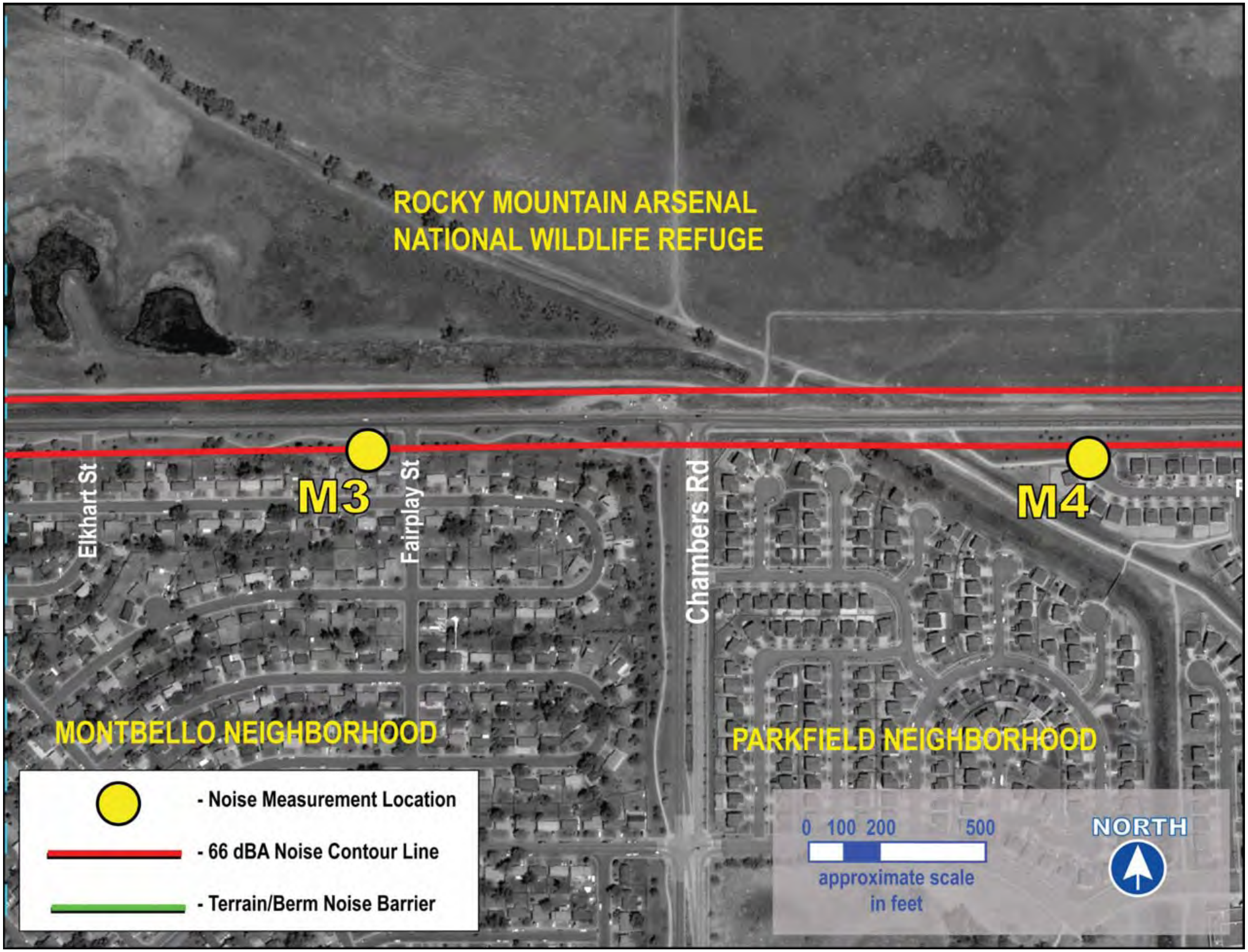
FIGURE 5 - 8

66 dBA Noise Level Contour for Existing Conditions (3)



Data Source: URS Corporation and Hankard Environmental Inc.

FIGURE 5 - 9
66 dBA Noise Level Contour for Existing Conditions (4)



Data Source: URS Corporation and Hankard Environmental Inc.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 10
66 dBA Noise Level Contour for Existing Conditions (5)

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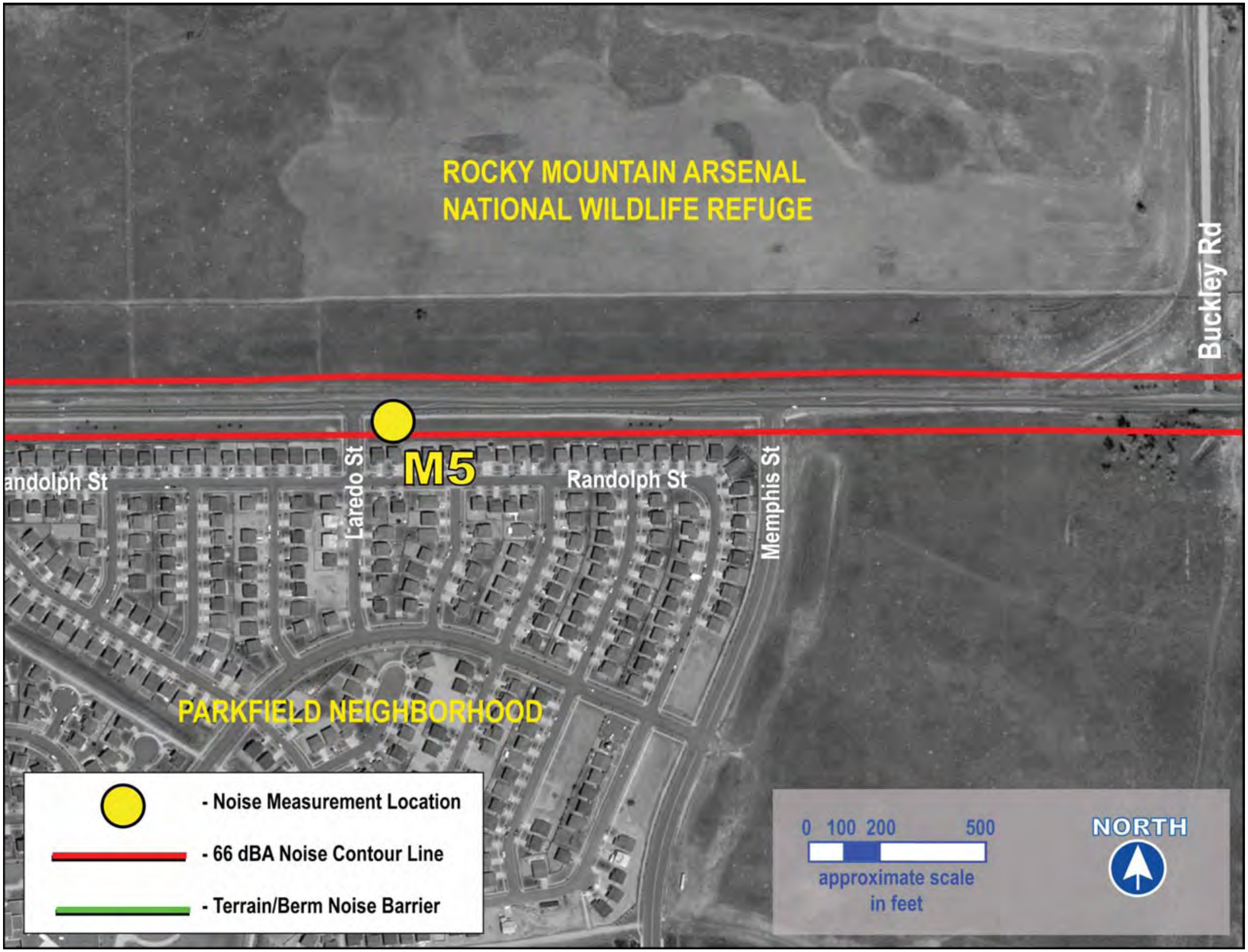
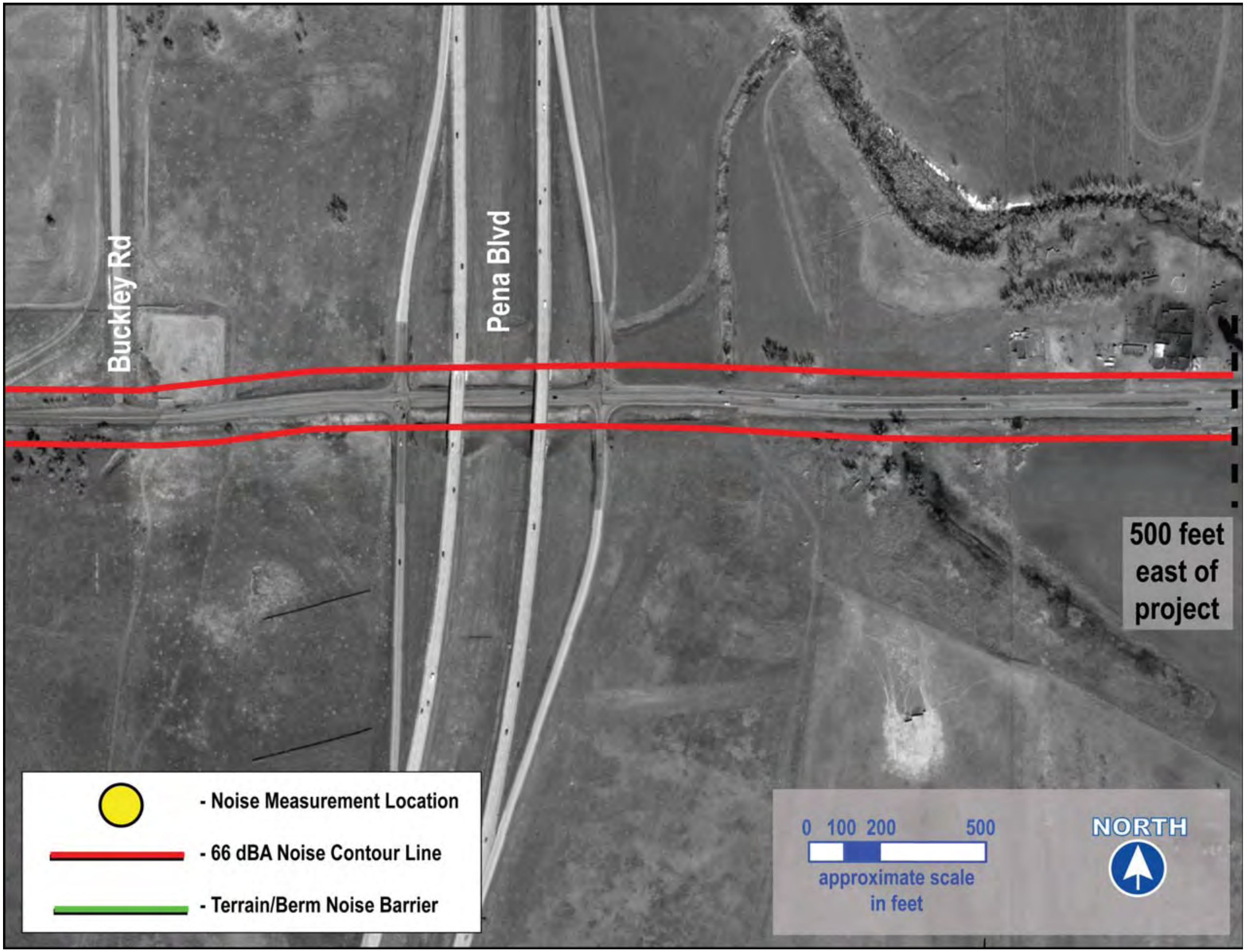


Data Source: URS Corporation and Hankard Environmental Inc.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 11
66 dBA Noise Level Contour for Existing Conditions (6)



Data Source: URS Corporation and Hankard Environmental Inc.

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 12
66 dBA Noise Level Contour for Existing Conditions (7)

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A Traffic Noise Model (TNM) (version 2.5) of the noise study area was constructed, which will ultimately be used to predict noise levels of the design year from the proposed roadway improvements. Included in the model were 56th Avenue, major cross streets, and terrain features such as building rows and earthen berms. The model was validated by comparing measured noise levels to those predicted at the measurement locations using traffic conditions present during the measurements. Modeling procedures were refined until the predicted noise levels were within 3 dBA of measured levels, with the exception of one location where the difference was 3.2 dBA. Model validation results are summarized in Table 5.1-9.

Table 5.1-9
Results of Traffic Noise Model Validation

Location	Measured Noise Level (one-hour L_{eq}, dBA)	Predicted Noise Level (one-hour L_{eq}, dBA)	Predicted Minus Measured Noise Level (20 minute L_{eq}, dBA)
M1	60.3	59.4	-0.9
M2	53.8	51.8	-2.0
M3	59.8	63.0	3.2
M4	54.1	56.7	2.6
M5	65.9	66.0	0.1

Source: URS Corporation and Hankard Environmental Inc.
Notes: L_{eq} = equivalent sound level
dBA = decibel of A-weighted scale

The TNM model was then used to predict the location of the 66 dBA noise level contour, as illustrated in Figures 5-6 through 5-12, using 2007 peak-hour traffic volumes collected for the corridor study. Sixty-six dBA is the CDOT NAC for residential land use. Between Havana Street and Peoria Street, where 56th Avenue has a four-lane section, the 66 dBA noise level contour lies approximately 100 feet north and south of the center of the road. Along the remainder of the study area, where 56th Avenue consists of two lanes, the contour lies approximately 75 feet north and south of the center of the road. The only notable exceptions are on the south side of 56th Avenue between Potomac Way and Blackhawk Way, as well as between Crown Boulevard and Elkhart Street, where there are earthen berms that inhibit sound propagation and as a result the contour lies only 50 feet from the road.

Existing noise levels in the study area are lower than CDOT's NAC standards for residential land use.

None of the existing residences located within the study area lie between the roadway and the 66 dBA noise level contour. Thus, existing noise levels at existing residences are lower than CDOT's 66 dBA NAC for residential land use.

The validated TNM model was also used to predict the location of the 66 dBA noise level contour and the 71 dBA noise level contour (CDOT NAC for commercial properties) using the design year (2035) peak-hour traffic volumes and the Recommended Alternative—6-lane roadway design. Where unobstructed by barriers (buildings), the 71-dBA noise level contour lies approximately 100 feet from the center of 56thAvenue, while the 66 dBA contour lies approximately 200 feet from the center of 56th Avenue.

Noise impact was assessed at the residences located along 56th Avenue in the Montbello and Parkfield neighborhoods by predicting noise levels at each house within the three rows closest to 56th Avenue. Predicted levels were then compared to CDOT's 66 dBA Noise Abatement Criteria for Category B land use. The numbers of residences where predicted noise levels equal or exceed CDOT's 66 dBA criterion are listed in Table 5.1-10.

No residence has a predicted increase in noise level from existing to design year conditions higher than the CDOT 10-dBA Increase Criterion, although some residences come close to this criterion with the highest increase of 9.7 dBA.

Noise mitigation will be determined in future environmental studies.

In summary, both the Montbello and Parkfield neighborhoods are considered impacted by noise as defined by the CDOT Noise Analysis and Abatement Guidelines (CDOT, 2002). Mitigation was not analyzed as part of this study, but should be included in any future environmental clearance analyses.

Table 5.1-10
Residences Impacted By Noise in Design Year (2035)

Neighborhood	Location of Residences	No. of Residences > 66 dBA	Total Number of Residences
Montbello	1st Row	82	144
	2nd Row	0	104
	3rd Row	0	102
Parkfield	1st Row	52	57
	2nd Row	1	39
	3rd Row	0	26
Total		*135*	*472*

Source: URS Corporation and Hankard Environmental Inc.
Notes: dBA = decibel of A-weighted scale

There are a number of commercial properties located between the 71 dBA noise level contour and 56th Avenue, meaning that predicted levels are higher than 71 dBA. However, there are no active outdoor use areas at any of these facilities that would benefit from noise abatement. There is no evidence at this stage of project planning that wildlife and outdoor use areas on the RMANWR would be impacted by the Recommended Alternative.

Hazardous Materials

The EPA has delegated enforcement of the federal hazardous waste regulations to the CDPHE. In accordance with FHWA and CDOT guidance, the potential for highway projects to impact hazardous material sites must be evaluated, as well as the potential for a hazardous materials site to impact the highway project. The regulations that apply to the acquisition, investigation, and cleanup of sites containing hazardous materials are:

- Resource Conservation and Recovery Act (40 CFR 260–299).

- Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 103, Sec. 9601 et seq.).
- Standards and Practices for All Appropriate Inquiries (40 CFR 312).
- Colorado Hazardous Waste Regulations (6 Code of Colorado Regulations (CCR) 1007-3, Part 260).
- Underground Storage Tank (UST) Remediation, Colorado Department of Labor and Employment-Division of Oil and Public Safety (7 CCR 1101-14).

Hazardous material sites along the 56th Avenue corridor were identified through an agency database search provided by Satisfi Environmental Information, Inc. on March 12, 2007. These sites could impact the project during construction and the acquisition of right-of-way, resulting in project delays and increased cost, particularly if they are not identified before construction.

A Modified Phase I Environmental Site Assessment (MESA) was conducted for the corridor, in general conformance with the American Society of Testing Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Process, 2005, to evaluate whether hazardous substances and/or petroleum products could be encountered in the study area.

At this stage in the process, there are no known hazardous materials sites that present sufficient risk such that an alignment would be changed. There are five sites ranked High and one ranked Moderate in the corridor, as summarized in Table 5.1-11. Contaminated soil and groundwater have been encountered at some of these sites. Based on the findings of the MESA, one site was identified as a Recognized Environmental Condition (REC). The 1998 pipeline spill on the RMANWR with a Satisfi ID “1c” as shown in Table 5.1-11, located north of 56th Avenue and east of Peoria Street, released 50 barrels of oil and no records of remedial actions were found. The other five sites listed in the table were identified with the potential to impact the Preferred Alternative.

Table 5.1-11
Hazardous Materials Sites Ranked High or Moderate Risk

Site Ranking	Satisfi ID	Facility Type	Facility Name	Facility Address	Comments
High	1a	Commercial	AMSA #22 (G)	12201 E 56th Avenue	UST, current and historical operations could include use of hazardous materials or petroleum products
High	1b	Military	Martinez USAR Center	12211 E 56th Avenue	UST
High	1c	Military	Rocky Mountain Arsenal	56th Avenue & Peoria Street	Petroleum pipeline spill
High	1e	Commercial	Denver Business Center	Southwest of 56th Avenue & Peoria Street	Historical operations could include use of hazardous materials or petroleum products
High	2e	Commercial	Atlantic Relocation Systems	10980 E 56th Avenue	LUST and UST
Moderate	2k	Commercial	Ryder Truck Rental 1139	10675 E 54th Avenue	LUST and UST, current and historical operations could include use of hazardous materials or petroleum products

Source: URS Corporation and Pinyon Environmental Engineering Resources, Inc.
Notes: Information contained in table obtained from environmental agency database search (Satisfi, 2007)
ID — identification
UST — Underground Storage Tank
LUST — Leaking Underground Storage Tank

As the project moves forward, a more detailed review of hazardous materials records will be completed. If there is the potential for hazardous materials to occur in the project corridor that could be encountered during construction, then additional work would be completed. If the soil and/or groundwater that will be encountered during construction are suspected to be contaminated, then a Phase II should be completed to characterize and delineate contamination in any areas of concern along the corridor. Hazardous materials concerns should be addressed in the project planning phases, prior to acquisition of right-of-way and start of construction. Specifically, in acquiring future permits the following need to be completed:

- An ASTM Phase I should be completed for any parcels that are to be acquired (including right-of-way). These should be completed at the time of acquisition, and should meet the ASTM standards.
- A materials management plan should be completed prior to any construction activities. That plan should look at proposed excavation activities, and reference those to the potential contamination sources identified in the current Phase I, and evaluate whether there is a potential to encounter contaminated soil and/or ground water. If so, then handling and disposal should be outlined in this plan.
- A health and safety plan should be completed prior to any construction activities.

Public Services and Utilities

The existing utilities generally run along the 56th Avenue corridor between Havana and Peña Boulevard. The utilities in the corridor within the existing right-of-way are:

Xcel electric lines in the corridor

- Denver Wastewater storm water lines.
- Denver Wastewater sanitary lines.
- Denver Water lines.
- Xcel Energy gas lines.
- Xcel Energy overhead electric lines.
- Xcel Energy underground electric lines.
- Denver Traffic Engineering Services.
- Comcast Cable Television, Chambers Road to Peña Boulevard.

Xcel transmission towers in the corridor

The utilities in the corridor outside the existing right-of-way include:

- Rocky Mountain Pipeline gas line (within RMANWR dedication).
- Xcel Energy gas lines.
- Xcel Energy overhead electric lines.
- South Adams County Water and Sanitation storm water line.
- Qwest telephone line.

- Comcast Cable Television, Havana Street to Chambers Road.

Other utilities that cross the corridor at Peña Boulevard include:

- Magellan-Midstream Partners gasoline lines.
- Sinclair Oil gasoline lines.

An Xcel electric substation in the corridor (East of Havana Street)

There are several proposed changes to utilities in the corridor. Rocky Mountain Pipeline plans to construct an eight-inch gas line within their easement north of 56th Avenue. Concurrent with the widening of 56th Avenue, the Xcel Energy (Xcel) 115 kilo-volts (kV) transmission line that runs along the north side of 56th Avenue from Havana Street to Potomac Way will be relocated onto RMANWR property to provide the necessary right-of-way for the widening of 56th Avenue. Xcel has no plans to underground these lines unless other entities will finance the project. Xcel requests a minimum of six months lead time to design the relocation of poles, and would prefer a lead time closer to twelve months. In addition, a 1041 land use permit will be required in Adams County. Xcel estimates that this permit could be obtained in approximately six months. Typically Xcel does not order structures until the land use permit is obtained.

An Xcel gas utility station in the corridor

A 20-inch high pressure gas main runs along the south side of 56th Avenue from Chambers Road to Peoria Street and runs under 56th Avenue from Peoria Street to Havana Street. A regulator station is located at the Martinez Army Reserve Center. This station will be moved to the north to provide the necessary right-of-way for the six-lane section of 56th Avenue.

Final utility locations should be surveyed prior to the completion of the utility design. Utility plans, which may include utility relocations, should be completed and approved before construction begins. Proper advance notice to service providers should ensure that delivery of public service is not interrupted.

No hospitals, police, or fire stations will be directly affected by the construction of improvements in the corridor.

5.2 Natural Environmental Resources

Farmlands

The Farmland Protection Policy Act (FPPA) (Subtitle I of the Title XV, Section 1539-1549) (FHWA, 1989; and NRCS, 2007a) of 1981 is intended to minimize the conversion of farmlands to nonagricultural use due to Federal projects. It assures that Federal programs are administered, to the extent possible, to be compatible with state, local, and private farmland protection programs and policies. The FPPA does not authorize the Federal Government to regulate the use of private or nonfederal land or affect the property rights of owners in any way. Projects are subject to FPPA requirements if they are completed by a federal agency or with assistance from a federal agency; and directly, or indirectly, convert farmland to nonagricultural use.

Prime and unique farmlands are under the jurisdiction of the U.S. Department of Agriculture (USDA). Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food and other agricultural crops and is considered farmland of national importance. Non-prime irrigated land and high potential dry cropland are considered farmland of statewide importance. Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops, as determined by the Secretary of Agriculture.

If a project has the potential to convert the aforementioned important farmlands to non-farm use, the project sponsors are required to contact the local Natural Resource Conservation Service (NRCS) office or USDA Service Center. For each farmland, the NRCS uses a Land Evaluation and Site Assessment system to establish a conversion impact rating score of the proposed sites. This score indicates whether potential adverse impacts to farmlands would exceed the recommended allowable level. The NRCS administers the regulations and provides guidance for the completion of the USDA Form AD 1006 for impacts to prime and unique farmlands.

The prime and unique farmland maps of Adams County were reviewed for the study area (NRCS, 2007b; NRCS, 2007c; and USDA, 1974). The Adams County Soils Survey was also reviewed (NRCS, 2007c; and USDA, 1974). There is no farmland map, or soil survey, for the City and County of Denver because it is considered an urban area. A drive-by survey was completed of the project area to confirm the current land uses.

Most of the land along 56th Avenue has either been developed or previously disturbed. The only soils of concern are located approximately 1,500 feet east of Peña Boulevard. There is a small horse farm on the north side of 56th Avenue that is not mapped as prime or unique (NRCS, 2007b). A small section on the south side of the road is mapped as high potential dry cropland that would be prime if irrigated (NRCS, 2007b).

Based on the above investigations and analyses, the project is not expected to impact prime or unique farmlands, and is not expected to convert farmland to non-agricultural use. Therefore, the project is not subject to the FPPA requirements, and completion of the USDA Form AD 1006 will not be required, unless project impacts extend more than 1500 feet east of Peña Boulevard.

Vegetation, Habitat, and Noxious Weeds

Vegetation and noxious weeds are managed under the following laws and regulations:

- NEPA requires that federal agencies consider impacts to the environment, including biological resources, prior to approval or funding of any activity.

- Management of noxious weeds is required under the Federal EO 13112—Invasive Species, FHWA Guidance on Invasive Species (1999), State of Colorado EO D00699—Development and Implementation of Noxious Weed Management Programs, the Colorado Noxious Weed Management Act (Colorado Regulatory Statutes 35.5.5-101-119 (2003)), and Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act (8 CCR 1206-2).

Vegetation, habitat, and noxious weed data were collected primarily from field observations in May, September, and October 2007, combined with use of detailed aerial photographs. In addition, data were collected or reviewed from existing sources, including maps, databases, publications, and agency information. The field study area includes lands within 300 feet of the centerline of 56th Avenue from Havana Street to east of Peña Boulevard, except where limited by access restrictions.

Plant Communities

There are nine vegetation/habitat types present in the study area, nearly all of which have been altered by past human activities. Each type is briefly described below.

Grassland south of 56th Avenue and west of Peña Boulevard - looking east

Grassland occupies much of the study area east of Uvalda Street on the north side of 56th Avenue, and east of Memphis Street on the south side of 56th Avenue. This community includes a mixture of perennial and annual, native and non-native species, and has developed from long-term natural succession or seeding of former agricultural lands. The grassland primarily consists of grasses about two-feet tall, but forbs are common throughout and are dominant in patches. Both introduced and native species exist. Woody species including plains cottonwood, Siberian elm, and rubber rabbitbrush occur as scattered individuals or clusters within the areas mapped as grassland.

Tree groves include larger clusters of trees in upland areas, not associated with streams or ditches. Some of these trees are used for nesting by raptors such as red-tailed hawks.

Rabbitbrush and sand sagebrush shrublands, both native shrub species, are very common or dominant in some areas. Sand sagebrush occurs on sandy soils in combination with a variety of grasses and forbs, and has been previously identified as a remnant natural community on the RMANWR (USFWS, 1996). The rabbitbrush community in the study area likely developed on previously disturbed areas, because this species readily colonizes previously disturbed lands.

Black locust thicket includes an area within the RMANWR that is composed of a homogenous stand of black locust.

Weedy forbs (prairie dog towns) exist on both sides of 56th Avenue. This habitat is characterized by numerous burrows and mounds and typically dominated by weedy forb species that are either eaten or cut short by the prairie dogs.

Riparian vegetation occurs along several ditches on the RMANWR. The largest area is along the Randolph tributary that runs parallel to 56th Avenue, from about Tucson Street on the west to Elkhart Street on the east. Smaller areas occur along other ditches that are perpendicular to 56th Avenue. Riparian areas are dominated by trees or shrubs with minor herbaceous species components that indicate higher moisture availability.

Marshes in a Parkfield wetland

Marsh includes constructed wetlands located on the RMANWR and within the Parkfield neighborhood. The Parkfield wetland is part of a stormwater collection system and consists of a constructed channel on both sides of 56th Avenue. It extends to the Parkfield II wetlands, which are a series of stormwater ponds with no outlet, located on the RMANWR.

Urban habitat includes buildings, pavement, and other unvegetated areas mixed with lawns, horticultural trees and shrubs, and small disturbed areas dominated by weedy vegetation.

Aquatic habitat includes stormwater detention ponds that just barely enter the study area west of the Highline Canal Lateral. Microscopic plants were found in these ponds.

Sensitive Plant Communities

There are no plant communities considered rare or sensitive based on botanical features. Prairie dog colonies are considered sensitive based on their value as wildlife habitat, and are discussed in the Wildlife section.

Noxious Weeds

Noxious weeds are plant species not native to Colorado and that are regulated under state law because they have negative impacts on crops, native plant communities, livestock, and/or the management of natural or agricultural areas. Colorado currently has 78 species on its noxious weed list (CDOA, 2006b). Under the permanent rules for the administration and enforcement of the Colorado Noxious Weed Act, state-listed species are placed into one of three categories. List A species are designated for eradication, and require prevention of seed production or development of reproductive propagules. List B species are managed by the state noxious weed management plan, with the goal of stopping the continued spread of these species. List C species are those for which the state, in consultation with other parties, would develop management plans with the goal of supporting jurisdictions that choose to require management of those species. Each county in the study area also maintains a list of noxious weeds that are a local priority. Table 5.2-1 provides a list of noxious weeds that are maintained by the counties and known or likely to occur in the study area, based on field studies. Several of these species are considered to be invasive at the RMANWR. In addition, annual rye, kochia and Russian thistle are considered to be invasive (RMANWR, 2007a). Field bindweed and cheatgrass are distributed throughout most grassland areas and prairie dog colonies, and field bindweed is often dominant in prairie dog colonies. Russian olive occurs in a number of areas. Other noxious weeds are relatively uncommon.

Cheatgrass on RMANWR
Photo Credit: Annette Casados, USFWS

Direct impacts by the Recommended Alternative to vegetation and habitat would primarily occur from vegetation-clearing and earthmoving. Most impacts would be permanent, as the former habitat would be replaced by the lane expansions and sidewalk/path construction. Acres of direct habitat loss are shown in Table 5.2-2.

Table 5.2-1
Observed Noxious Weeds in the Study Area

Common Name	Noxious Weed Listing			Occurrence in Project Area
	Colorado State Weed Status	CDOT and County Lists	Invasive at RMA	
Canada thistle	B	CDOT, D, A	✓	Common along ditches and in riparian areas
Common burdock	C	D		Riparian areas
Common mullein	C	D	✓	Occasional individuals and patches
Diffuse knapweed	B	CDOT, D, A		Not observed, may occur
Downy brome (cheatgrass)	C	D	✓	Common
Field bindweed	C	CDOT, D, A	✓	Common in prairie dog towns where it is dominant and in many grassland areas
Hoary cress	B	CDOT, D		Not observed, may occur
Leafy spurge	B	CDOT, D, A		Not observed, may occur
Musk thistle	B	CDOT, D, A	✓	Occasional individuals and groups
Poison hemlock	C	D		Observed along ditches
Puncture vine	C	D		Occasional
Quackgrass	B	D		Observed in riparian areas
Russian knapweed	B	D, A	✓	Not observed, may occur
Russian olive	B	CDOT, D	✓	Occurs along ditches, in riparian areas and tree groves
Scotch thistle	B	CDOT, D, A		Not observed, may occur

Source: Colorado Department of Agriculture (CDOA), CDOT, CCD, Adams County, and RMANWR.
Notes: A — Adams County list
B — List B species are managed by the state noxious weed management plan, with the goal of stopping the continued spread of these species.
C — List C species are those for which the state, in consultation with other parties, would develop management plans with the goal of supporting jurisdictions that choose to require management of those species.
D — City and County of Denver list
CDOT — CDOT Weed Maintenance and Mapping Priority list

Table 5.2-2
Direct Impacts to Vegetation/Habitats of the Recommended Alternative

County	Acres of Direct Impact to Habitats					
	Grassland	Prairie Dog Towns	Urban	Sand Sagebrush	Riparian	All Habitats
Denver	3.55	2.07	15.71	0.00	0.07	21.40
Adams	15.89	14.54	12.95	5.16	0.00	48.54
Total	*19.45*	*16.60*	*28.66*	*5.16*	*0.07*	*69.94*

Source: URS Corporation.

Portions of the impacted areas may be only temporarily impacted and will be re-vegetated after construction. There will be no impacts to several types of habitats including tree groves, rabbitbrush shrubland, black locust thicket, marsh, and aquatic habitat.

Most of the impacts would occur in urban, grassland, and prairie dog town habitat. Impacts to urban habitat would primarily occur in the existing road right-of-way. Grassland and prairie dog town habitats would mostly be affected on the north side of 56th Avenue. Only one small area of riparian habitat would be affected, east of Peña Boulevard. Impacts to prairie dog towns are discussed in more detail in the Section on Wildlife Habitats and Threatened & Endangered Species. None of the other affected habitats are considered rare or sensitive.

A **Noxious Weed Management Plan** will be prepared prior to construction and implemented during construction

Project-related construction may introduce new noxious weeds into the project area or increase the abundance of existing noxious weeds. Removal of existing vegetation and disturbance of soils encourages germination of weed seeds and the spread of roots and seeds. Airborne seeds from noxious weeds present in areas adjacent to the project may germinate in areas where vegetation has been removed. After construction, noxious weeds can persist or become established in reclaimed areas. Noxious weeds that are present in the construction right-of-way can spread into adjacent lands. Impacts from noxious weeds are primarily an issue when they have the potential to spread to open space, sensitive areas, agricultural lands, or riparian areas. For the 56th Avenue Project, the only sensitive area is the RMANWR. The

RMANWR has an active weed management program, and impacts from this project are likely to be minor or negligible.

As this project moves forward, a noxious weed survey will be conducted, and a Noxious Weed Management Plan will be prepared prior to construction, and implemented during construction. With use of this plan, impacts associated with noxious weeds would be minor or negligible.

Riparian Areas, Wetlands and Floodplains

Riparian areas and wetlands are managed under the following laws and their implementing regulations:

- NEPA requires that federal agencies consider impacts to the environment, including biological resources, prior to approval or funding of any activity.
- Wetlands and other waters of the U.S. are protected under Section 404 of the Clean Water Act (43 USC 1344), and impacts must be avoided, minimized or mitigated. Permits are required from the U.S. Army Corps of Engineers for activities that result in discharge of fill material into waters of the U.S., including wetlands.

Regulatory information for floodplains is described later in the sub-section "Floodplains."

Riparian areas

A riparian area north of 56th Avenue

Riparian areas are those associated with streams and other water bodies that have distinctly different vegetation due to presence of surface or groundwater. Most riparian areas are mesic, meaning that they have moisture conditions intermediate between xeric (dry) uplands and hydric (wet) areas. Riparian areas typically occur along streams but also occur adjacent to lakes, canals and ditches.

Riparian habitat supports a higher diversity of wildlife year-round than any other habitat in the Front Range, and many species are restricted to wetlands or riparian environments. Amphibians and many reptiles occur most frequently in riparian habitats. Riparian habitat is important for breeding birds and many migratory bird species, which use riparian corridors during periods of travel (Andrews and Righter, 1992).

Riparian areas exist along several ditches on the RMANWR. The largest area is along the Randolph tributary that runs parallel to the north side of 56th Avenue, from around Tucson Street to Elkhart Street. Smaller areas occur along other ditches that are perpendicular to 56th Avenue.

The Recommended Alternative would have direct impacts to 0.07 acre of riparian habitat east of Peña Boulevard. This loss is considered minor, and the affected habitat is of low quality. The impacted area is between the edge of the existing roadway and the main block of riparian habitat and has no trees or shrubs, which are present in the adjacent portions of the riparian area. The riparian area of which the impacted area is a part appears to have had more moisture in the past and appears to be in decline.

Wetlands and other water (OW) features


Wetland south of 56th Avenue

Wetlands are important biological resources that perform many functions including groundwater recharge, flood flow attenuation, erosion control, and water quality improvement. They also provide habitat for many plants and animals, including threatened and endangered species.

Other water (OW) features, as defined by the USACE, are any non-vegetated aquatic feature, including ephemeral, intermittent and perennial waterways, irrigation ditches, ponds, reservoirs, and any other features that are predominately open water. Riparian buffers can develop in transitional areas surrounding wetlands and OW features, where adjacent land has remained undisturbed for a period of years.

Wetlands and OW features were formally delineated within a 600-foot wide corridor centered on the existing centerline of 56th Avenue. Using the Cowardin system (Cowardin et al., 1979), wetlands were classified into three groups: palustrine emergent (PEM), palustrine scrub/shrub

(PSS), and PEM/PSS combination. Wetlands and OW features were further organized into four major groups based on hydrological sources, including natural, irrigated, stormwater-related, and wetlands with a combination of hydrologic sources.

Wetlands and OW features are considered jurisdictional if they are directly connected or adjacent to perennial, intermittent, or ephemeral waters of the U.S.; are named irrigation canals or ditches; or are formed from, or hydrologically associated with, natural springs or seeps. Nine wetlands and nine OW features were identified in the study area, as summarized in Tables 5.2-3 and 5.2-4. Observed wetlands as shown in Table 5.2-3 are described as following in further detail:

- Wetland (WL) 1-1 appears as a 1- to 3-foot fringe wetland adjacent to a stormwater detention pond (OW 1-1).
- WL 4-1 appears as a 2-foot fringe wetland adjacent to the Joliet Interceptor canal (OW 4-1).
- WL 6-1 appears as a 1-foot fringe wetland adjacent to a ditch/canal (OW 6-1).
- WL 6-2 appears as a linear wetland located in a ditch that drains to the south into a culvert and under the existing right-of-way of 56th Avenue.
- WL 7-1 and WL 7-2 both appear as 2-foot fringe wetlands adjacent to the Randolph Tributary (OW 7). Soil cores were collected and analyzed revealing a silty sand texture with a chroma of 10 YR 5/2 (0-12 inches).
- WL 8-1 appears as a fringe wetland bordering engineered stormwater retention ponds (OW 8-1).
- WL 9-1 appears as an area associated with the East Irondale Gulch which forms a confluence with engineered stormwater retention ponds (OW 8-1) to the north and west.
- WL 11-1 appears as ditched linear wetland area associated with First Creek.

Table 5.2-3
Wetlands in the Study Area

Feature	Classification	Soil	Chroma	Area (acres)	Jurisdictional (acres)
WL 1-1	PEM/PSS	Hydric[1]	N/A	.0.02	0.02
WL 4-1	PEM/PSS	Hydric[1]	N/A	0.11	0.11
WL 6-1	PEM/PSS	sandy silt[2]	10 YR 2/1 (0-7 inches)	0.004	0.004
WL 6-2	PEM	silty clay loam/silty sand[2]	7.5 YR 5/2 (0-5 inches)/ 7.5 YR 3/1 (5-10 inches)	0.34	0.34
WL 7-1	PEM	silty sand	10 YR 5/2 (0-12 inches)	0.35	0.35
WL 7-2	PEM/PSS	silty sand	10 YR 5/2 (0-12 inches)	0.24	0.24
WL 8-1	PEM	Hydric[1]	N/A	0.65	0.65
WL 9-1	PEM	Hydric[1]	N/A	1.36	1.36
WL 11-1	PEM	Hydric[1]	N/A	0.15	0.15
TOTAL	N/A	N/A	N/A	3.224	**3.224**

Source: URS Corporation.
Notes: 1 — assumed without taking soil cores because of the presence of a distinct wetland boundary, evidence of wetland hydrology and the dominance of hydrophytic vegetation.
2 — Soil cores were collected and analyzed.
N/A — not applicable
PEM — palustrine emergence
PSS — palustrine scrub/shrub
WL — wetland
YR — yellowish red

Of the OW features shown in Table 5.2-4, hydrology appears to be supported by run-off, stormwater, or a combination of the two.

Table 5.2-4
Other Water (OW) Features in the Study Area

Feature	Description	Area (acres)
OW 4-1	Identified as the Joliet Interceptor drainage canal which drains to the north and enters the Havana Pond via the Havana Interceptor. It has an Ordinary High Water Mark (OHWM) width of 15 feet with an average bankfull depth of 2 feet.	0.04
OW 4-2	Identified as the Havana Interceptor which is a 40-foot wide, concrete-lined, trapezoidal channel with a 9-foot bankfull width and very shallow water flow.	0.16
OW 6-1	Identified as a canal that drains to the north and enters a stormwater retention pond. It has an OHWM width of 3 feet and an average bankfull depth of 2 feet.	0.01
OW 7	Identified as the Randolph Tributary, a contiguous perennial channel. It drains to the west and eventually confluences with OW 7-3. It has an OHWM width of 13 feet with an average bankfull depth of 1 foot.	0.97
OW 7-3	Identified as the Uvalda Interceptor. It has an OHWM width of 10 feet with an average bankfull depth of 0.5 foot.	0.03
OW 8-1	Identified as an engineered stormwater retention pond.	0.57
OW 9-1	Identified as a concrete-lined ditch that drains to the west.	0.07
OW 10-1	Identified as a concrete-lined ditch that drains to the west.	0.12
TOTAL	**N/A**	**1.97**

Source: URS Corporation.
Notes: OW — other water
N/A — not applicable

The Recommended Alternative will have no direct impacts on wetlands.

No direct impacts to wetlands are anticipated as a result of this project, therefore no mitigation is required.

Floodplains

Floodplains are lands on either side of a stream that are inundated when the capacity of the stream channel is exceeded during a 100-year storm event. EO 11988, Floodplain Management (1977), was authorized to direct federal agencies to "provide leadership and take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." This EO was authorized to assist in furthering the National Environmental Policy Act of 1969, the National Flood Insurance Act of 1968 (amended), and the Flood Disaster Protection Act of 1973.

CFR, Title 23 – Highways, Chapter I – FHWA, Part 650 – Bridges, Structures, and Hydraulics, prescribes the policies and procedures that the FHWA is directed to implement in the "location and hydraulic design of highway encroachments on floodplains."

CFR, Title 44 – Emergency Management and Assistance, Chapter I – Federal Emergency Management Agency (*FEMA)*, contains the basic policies and procedures of FEMA to regulate floodplain management and to analyze, identify, and map floodplains for flood insurance purposes.

Generally, these regulations are enforced at the local level by local governments, with assistance from agencies such as the Urban Drainage and Flood Control District (UDFCD) and Colorado Water Conservation Board. The 56th Avenue corridor will be designed to meet the CCD floodplain standards, as documented in the CCD Floodplain Ordinance and the CCD Manual of Storm Drainage Design and Technical Criteria.

Floodplains are associated with the major drainageways and streams in the study area. Changes in the floodplain, such as adding fill material, constructing buildings or bridges, or in any way limiting the natural conveyance of floodwaters, can cause a rise in the 100-year water surface and can subsequently impact properties not previously affected by a 100-year storm event.

No FEMA-regulated floodplains exist in the study area

The 56th Avenue corridor is located in the South Platte River Basin, more or less on a ridgeline between the Sand Creek and Irondale Gulch watersheds. There are no floodplains regulated by the FEMA in the study area, only major drainageways tributary to Irondale Gulch and First Creek. The existing uses have been in place for many years and some of the existing storm drainage infrastructure does not meet the current CCD standards for drainage.

East of Havana Street, 56th Avenue crosses the Joliet Interceptor and the Uvalda Interceptor, and parallels the Randolph Tributary, which is the outfall for the Parkfield Interceptor. These are major drainageways that convey storm flows from developed areas south of 56th Avenue to the RMANWR. Although these drainageways are not FEMA regulated, drainage ordinances have been enacted by the CCD that prohibit modifications to a site that would increase 100-year flood depths on adjacent and downstream properties.

…no potential floodplain impacts of the Recommended Alternative

As there are no floodplains in the corridor, there will be no potential floodplain impacts associated with the Recommended Alternative.

Wildlife Habitats and Threatened & Endangered Species

Wildlife and threatened and endangered species are managed under a number of federal and state laws and regulations, including the following:

- NEPA (42 USC 4321-4327) requires that federal agencies consider impacts to the environment, including biological resources, prior to approval or funding of any activity.
- The Endangered Species Act of 1973 (16 USC 1531-1543) protects listed threatened or endangered species. Under Section 7 of the Act,

the federal government is forbidden to take any action that is likely to jeopardize a listed species or to degrade its critical habitat. The Colorado Division of Wildlife (CDOW) has also established a list of state threatened or endangered species.

- The Fish and Wildlife Coordination Act (16 USC 661-667d) requires early coordination with federal and state wildlife agencies for any project involving stream channel modifications.
- Colorado Senate Bill 40, Protection of Fishing Streams, requires that CDOT consult with the CDOW on any project involving CDOW jurisdictional streams, their bank, or tributaries.
- The Migratory Bird Treaty Act (16 USC 703-712) prohibits destruction or disturbance of active nests, eggs, or young birds. This act applies to nearly all bird species, including raptors, waterfowl, rare and sensitive species, and neotropical migrants. EO 13186 - *Responsibilities of Federal Agencies to Protect Migratory Birds* directs federal agencies to take certain actions to implement this act.
- Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 USC 668-668d).


Prairie dog habitat north of 56th Avenue

The most important wildlife habitats in the study area are prairie riparian areas, wetlands, prairie dog colonies and grasslands and shrublands. Aquatic habitat is limited to the Parkfield II stormwater detention ponds and small areas of surface water in ditches and wetlands. The RMANWR provides an important habitat for a variety of species, and occupies most of the northern half of the study area.

Mule deer and white-tailed deer are the largest mammals known to occur in the study area. The north side of 56th Avenue is mapped as a mule deer winter concentration area with a resident mule deer population (NDIS, 2007). Mule deer are considered common on the RMANWR, with a population of 530 animals in 1996 (USFWS, 1996). The RMANWR is also considered to be within overall range for white-tailed deer (NDIS, 2007); however, they are considered to be uncommon on the RMANWR (USFWS, 1994b). Bison have recently been reintroduced to the RMANWR, but the reintroduction area is outside of the study area.

Other common mammal species at RMANWR include coyote, raccoon, red fox, badger, desert cottontail, black-tailed jackrabbit, black-tailed prairie dog, common muskrat, fox squirrel, and thirteen-lined ground squirrel. Small rodents include plains pocket gopher, meadow vole, deer mouse, western harvest mouse, Ord's kangaroo rat, hispid pocket mouse, plains pocket mouse, northern grasshopper mouse, and house mouse. Most of these species are also likely to occur within undeveloped areas east of the RMANWR and the Parkfield neighborhood. Big brown bat is the most common bat species, based on studies at the RMANWR (Everette et al, 2001).

Black-tailed prairie dog colonies occupy about one-quarter of the study area, mostly north of 56th Avenue. Figure 5-13 illustrates the general locations of prairie dog colonies along 56th Avenue. The prairie dogs provide an important food source for predators such as coyotes and raptors, and their towns and burrows provide habitat for other species such as desert cottontail, snakes and burrowing owls. Black-tailed prairie dog colonies are sensitive habitats because of their importance as habitat for a number of other species. There are no wildlife corridors within the study area.

Raptors include hawks, eagles, falcons, and owls. An active red-tailed hawk nest was observed in May 2007 near the east end of the study area, and a stick nest that might be used by red-tailed hawk or Swainson's hawk was observed in September 2007 on the west side of the study area. In addition, the RMANWR maintains nest boxes for American kestrel, at least two of which are located within the study area. Other raptor species that may nest include great-horned owl and burrowing owl. One bald eagle nest is located on the RMANWR, but not within or near the study area. Red-tailed hawk, Swainson's hawk and great-horned owl nest primarily in trees. Kestrels nest in a variety of.

Prairie Dog Habitat

Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 -13
Prairie Dog Habitat

settings including kestrel nest boxes on the RMANWR. Burrowing owls nest mostly in prairie dog burrows. Wintering and migrating raptor species include bald eagle, ferruginous hawk, rough-legged hawk, northern harrier, red-tailed hawk, and prairie falcon.

Common bird species include house sparrow, European starling, rock dove, mourning dove, northern flicker, black-billed magpie, barn swallow, western meadowlark, horned lark, American robin, red-winged blackbird, western kingbird, eastern kingbird, common grackle, house finch, killdeer and Canada goose. Several species of migrating ducks are likely to occur on the Parkfield II ponds, especially in the fall.

Several species of reptiles and amphibians are reported to be common in grasslands at the RMANWR (USFWS, 1994a), including plains spadefoot toad, lesser earless lizard, many-lined skink, western bullsnake and prairie rattlesnake. Common amphibians and reptiles of wetlands and open water include tiger salamander, Woodhouse's toad, striped chorus frog, bullfrog, eastern yellow-bellied racer, and several species of garter snakes.

Federally-listed threatened and endangered (T&E) species in Colorado by county were obtained from the USFWS website (USFWS, 2006). State-listed species were obtained from the CDOW website (CDOW, 2007a). Table 5.2-5 lists the T&E species that may occur in the study area

…impacts to prairie dog towns will need to be mitigated. Impacts to all other wildlife habitats are expected to be minimal

The Recommended Alternative may have several types of impacts to wildlife habitats in the corridor associated with roadway widening, including habitat loss, habitat degradation, disturbance (avoidance and displacement), and direct mortality. The most important habitat loss would result from the removal of prairie dog towns, because they provide habitat and food for a number of other wildlife species. All other impacts are expected to be minor and many will be temporary.

Table 5.2-5
Threatened and Endangered Species

Common Name	Status[1]	Habitat[2]	Potential For Occurrence
Birds			
Bald eagle	Federally protected, ST	Large lakes, rivers, and prairie dog colonies, especially in winter	RMANWR is a winter foraging area, uncommon at other seasons. May occur occasionally in study area but not likely to forage along roadside.
Burrowing owl	ST	Grasslands, usually in association with prairie dog colonies	Suitable habitat is present. No known nests
Mexican spotted owl	FT, ST	Mixed conifer forests and narrow, shady cool canyons at 4,400 to 6,800 feet	Not present, no suitable habitat
Mammals			
Black-footed ferret	FE, SE	Prairie dog colonies	Suitable habitat, but does not occur
Preble's meadow jumping mouse	FT, ST	Occurs along Front Range of northern Colorado and southern Wyoming mostly in riparian areas along perennial streams	Not present. Areas outside of the RMANWR are in the Metro Denver block clearance area.
Plants			
Ute ladies'-tresses	FT	Sub-irrigated alluvial soils along streams, open meadows on floodplains	Not present.

Source: URS Corporation
Note:

1 Status: FE = federally endangered, FT = federally threatened, (USFWS, 2006); SE = state endangered, ST = state threatened (CDOW, 2007)

2 Sources: Andrews and Righter, 1992; Kingery, 1998; Fitzgerald, Meaney and Armstrong, 1994; and NDIS, 2007.

The Recommended Alternative will have no effects on federally listed T&E species. Black-tailed prairie dogs are a state species of special concern and also the subject of a specific CDOT mitigation policy. Construction of the Recommended Alternative would eliminate approximately 16.60 acres of prairie dog towns, while the actual acreage of impacts may vary depending on the size of prairie dog towns at the time of construction. Impacts would result in a decrease in size of prairie dog towns that extend far outside of the project area. No prairie dog towns would be eliminated by the construction. The actual acreage of impacted colonies and number of prairie dogs in the affected area would be estimated as part of the final design. The impacts of the Recommended Alternative on other special status species are expected to be negligible to minor.

Visual Resources

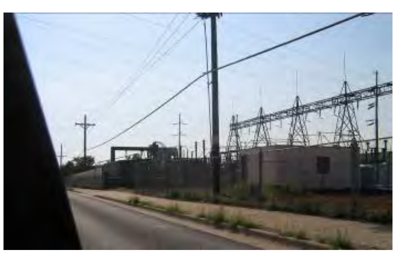
56th Avenue at Havana Street, a bridge over Havana Interceptor in the distance. Looking northwest

Aesthetics (i.e. visual resources) for the 56th Avenue corridor have been defined as the existing built and natural visual environments that are of historical significance, or represent landscapes or sensitive visual areas. A visual resource inventory was conducted through field visits, study of aerial photographs, regional maps and other agency documents during the summer and fall of 2007. The inventory process is based on guidelines set forth by the FHWA and the CDOT NEPA Manual, June 2007. The following laws, regulations and guidance were followed during this analysis:

- Highway Beautification Act of 1965.
- Federal Aid Highway Laws 2005, section 138.
- Transportation Laws 2005, sections 303(a) and 303(b).
- FHWA Technical Advisory T6640.8a (FHWA 1987, section 5(G)(21))
- FHWA Visual Impact Assessment Manual (NEPA and Section 4(f) evaluations)

Gated entry to RMANWR
Looking northeast

The study area of this analysis includes a typical 160-foot roadway width of 56th Avenue from Havana Street to approximately 1,050 feet east of Peña Boulevard.



Electric utility station, high voltage utility poles with multiple lines. Looking southeast

Major visual resources consist of the RMANWR site with wide areas of native prairie grass up to the right-of-way on the north side of 56th Avenue; large storage and distribution facilities south of 56th Avenue between Havana Street and Peoria Street; and a large residential area with several neighborhood parks expanding from Peoria Street to Memphis Street south of 56th Avenue. The eastern end of the corridor has expansive views of prairie open space and small clusters of native trees. The horizontal ground plane is low and varies from season to season. The most visually dominant landforms are associated with surrounding hills outside of the study area; and the changes in elevation at bisecting drainages.

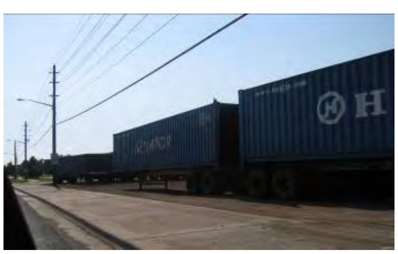
56th Avenue at Peoria Street, landscaped distribution facility, Montbello Neighborhood in the background. Looking southeast

Cultural modifications such as high voltage lines with transmission towers, wooden telephone lines with transformers, residential homes and light commercial distribution uses limit the visual intactness of visual resources in this area. No significant historical structures remain to date.

Impacts to visual resources are analyzed according to changes from the existing environment, taking into consideration contrast of proposed changes, sensitivity of the public to changes and magnitude of the area impacted. It is assumed all changes will be within the immediate foreground view of roadway users and properties facing 56th Avenue.

Under Peña Boulevard Bridge Looking southeast

Under the Recommended Alternative, between Havana Street and Peoria Street, an improved "gateway" landscape treatment at the RMANWR entrance would be created, therefore improving the current visual quality of this area. As a tree lawn and landscaped medians are introduced, the electrical substation view would be softened and the greenbelt would receive a wider landscape buffer. Overall, the visual impacts to this section would be noteworthy, but favorable.



Semi-trailer storage facility, wooden utility poles with multiple lines and street lights. Looking southeast

Between Peoria Street and Chambers Road, the Martinez Army Reserves Center, high voltage transmission lines and the open views of the RMANWR dominate the existing visual character. These features will be partially screened by a tree lawn and median plantings. There will be a wildlife pullout parking area and trail connection to the perimeter trail of the RMANWR. On the south side, the Montbello neighborhood is currently bordered by a wide turf greenbelt with several large mature trees. The visual impacts to and from the roadway views would not be sizeable when compared to the existing context.

Between Chambers Road and Memphis Street, the Highline Canal Lateral intersects 56th Avenue and Parkfield residential housing development is the dominant feature on the south with a park-like setting in the foreground view. A landscaped median will be the only important visual change in the Recommended Alternative, which will assist in connecting this section of the corridor to the sections to the west. This change is moderate and positive for the area.

Between Memphis Street and 1,050 feet east of Peña Boulevard, the landscape views open up to wider views of rolling hills and native prairie grass. Peña Boulevard rises above 56th Avenue containing no significant landscape features. The Recommended Alternative would include an improved landscaped median on either side of the overpass, resulting in a minor positive modification to the visual quality of the area.

Water Resources and Water Quality

The primary federal regulations driving the current stormwater quality program are the Phase I and Phase II Stormwater Regulations under the Clean Water Act, 33 USC 1251, et seq. that, among other requirements, require regulated entities to obtain a National Pollutant Discharge Elimination System (NPDES) permit for their stormwater discharges. The NPDES regulations specify entities that are required to have permits to control the discharge of pollutants to the maximum extent practicable. CDPHE has jurisdiction over the NPDES permit program in Colorado.

The 56th Avenue Improvements area overlaps both the CCD and City of Commerce City, which is in Adams County. The CCD and the City of Commerce City have individual NPDES permits.

…no perennial streams in the study area

The 56th Avenue corridor crosses several intermittent and ephemeral streams, including the Havana Interceptor, Joliet Interceptor, Uvalda Interceptor and East Irondale Gulch. Each of these streams runs generally from south to north, continuing into the RMANWR and ending in marshes, irrigation features, or lakes. Table 5.2-6 displays features of these major watercourse crossings. In addition, the Highline Canal Lateral passes through the study area. No perennial streams are located in the 56th Avenue corridor study area.

According to the 303(d) List responded to by the EPA on September 13, 2006, none of the stream sections in the study area are impaired. The mainstem of the South Platte River as shown in Table 5.2-6 was removed from the 303(d) List in the same EPA response.

Table 5.2-6
Major Watercourse Crossings

Stream	Crossing of 56th Avenue	River Basin (nearest classified downstream water body)	Upstream Watershed area (square miles)
Havana Interceptor	Bridge at Havana Street	Mainstem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado, to a point immediately below the confluence with Big Dry Creek.[1]	3.6
Joliet Interceptor	Culvert at Joliet Street	Mainstem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado, to a point immediately below the confluence with Big Dry Creek.[1]	0.6
Uvalda Interceptor	Culvert at Uvalda Street	Mainstem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado, to a point immediately below the confluence with Big Dry Creek.[1]	3.3
East Irondale Gulch	Box Culvert At Chambers Road	Mainstem of the South Platte River from the Burlington Ditch diversion in Denver, Colorado, to a point immediately below the confluence with Big Dry Creek.[1]	3.1

Source: City and County of Denver Storm Drainage Master Plan, April 2005.

Notes: 1: Watercourse not directly connected with the South Platte. Watercourse is interrupted by development consisting of railroads or irrigation features with no crossing.

The study area is situated above the Denver groundwater basin, which underlies a 6,700-square-mile area in Colorado and extends from the Front Range of the Rocky Mountains east to near Limon, and from Greeley south to near Colorado Springs. This basin includes four main bedrock aquifers, layered in an elongated bowl-shaped basin. Three of these are located in the study area, including the Denver Aquifer, the Arapahoe Aquifer, and the Laramie-Fox Hills Aquifer. The aquifers are generally confined, except in the upper parts where surface water may interact with groundwater.

The low transmissivity of the above-mentioned aquifers historically has limited large-volume, low-profit water uses, such as irrigation of commercial crops, and has enabled water use that is less constrained by cost. Records from 1985 show that water withdrawn from the approximately 12,000 wells completed in the Denver Basin was primarily used for public supply, with the remainder for agriculture.

One active well which taps the Denver Aquifer is listed by the Colorado Division of Water Resources (DWR) within the study area (see Figure 5-14). This 1,780-foot deep well is currently reported by the DWR as still in use, with a yield of 180 gallons per minute. In addition, three abandoned water supply wells are located within the study area.

With implementation of BMPs, no impacts on water quality of the Recommended Alternative

According to the CCD, permanent stormwater quality Best Management Practices (BMPs) are required for new construction. Water quality BMPs to treat additional runoff will be evaluated during final design. Since BMPs are required, there will be no impacts on water quality by the Recommended Alternative.

Permit Requirements

Below is a list of the permits that may be required and, if required, would be obtained upon implementation of the Recommended Alternative. It should be noted that this list may not be complete as other permits may be identified in a future NEPA process.

- Air Quality permit from the APCD must be acquired prior to the start of construction.
- CCD currently holds a Municipal Separate Storm Sewer System (MS4) permit through CDPHE, and the proposed culvert outfalls might add another facility to this permit.

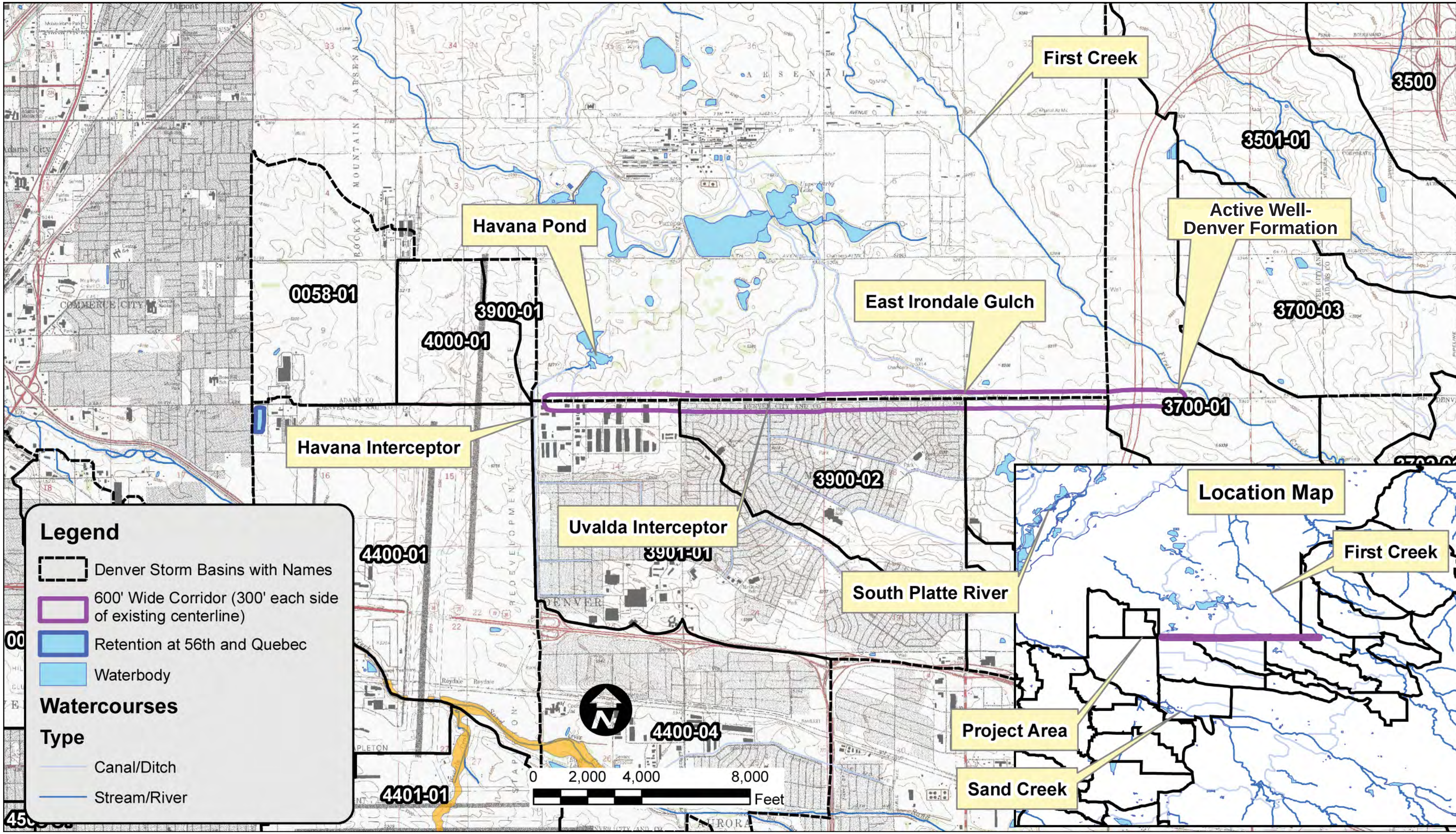
During a future NEPA process, other permits may be identified as required and added to this list

- NPDES Construction Activities Stormwater Discharge Permit, CCD and CDPHE.
- Section 404 Permit, USACE.
- Section 402 Permit, CDPHE, if applicable.
- Revocable Street Occupancy Permit, CCD.

Sewer Use and Drainage Permit, CCD.

- Groundwater Discharge Permit, CDPHE.

- Colorado Discharge Permit System for stormwater discharge, CDPHE.
- Burrowing owl clearance survey required by CDOW if impacting black-tailed prairie dog colonies between March 15 and October 31.
- Construction access permits for traffic control.
- Property access and local permits as required.



Data Source: URS Corporation

56th Avenue Corridor Study
Havana Street to Peña Boulevard

FIGURE 5 - 14
Water Quality Affected Areas

URS
DENVER THE MILE HIGH CITY

6.0 COMMUNITY OUTREACH AND AGENCY INVOLVEMENT

The Community Outreach and Agency Involvement program was developed to build community awareness of the study; identify the issues and concerns of businesses, residents, community groups, resource agencies, special interest groups, and other stakeholders; and engage the stakeholders in the development and screening of alternatives for corridor improvements.

6.1 Public Outreach

PUBLIC OUTREACH

- Open Houses
- Neighborhood Groups
- Business Community

The study team held a series of meetings with individuals, businesses, neighborhood groups and the community. The primary method for public outreach included two formal public meetings, using an "open house" format, that were conducted at key milestones during the study process.

Public Open Houses

A public scoping meeting was held on June 7, 2007. The purpose of the meeting was to introduce attendees to the study, provide an overview of the study process, and solicit initial opinions on the community's issues and concerns.

The open house format included a formal presentation followed by a question and answer session. Attendees inspected display boards and met with study team members during the open house about various environmental and technical aspects of the project. The formal presentation was introduced by Councilman Michael Hancock and was conducted by the study team. After the question and answer session, attendees were able to give verbal and written comments to study team members.

The values and opinions that were expressed included:

- A general consensus of the need for improvements along 56th Avenue.
- An understanding of the construction funding limitations of the project.
- A concern that no homes adjacent to 56th Avenue be acquired for the project.
- A desire to see bicycle trails incorporated into the project and access to the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR) enhanced.
- A general concern about increased traffic noise and the need for noise mitigation.

The 40-plus comments received during this open house were recorded, collected and entered into a comment matrix.

The second public meeting was held on December 6, 2007 and was scheduled during the development and screening of alternatives process. The purpose of the second public meeting was to:

- Review overall planning of the 56th Avenue corridor from Quebec Street to Peña Boulevard, defining the environmental assessment process for the Quebec Street to Havana Street section of the corridor, and the corridor study process for the Havana Street to Peña Boulevard section.
- Review and describe alternative roadway improvement options that were developed in response to the environmental scoping process.
- Identify a Recommended Alternative. At this meeting, the public was asked to comment on the study team's recommendation that the Recommended Alternative is to widen 56th Avenue to six lanes

with a raised center median and detached multi-use paths (Alternative 7).

- Seek guidance and feedback from attendees on other issues of concern.

The format of the second public meeting closely followed the first one with an open house format supplemented with a formal presentation and a question and answer session. Informal, one-on-one meetings with the attendees were encouraged to allow for a more detailed discussion of the alternatives and the screening process.

At the request of the study team, representatives of organizations that have been and/or are planning projects adjacent to the study area attended the public meeting and brought display boards of their own. Projects that were represented included the RMANWR, Stapleton Redevelopment and Prairie Gateway.

Over 30 comments were received and recorded during this public meeting. Since the public meeting included reviews of alternatives for both the Environmental Assessment (EA) section of 56th Avenue between Quebec Street and Havana Street, and the corridor study section between Havana Street and Peña Boulevard, many of the received comments are of interest but are not directly applicable to the corridor study section. Comments reflected the following major topics:

- Attendees concurred in the designation of Havana Street to Peña Boulevard section of 56th Avenue for a corridor study planning process, with the section between Quebec Street and Havana Street designated for a detailed EA process.
- There was general consensus on the Recommended Alternative.
- There were a few concerns about the required changes in local access, including emergency response, if a raised center median is constructed in the section of 56th Avenue east of Havana Street.

- Additional traffic signals in the corridor are desired and the potential locations and requirements for future traffic signals were reviewed.
- There is continued interest in access from the neighborhoods to the RMANWR and bicycle trails.
- Traffic noise and the likelihood of further traffic congestion were mentioned as concerns.

Responses to comments from both public open houses were communicated through public, small group, and stakeholders meetings.

Neighborhood Outreach

In addition to the formal public meetings, the study team conducted an outreach plan to neighborhood organizations. Representatives of the study team attended town hall meetings conducted by Councilman Michael Hancock. The study team also provided project updates to and solicited input on study issues from the following organizations:

- Montbello United Neighbors.
- Far Northeast Neighbors.
- 50+ Club of Green Valley Ranch.
- Green Valley Ranch Homeowners Association.
- Gateway Metro Citizens Group.
- Stapleton United Neighbors.
- Northern Airport Corridor Association.
- Northern Corridor Coalition.
- Denver County Democrats District 7.

Business Community

One-on-one meetings with representatives of the area business community were conducted. Presentations were made to the Black Chamber of Commerce and the Far Northeast Business Association.

Both organizations supported transportation improvements in the 56th Avenue corridor.

Outreach to other businesses with interests in the 56th Avenue corridor included:

- ProLogis.
- Stapleton Redevelopment Corporation.
- Forest City Stapleton.
- Xcel Energy.
- Kaneb Energy.
- Sand Creek Greenway Foundation.
- Kroenke Sports Enterprise.
- American Realty Trust.

6.2 Agency Outreach

In addition to the primary agency participants including the City and County of Denver (CCD), Colorado Department of Transportation (CDOT), and Federal Highway Administration (FHWA), public agencies included in the scoping and outreach process included:

- United States (U.S.) Army.
- U.S. Army Reserve.
- U.S. Fish and Wildlife Service.
- U.S. Environmental Protection Agency.
- U.S. Army Corps of Engineers.
- U.S. Postal Service.
- Public Utilities Commission.
- Regional Transportation District.
- Urban Drainage & Flood Control District.
- Metropolitan Wastewater District.
- South Adams County Water and Sanitation District.
- Denver Regional Council of Governments.

- Adams County.
- City of Aurora.
- City of Brighton.
- City of Commerce City.
- Denver Fire Department.
- Denver Water Department.
- Denver International Airport/Denver Aviation Department.

One-on-one meetings with a number of agency representatives were conducted. In addition, formal briefings of the 56th Avenue study were provided at the regularly scheduled meetings of the Northeast Metro Win-Win Coalition. Started in 1997 to facilitate informal, collaborative dialogue of area stakeholders, the Win-Win Coalition now regularly engages a wide range of public agencies, developers and others with an interest in the northeast quadrant, with a focus on issues related to land use, drainage, open space/trails, and transportation.

Outreach to the Win-Win Coalition also included several briefings to the coalition's steering committee, and meetings with the Coalition's transportation subcommittee and the open space/trails task committee.

Issues identified during the agency outreach process included:

- Relocation and timing of improvement, relocation or new water, gas, electric and sewerage utilities.
- Plans for a RMANWR perimeter trail and trailheads.
- Right-of-way acquisition issues involving Adams County and the U.S. Army Reserve.
- Storm drainage basin improvement plans.

6.3 Native American Consultation

Section 106 of the National Historic Preservation Act (as amended) and the Advisory Council on Historic Preservation regulations (36 Code of

Federal Regulations (CFR) 800.2[c][2][ii]) mandate that federal agencies coordinate with interested Native American tribes in the planning process for federal undertakings. Consultation with Native American tribes recognizes the government-to-government relationship between the United States government and sovereign tribal groups.

In October 2007, FHWA contacted the following twelve federally recognized tribes with an established interest in Adams and Denver Counties, Colorado, and invited them to participate as consulting parties:

- Apache Tribe of Oklahoma.
- Cheyenne and Arapaho Tribes of Oklahoma (two tribes administered by a unified tribal government).
- Cheyenne River Sioux Tribe (South Dakota).
- Comanche Nation of Oklahoma.
- Crow Creek Sioux Tribe (South Dakota).
- Kiowa Tribe of Oklahoma.
- Northern Arapaho Tribe (Wyoming).
- Northern Cheyenne Tribe (Montana).
- Oglala Sioux Tribe (South Dakota).
- Pawnee Nation of Oklahoma.
- Rosebud Sioux Tribe (South Dakota).
- Standing Rock Sioux Tribe (North Dakota).

Only the Northern Cheyenne Tribe responded in writing to the solicitation, accepting the invitation to consult and requesting a copy of the archaeological resources survey report. Upon reviewing the report, however, the tribe indicated it had no continued interest in the project or in being a consulting party. None of the remaining tribes elected to reply, and therefore no tribal governments participated in the project under the auspices of the NRHP. As a result of these actions, FHWA has fulfilled its legal obligations for tribal consultation under federal law.

6.4 Public Information Outreach Techniques

KEY OUTREACH TECHNIQUES

- Fact Sheet and Flyers
- Newsletters
- Web Page
- Paid Media

In addition to the outreach programs described in the previous sections, the public outreach team used several targeted methods to reach the corridor stakeholders, including door flyers, paid media, and a study web page.

Fact Sheets and Flyers

The study team produced and distributed bilingual (English and Spanish) fact sheets and flyers to build awareness of the project and to invite interested citizens to attend the public meetings/open houses. Over 5,000 flyers were distributed door-to-door in the Montbello neighborhood. Meeting notices were also distributed to recreation centers, fire stations, schools, retail establishments, and government offices in the Montbello, Parkfield, and Green Valley Ranch neighborhoods.

Newsletters

The study team used printed and electronic newsletters to inform stakeholders and to communicate progress in the process. With the permission and coordination of Councilman Hancock's office, articles were placed in two of his newsletters to introduce the project, invite public participation and update constituents on the progress. This newsletter is mailed to every household in his council district—approximately 6,000 households.

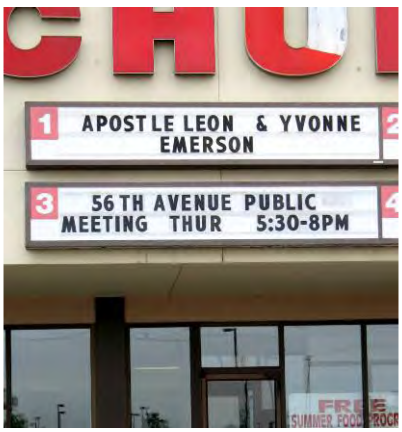
Information about the public meetings was also distributed through the Stapleton Intranet, an electronic newsletter received by more than 7,000 households and businesses in the Stapleton neighborhood.

Web Page

The study team also created and maintained a project web page on the CCD website. This web page was periodically updated with contact information and summary updates on project progress. The study team also monitored an opinion line for callers.

Paid Media

The study team inserted paid meeting notice advertisements into several newspapers that serve the Montbello, Green Valley Ranch, Parkfield, and Stapleton neighborhoods. Because of the substantial Hispanic population in the corridor, advertisements in bilingual (English and Spanish) newspapers were translated into Spanish.



Other

Notices were displayed on the marquees of both public meeting venues, the Now Faith Christian Center and Montbello High School, several days prior to the event. The Black Chamber of Commerce also sent a notice to its e-mail list.

6.5 Environmental Justice Strategy

Given the diverse demographic profile of the study area, the study team devised and implemented a culturally sensitive and creative outreach strategy, using traditional and non-traditional approaches which included:

- Notification, pre-briefing and close coordination with the Black Ministerial Alliance.
- Bilingual (English and Spanish) flyer distribution to six neighborhood churches.

- Bilingual (English and Spanish) flyer distribution to the all-Spanish language Church of the Ascension.
- Bilingual (English and Spanish) flyer distribution in Gateway Center Carniceria.
- Guided the study process by responding to the received opinions.
- Ensured that input from the public outreach process was documented and reflected in the scoping and alternatives analysis.
- Obtained a general acceptance of the project prior to moving forward on study tasks.

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APPENDIX A
PLANNING AND ENVIRONMENTAL LINKAGES

Federal Highway Administration (FHWA), Colorado Division
Planning/Environmental Linkages (PEL) Questionnaire

56TH AVENUE, HAVANA STREET TO PEÑA BOULEVARD
DENVER, COLORADO

This questionnaire is intended to act as a summary of the Planning process and ease the transition from the planning study to a NEPA analysis. Often, there is no overlap in personnel between the planning and NEPA phases of a project, and much (or all) of the history of decisions, etc, is lost. Different planning processes take projects through analysis at different levels of detail. Without knowing how far, or in how much detail a planning study went, NEPA project teams often re-do work that has already been done. Planning teams need to be cautious during the alternative screen process; alternative screening should focus on purpose and need/corridor vision, fatal flaw analysis and possibly mode selection. This may help minimize problems during discussions with resource agencies. Alternatives that have fatal flaws or do not meet the purpose and need/corridor vision cannot be considered viable alternatives, even if they reduce impacts to a particular resource. This questionnaire is consistent with the 23 CFR 450 (Planning regulations) and other FHWA policy on Planning and Environmental Linkage process.

Instructions: These questions should be used as a guide throughout the planning process, not just answered near completion of the process. When a PEL study is started, this questionnaire will be given to the project team. Some of the basic questions to consider are: "What did you do?", "What didn't you do?" and "Why?". When the team submits a PEL study to FHWA for review, the completed questionnaire will be included with the submittal. FHWA will use this questionnaire to assist in determining if an effective PEL process has been applied before NEPA processes are authorized to begin. The questionnaire should be included in the planning document as an executive summary, chapter, or appendix.

1. Background:

   a. What is the name of the PEL document and other identifying project information (e.g. sub-account or STIP numbers)?

The PEL efforts are documented in:

- *56th Avenue, Havana Street to Peña Boulevard, Corridor/PEL Study ("Corridor Study"), 2008*

The study was completed under the following funding accounts:

- *City and County of Denver (CCD) Project CE 63047*
- *FHWA/Colorado Department of Transportation (CDOT) Project STU M320-043, 15759*

   b. Provide a brief chronology of the planning activities (PEL study) including the year(s) the studies were conducted.

The 56th Avenue, Havana Street to Peña Boulevard, Corridor/PEL Study and the concurrent 56th Avenue, Quebec Street to Havana Street, Environmental Assessment were initiated in January 2007 and were completed in 2008.

Both studies built on a number of previous locally-produced study efforts, most notably the East 56th Avenue Corridor Concept Plan (2004) prepared by the multi-agency Northeast Metro Win-Win Coalition.

c. Provide a description of the existing transportation corridor, including project limits, modes, number of lanes, shoulder, access control and surrounding environment (urban vs. rural, residential vs. commercial, etc.)

The limits of the study corridor were 56th Avenue, from Havana Street to 1200-feet east of Peña Boulevard. An urban arterial, the existing roadway has four lanes from Havana Street to Peoria Street, and two lanes from Peoria Street to Peña Boulevard. The existing roadway has sections of both curb and gutter and narrow unpaved shoulders. Existing land uses include industrial (south side of 56th Avenue, Havana Street to Peoria Street), residential (south side of 56th Avenue, Peoria Street to Peña Boulevard), and the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR) and the Martinez Army Reserve Center (north side of 56th Avenue, Havana Street to Peña Boulevard). There are few private accesses to 56th Avenue.

d. Who was the sponsor of the PEL study (CDOT, Local Agency, Other)?

The primary agency participants in the Corridor Study were the City and County of Denver (CCD), Colorado Department of Transportation (CDOT), and Federal Highway Administration (FHWA).

e. Who was included on the study team (Name and title of agency representatives, consultants, etc.)?

Agency lead staff:

City and County of Denver:	*Donna Douville*
Colorado Department of Transportation:	*David Singer, Tamara Hunter-Maurer, Sheble McConnellogue, Chuck Attardo, and Gary Huber*
Federal Highway Administration:	*Marcee Allen*

Consultant services were provided by the Denver office of URS Corporation.

f. Are there recent, current or near future planning studies or projects in the vicinity? What is the relationship of this project to those studies/projects?

The project's analysis was consistent with the 2035 DRCOG regional transportation plan. The study team also coordinated with the City and County of Denver's Gateway planning effort, the Stapleton Redevelopment project, and the Prairie Gateway project.

2. Methodology used:

a. Did you use NEPA-like language? Why or why not?

Since a concurrent NEPA process was conducted for the segment of 56th Avenue, Quebec Street to Havana Street, it was determined that NEPA-like language would <u>not</u> be used for the Corridor Study to better differentiate the two study efforts and to clarify in the minds of stakeholders that the Corridor Study was not a NEPA process.

b. What were the actual terms used and how did you define them? (Provide examples or list)

Corresponding terms:

NEPA	**Corridor Study**
"Purpose and Need"	*"Goals and Issues"*
Select "Proposed Action" or "Preferred Alternative"	*Identify "Recommended Alternative"*

Alternatives that were developed and evaluated in the Corridor Study were consistent with the definition described in the Council on Environmental Quality (CEQ) guidance document as including "those that are practical or feasible from the technical and economic standpoint and using common sense."

c. How do you see these terms being used in NEPA documents?

Terminology used in the Corridor Study was specially designed to be updated to NEPA terms at the time a NEPA study effort is undertaken.

d. What were the key steps and coordination points in the PEL decision-making process? Who were the decision-makers and who else participated in those key steps? For example, for the corridor vision, the decision was made by CDOT and the local agency, with buy-in from FHWA, the Corps, and USFWS.

Key milestone efforts in the study process included:

- *Identification of study goals and issues*

- *Identification of logical termini (coordinated with the concurrent 56th Avenue, Quebec Street to Havana Street, Environmental Assessment*
- *Designation of a threshold year for traffic analyses (2035)*
- *Identification of alternatives and screening criteria*
- *Identification of a Recommended Alternative*

The primary decision-makers in the study process were the agency participants in the Corridor Study (CCD, CDOT, and FHWA).

Guidance and support for the decision-making process was gained through a series of meetings with individuals, businesses, neighborhood groups and the community. The primary method for public outreach was two formal public meetings, using an "open house" format, that were conducted at key milestones during the study process.

e. How should the PEL information below be presented in NEPA?

The Corridor Study final report followed the format of an Environmental Assessment to allow a future NEPA study effort to readily extract pertinent data from the report.

3. Agency coordination:

a. Provide a synopsis of coordination with federal, tribal, state and local environmental, regulatory and resource agencies. Describe their level of participation and how you coordinated with them.

In the addition to the primary agency participants in the Corridor Study (CCD, CDOT, and FHWA), the Corridor Study and the concurrent Environmental Assessment involved coordination with the following federal, tribal, state and local environmental, regulatory and resource agencies:

- *U.S. Army*
- *U.S. Army Reserve*
- *U.S. Fish and Wildlife Service*
- *U.S. Environmental Protection Agency*
- *U.S. Army Corps of Engineers*
- *U.S. Postal Service*
- *Public Utilities Commission*
- *Regional Transportation District*
- *Urban Drainage & Flood Control District*
- *Metropolitan Wastewater District*
- *South Adams County Water and Sanitation District*

- *Denver Regional Council of Governments*
- *Adams County*
- *City of Aurora*
- *City of Brighton*
- *City of Commerce City*
- *Denver Fire Department*
- *Denver Water Department*
- *Denver International Airport*
- *Native American Consultation*

In addition to one-on-one meetings with several of these agencies, regular briefings of the study status were provided to those agency representatives that participated in the quarterly meetings of the Northeast Metro Win-Win Coalition.

b. What transportation agencies (e.g. for adjacent jurisdictions) did you coordinate with or were involved in the PEL study?

Transportation agencies included in the list above: CCD, CDOT, FHWA, Regional Transportation District, Denver Regional Council of Governments, Adams County, *City of Brighton, City of Commerce City, and Denver International Airport.*

c. What steps will need to be taken with each agency during NEPA scoping?

The corridor is experiencing changes due to continued growth and development in the surrounding area. Corridor issues and concerns may need to be re-evaluated during the agency scoping process for a subsequent NEPA study.

4. Public coordination:

a. Provide a synopsis of your coordination efforts with the public and stakeholders.

The study team held a series of meetings with individuals, businesses, neighborhood groups and the community. The primary method for public outreach was two formal public meetings, using an "open house" format, that were conducted at key milestones during the study process. Public comments, relevant to both the 56th Avenue Environment Assessment and Corridor Study efforts, are documented in the Appendix to the 56th Avenue, Quebec Street to Havana Street, Environmental Assessment (2008).

5. Corridor Vision/Purpose and Need:

a. What was the scope of the PEL study and the reason for doing it?

Due to its location and a lack of the parallel arterial system, 56th Avenue serves as a major east-west regional thoroughfare. In addition to its regional function, 56th Avenue provides important local access, via intersecting local streets and collector roadways, to various land uses along the arterial.

West and east of the study corridor, the 56th Avenue corridor is experiencing significant land use development. Major ongoing and planned developments affecting traffic demand in the 56th Avenue corridor include Prairie Gateway, Stapleton Redevelopment, Parkfield, and Gateway/Green Valley Ranch. These developments, as well as general growth in this part of the Denver metro area, will increase traffic demand on 56th Avenue, spurring concerns that without improvements, 56th Avenue will be unable to meet future travel demand.

As a result, this corridor was identified for a detailed Corridor Study to evaluate existing and future traffic conditions along the corridor, and to develop a set of feasible transportation improvement measures that will enable the corridor to effectively serve future traffic demand.

b. Provide the corridor vision, objectives, or purpose and need statement.

The vision for the 56th Avenue corridor is to meet forecast mobility and accessibility needs for users of all modes (including pedestrians, bicyclists, cars, buses, and trucks). The goals of the project are:

- *Manage future traffic congestion*
- *Promote multi-modal use of the corridor*

c. What steps will need to be taken during the NEPA process to make this a project-level purpose and need statement?

The Corridor Study identified a number of project "goals and issues" that directly support the development of a NEPA "Purpose and Need" statement.

6. Range of alternatives considered, screening criteria and screening process:

a. What types of alternatives were looked at? (Provide a one or two sentence summary and reference document.)

Alternatives that were evaluated in detail included widening 56th Avenue to four- or six-lanes, with and without on-street bicycle lanes. While the Corridor Study did consider alternatives that did not meet the project goals (and were discarded during the initial screening process), the Corridor Study did not consider obviously infeasible alternatives such as a monorail, subway, etc. A No-Action alternative was included in the evaluation.

Descriptions of all alternatives are contained in the 56th Avenue, Havana Street to Peña Boulevard, Corridor/PEL Study (2008).

b. How did you select the screening criteria and screening process?

The established project goals and issues, potential environmental impacts, and practicality and feasibility were used as the screening criteria for the initial screening.

To capture a broad range of evaluation considerations, the detailed screening process used screening criteria grouped into four categories: policy, design and construction, environmental resources, and traffic engineering.

The initial and detailed screening process and criteria were developed in cooperation with the study's agency and public participants. The screening process and criteria were presented and discussed at a Public Open House.

c. For alternative(s) that were screened out, briefly summarize the reasons for eliminating the alternative(s). (During the initial screenings, this generally will focus on fatal flaws)

The initial screening results suggested that only the widening alternatives could potentially achieve the project goals, address issues and also be practical and feasible. The other alternatives, excluding the No-Action alternative, were filtered out.

In the detailed screening process, the alternative identified as the Recommended Alternative had the following characteristics that resulted in the elimination of other competing alternatives:

- *It is consistent with the DRCOG 2035 Plan.*
- *It will effectively increase corridor travel speed, reduce delay, and relieve forecast traffic congestion. It minimizes the diversion of forecast traffic demand to parallel arterials, reducing forecast traffic volume and congestion on these parallel arterials.*
- *It provides for multi-modal transportation in the corridor with continuous pedestrian and bicycle facilities as well as enhanced public transit services. It is consistent with the City bicycle facility practices by providing an off-street bicycle/pedestrian trail that will parallel 56th Avenue.*
- *It conforms to the City design standards for urban arterials in relation to roadway and sidewalks widths.*

- *The probable construction cost of the Recommended Alternative is estimated to be less than $30 million, which is considered feasible and fundable.*
- *The complete implementation of the Recommended Alternative will require a relatively small amount of additional right-of-way, i.e., five (5) acres or less, along the approximately 4.5-mile long corridor.*
- *It will have very limited effect on the greenbelt on the south side of 56th Avenue, adjacent to Parkfield and Montbello neighborhoods.*
- *The construction requires 20 acres or less of prairie dog relocation along the corridor.*
- *It provides roadway/intersection capacity that meets the future travel demand.*
- *It provides satisfactory intersection operations along 56th Avenue where most signalized intersections are forecast to operate at a LOS D or better during peak traffic periods in year 2035.*

d. Which alternatives should be brought forward into NEPA and why?

Alternatives brought forward into the detailed screening process should be considered in a subsequent NEPA process. These alternatives included:

- *Widening 56th Avenue to four-lanes, Havana Street to Peña Boulevard, with and without on-street bicycle lanes.*
- *Widening 56th Avenue to six-lanes, Havana Street to Peña Boulevard, with and without on-street bicycle lanes.*

e. Did the public, stakeholders, and agencies have an opportunity to comment during this process?

The study team held a series of meetings with individuals, businesses, neighborhood groups and the community. The primary method for public outreach was two formal public meetings, using an "open house" format, that were conducted at key milestones during the study process. As noted above, the screening process, criteria and identification of the Recommended Alternative were presented and discussed at a Public Open House.

The screening process, criteria and identification of the Recommended Alternative were also presented and discussed with those agency representatives that participated in the quarterly meeting of the Northeast Metro Win-Win Coalition.

f. Were there unresolved issues with the public, stakeholders and/or agencies?

Environmental resource mitigation strategies were not evaluated in this Corridor Study. Members of the public expressed particular concern about noise mitigation strategies.

7. Planning assumptions and analytical methods:

a. What is the forecast year used in the PEL study?

2035

b. What method was used for forecasting traffic volumes?

Traffic volumes for each of the alternatives were derived from the 2035 DRCOG regional travel demand model.

c. Are the planning assumptions and the corridor vision/purpose and need statement consistent with the long-range transportation plan?

Yes. The DRCOG 2035 regional transportation plan includes capacity improvements (specifically, widening to six-lanes) on 56th Avenue from Havana Street to Peña Boulevard.

d. What were the future year policy and/or data assumptions used in the transportation planning process related to land use, economic development, transportation costs and network expansion?

All network and socioeconomic factors and assumptions contained in the 2035 DRCOG regional travel demand model were retained for this study's analysis.

8. Resources (wetlands, cultural, etc.) reviewed. For each resource or group of resources reviewed, provide the following:

a. In the PEL study, at what level of detail was the resource reviewed and what was the method of review?

Literature searches and field investigations, as appropriate to the resource, was conducted.

Consultation with and concurrence from resource agencies was not conducted as a part of the study.

b. Is this resource present in the area and what is the existing environmental condition for this resource?

Resources in the corridor are documented in Chapter 5 of the 56th Avenue, Havana Street to Peña Boulevard, Corridor/PEL Study (2008). Resources in and adjacent to the corridor include: sensitive noise receptors, Section 4(f) resources, wildlife, T & E species, air quality, visual resources, water resources, wetlands, environmental justice populations, land use and socio-economic considerations, hazardous materials, potentially historic resources, public services and utilities, vegetation, and noxious weeds.

c. What are the issues that need to be considered during NEPA, including potential resource impacts and potential mitigation requirements (if known)?

No unusual issues associated with resources that are known to be in or adjacent to the corridor. The Rocky Mountain Arsenal National Wildlife Refuge is immediately adjacent to the 56th Avenue corridor; no right-of-way will be required from the Refuge to construct the Recommended Alternative.

d. How will the data provided need to be supplemented during NEPA?

Depending on the timing of the NEPA effort, certain resources in the corridor will require an historic assessment.

9. List resources that were not reviewed in the PEL study and why? Indicate whether or not they will need to be reviewed in NEPA and explain why.

There were no environmental resources commonly encountered in an urban arterial corridor that were purposely omitted from consideration in the Corridor Study. Consultation with and concurrence from resource agencies was not conducted as a part of the study and will need to be performed in a subsequent NEPA study.

10. Were cumulative impacts considered in the PEL study? If yes, provide the information or reference where it can be found.

Cumulative impacts were not evaluated in the Corridor Study. Cumulative impacts were assessed in the 56th Avenue, Quebec Street to Havana Street, Environmental Assessment (2008).

11. Describe any mitigation strategies discussed at the planning level that should be analyzed during NEPA.

Mitigation strategies were not evaluated for this Corridor Study. Mitigation may be needed for the following resources: roadway noise, prairie dogs, environmental justice, Section 4(f) resources, hazardous materials, historic resources, public services and utilities, and air quality.

12. What needs to be done during NEPA to make information from the PEL study available to the agencies and the public? Are there PEL study products which can be used or provided to agencies or the public during the NEPA scoping process?

Relevant planning products that are readily available to a subsequent NEPA process include:

- *56th Avenue, Havana Street to Peña Boulevard, Corridor/PEL Study (2008)*
- *56th Avenue, Quebec Street to Havana Street, Environmental Assessment (2008).*

13. Are there any other issues a future project team should be aware of?

    a. Examples: Utility problems, access or ROW issues, encroachments into ROW, problematic land owners and/or groups, contact information for stakeholders, special or unique resources in the area, etc.

The Rocky Mountain Arsenal National Wildlife Refuge on the north side of 56th Avenue is a potential Section 4(f) resource. Right-of-way for transportation purposes was dedicated to the City and County of Denver.

By agreement between the City and County of Denver and Xcel Energy, the electric transmission towers on north side of 56th Avenue will be relocated onto the RMANWR prior to commencing the construction of roadway improvements on 56th Avenue.

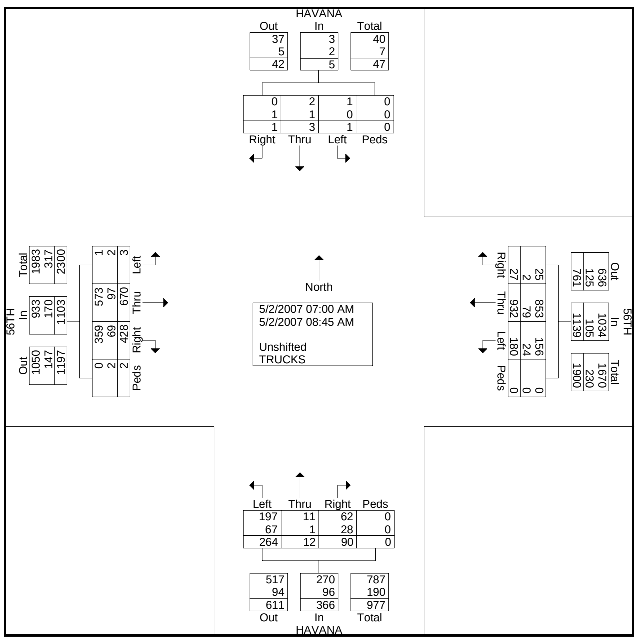
APPENDIX B
TRAFFIC COUNTS

All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : HAVANA&56THAM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

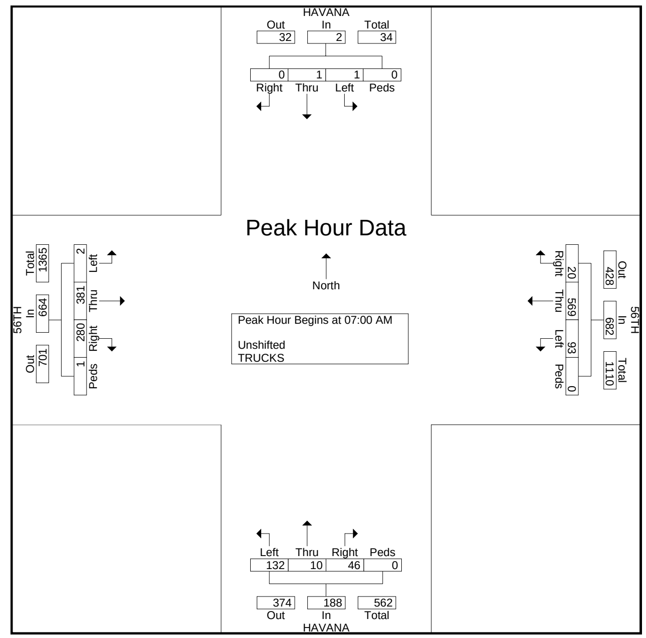
	HAVANA Southbound				56TH Westbound				HAVANA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	20	145	5	0	30	2	9	0	0	93	84	0	388
07:15 AM	0	0	0	0	18	106	9	0	26	7	16	0	0	97	68	0	347
07:30 AM	1	1	0	0	22	152	4	0	35	0	6	0	0	80	68	1	370
07:45 AM	0	0	0	0	33	166	2	0	41	1	15	0	2	111	60	0	431
Total	1	1	0	0	93	569	20	0	132	10	46	0	2	381	280	1	1536
08:00 AM	0	0	0	0	25	125	1	0	36	1	12	0	0	77	47	0	324
08:15 AM	0	0	1	0	18	93	3	0	30	1	10	0	0	82	43	1	282
08:30 AM	0	1	0	0	24	88	3	0	41	0	9	0	1	69	35	0	271
08:45 AM	0	1	0	0	20	57	0	0	25	0	13	0	0	61	23	0	200
Total	0	2	1	0	87	363	7	0	132	2	44	0	1	289	148	1	1077
Grand Total	1	3	1	0	180	932	27	0	264	12	90	0	3	670	428	2	2613
Apprch %	20	60	20	0	15.8	81.8	2.4	0	72.1	3.3	24.6	0	0.3	60.7	38.8	0.2	
Total %	0	0.1	0	0	6.9	35.7	1	0	10.1	0.5	3.4	0	0.1	25.6	16.4	0.1	
Unshifted	1	2	0	0	156	853	25	0	197	11	62	0	1	573	359	0	2240
% Unshifted	100	66.7	0	0	86.7	91.5	92.6	0	74.6	91.7	68.9	0	33.3	85.5	83.9	0	85.7
TRUCKS	0	1	1	0	24	79	2	0	67	1	28	0	2	97	69	2	373
% TRUCKS	0	33.3	100	0	13.3	8.5	7.4	0	25.4	8.3	31.1	0	66.7	14.5	16.1	100	14.3



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : HAVANA&56THAM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	HAVANA Southbound					56TH Westbound					HAVANA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	20	145	5	0	170	30	2	9	0	41	0	93	84	0	177	388
07:15 AM	0	0	0	0	0	18	106	9	0	133	26	7	16	0	49	0	97	68	0	165	347
07:30 AM	1	1	0	0	2	22	152	4	0	178	35	0	6	0	41	0	80	68	1	149	370
07:45 AM	0	0	0	0	0	33	166	2	0	201	41	1	15	0	57	2	111	60	0	173	431
Total Volume	1	1	0	0	2	93	569	20	0	682	132	10	46	0	188	2	381	280	1	664	1536
% App. Total	50	50	0	0		13.6	83.4	2.9	0		70.2	5.3	24.5	0		0.3	57.4	42.2	0.2		
PHF	.250	.250	.000	.000	.250	.705	.857	.556	.000	.848	.805	.357	.719	.000	.825	.250	.858	.833	.250	.938	.891



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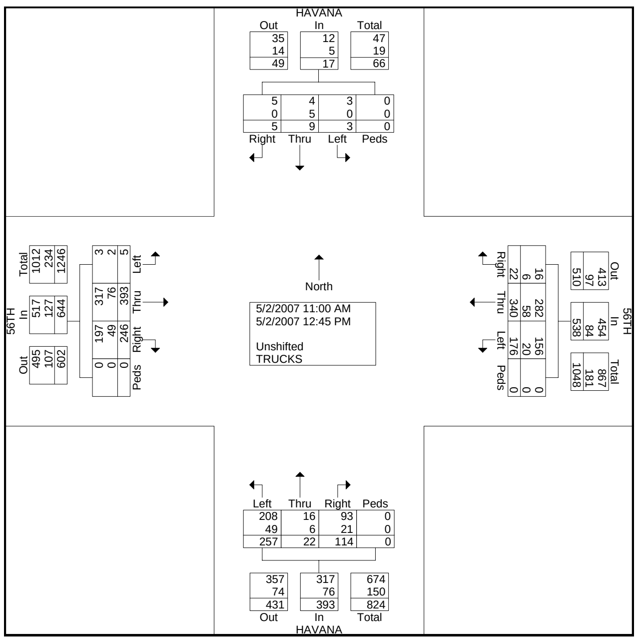
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : HAVANA&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

	HAVANA Southbound				56TH Westbound				HAVANA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	20	33	0	0	28	0	12	0	0	54	45	0	192
11:15 AM	1	1	1	0	18	45	3	0	30	1	14	0	0	55	38	0	207
11:30 AM	0	2	0	0	22	55	3	0	29	2	15	0	1	46	39	0	214
11:45 AM	0	2	0	0	32	61	6	0	34	2	12	0	1	65	36	0	251
Total	1	5	1	0	92	194	12	0	121	5	53	0	2	220	158	0	864
12:00 PM	0	1	0	0	24	44	3	0	33	7	12	0	1	44	27	0	196
12:15 PM	1	2	1	0	18	41	4	0	39	4	16	0	1	50	26	0	203
12:30 PM	1	1	1	0	23	37	2	0	41	4	16	0	1	42	21	0	190
12:45 PM	0	0	2	0	19	24	1	0	23	2	17	0	0	37	14	0	139
Total	2	4	4	0	84	146	10	0	136	17	61	0	3	173	88	0	728
Grand Total	3	9	5	0	176	340	22	0	257	22	114	0	5	393	246	0	1592
Apprch %	17.6	52.9	29.4	0	32.7	63.2	4.1	0	65.4	5.6	29	0	0.8	61	38.2	0	
Total %	0.2	0.6	0.3	0	11.1	21.4	1.4	0	16.1	1.4	7.2	0	0.3	24.7	15.5	0	
Unshifted	3	4	5	0	156	282	16	0	208	16	93	0	3	317	197	0	1300
% Unshifted	100	44.4	100	0	88.6	82.9	72.7	0	80.9	72.7	81.6	0	60	80.7	80.1	0	81.7
TRUCKS	0	5	0	0	20	58	6	0	49	6	21	0	2	76	49	0	292
% TRUCKS	0	55.6	0	0	11.4	17.1	27.3	0	19.1	27.3	18.4	0	40	19.3	19.9	0	18.3



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	HAVANA Southbound					56TH Westbound					HAVANA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
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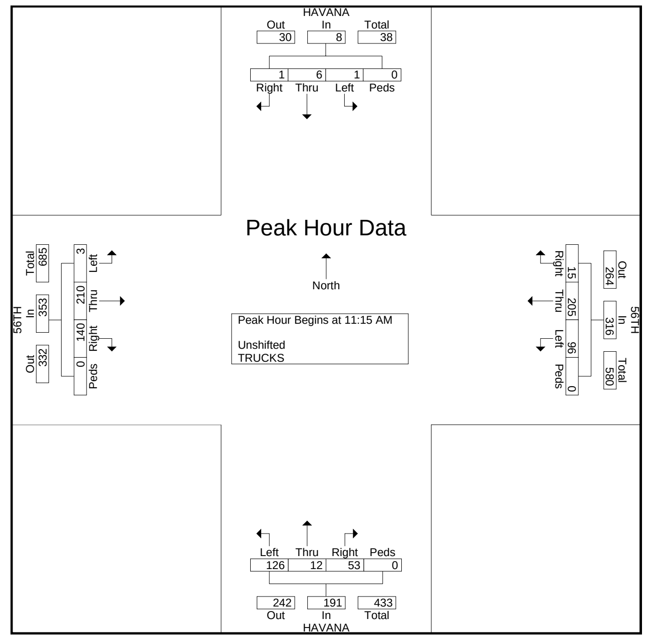
11:15 AM	1	1	1	0	3	18	45	3	0	66	30	1	14	0	45	0	55	38	0	93	207
11:30 AM	0	2	0	0	2	22	55	3	0	80	29	2	15	0	46	1	46	39	0	86	214
11:45 AM	0	2	0	0	2	32	61	6	0	99	34	2	12	0	48	1	65	36	0	102	251
12:00 PM	0	1	0	0	1	24	44	3	0	71	33	7	12	0	52	1	44	27	0	72	196
Total Volume	1	6	1	0	8	96	205	15	0	316	126	12	53	0	191	3	210	140	0	353	868
% App. Total	12.5	75	12.5	0		30.4	64.9	4.7	0		66	6.3	27.7	0		0.8	59.5	39.7	0		
PHF	.250	.750	.250	.000	.667	.750	.840	.625	.000	.798	.926	.429	.883	.000	.918	.750	.808	.897	.000	.865	.865

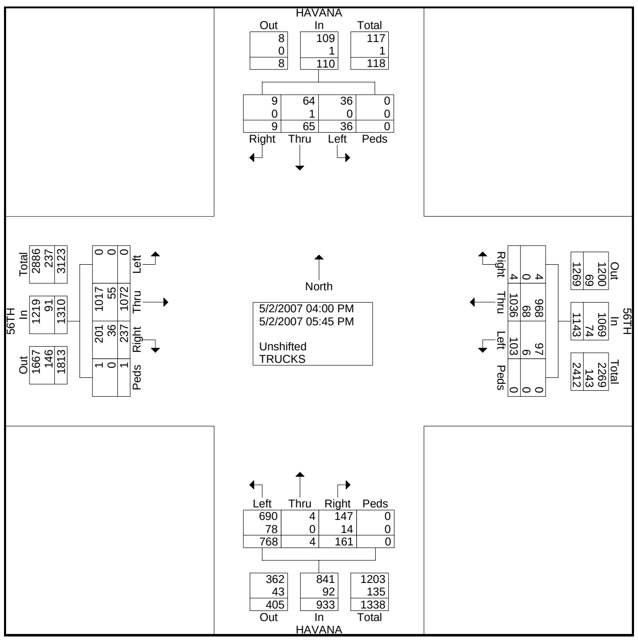


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : HAVANA&56THPM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

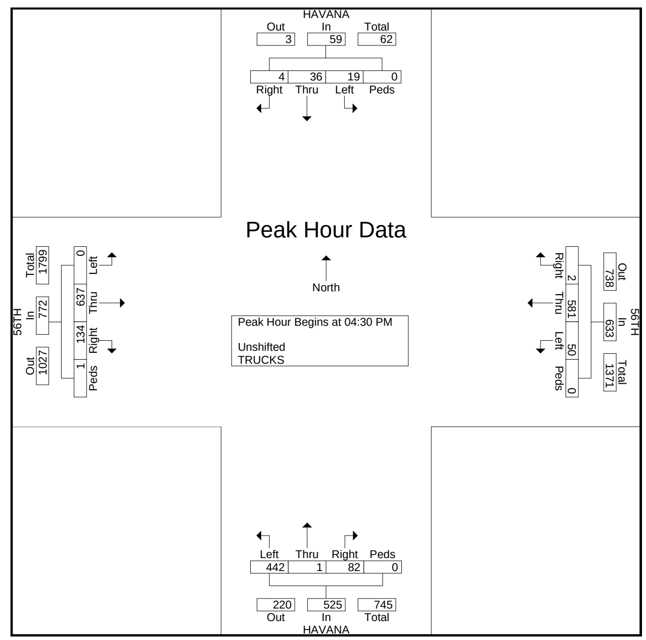
	HAVANA Southbound				56TH Westbound				HAVANA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	11	13	1	0	17	134	0	0	94	2	31	0	0	108	30	0	441
04:15 PM	5	14	2	0	13	109	2	0	80	1	15	0	0	115	25	0	381
04:30 PM	6	14	1	0	11	106	0	0	101	1	23	0	0	144	29	0	436
04:45 PM	3	13	2	0	10	150	0	0	88	0	20	0	0	175	36	1	498
Total	25	54	6	0	51	499	2	0	363	4	89	0	0	542	120	1	1756
05:00 PM	5	6	0	0	16	177	0	0	126	0	25	0	0	168	39	0	562
05:15 PM	5	3	1	0	13	148	2	0	127	0	14	0	0	150	30	0	493
05:30 PM	1	1	1	0	11	122	0	0	102	0	15	0	0	115	25	0	393
05:45 PM	0	1	1	0	12	90	0	0	50	0	18	0	0	97	23	0	292
Total	11	11	3	0	52	537	2	0	405	0	72	0	0	530	117	0	1740
Grand Total	36	65	9	0	103	1036	4	0	768	4	161	0	0	1072	237	1	3496
Apprch %	32.7	59.1	8.2	0	9	90.6	0.3	0	82.3	0.4	17.3	0	0	81.8	18.1	0.1	
Total %	1	1.9	0.3	0	2.9	29.6	0.1	0	22	0.1	4.6	0	0	30.7	6.8	0	
Unshifted	36	64	9	0	97	968	4	0	690	4	147	0	0	1017	201	1	3238
% Unshifted	100	98.5	100	0	94.2	93.4	100	0	89.8	100	91.3	0	0	94.9	84.8	100	92.6
TRUCKS	0	1	0	0	6	68	0	0	78	0	14	0	0	55	36	0	258
% TRUCKS	0	1.5	0	0	5.8	6.6	0	0	10.2	0	8.7	0	0	5.1	15.2	0	7.4



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : HAVANA&56THPM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

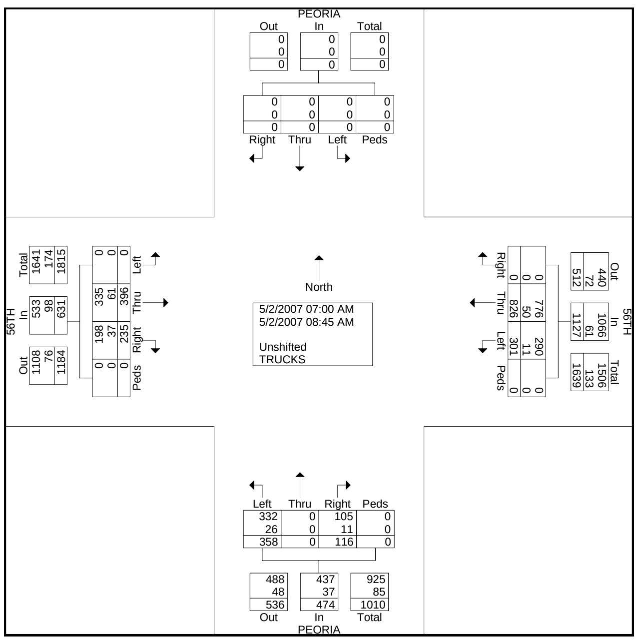
	HAVANA Southbound					56TH Westbound					HAVANA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	6	14	1	0	21	11	106	0	0	117	101	1	23	0	125	0	144	29	0	173	436
04:45 PM	3	13	2	0	18	10	150	0	0	160	88	0	20	0	108	0	175	36	1	212	498
05:00 PM	5	6	0	0	11	16	177	0	0	193	126	0	25	0	151	0	168	39	0	207	562
05:15 PM	5	3	1	0	9	13	148	2	0	163	127	0	14	0	141	0	150	30	0	180	493
Total Volume	19	36	4	0	59	50	581	2	0	633	442	1	82	0	525	0	637	134	1	772	1989
% App. Total	32.2	61	6.8	0		7.9	91.8	0.3	0		84.2	0.2	15.6	0		0	82.5	17.4	0.1		
PHF	.792	.643	.500	.000	.702	.781	.821	.250	.000	.820	.870	.250	.820	.000	.869	.000	.910	.859	.250	.910	.885



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

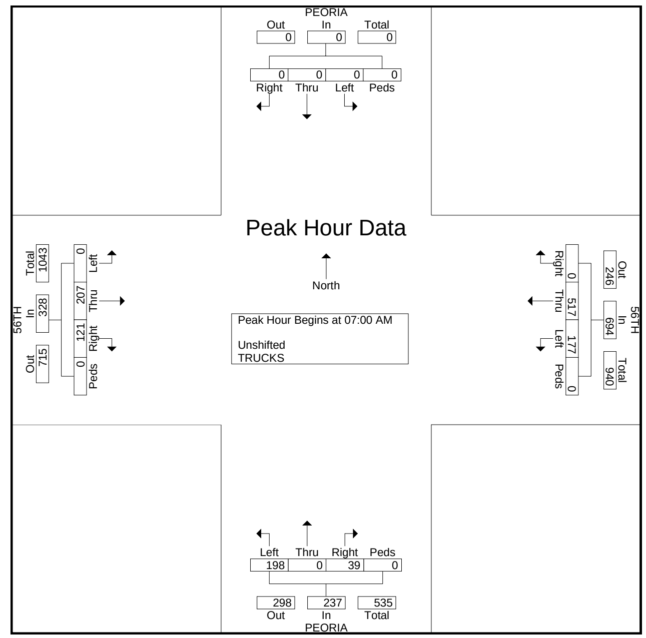
Groups Printed- Unshifted - TRUCKS

	PEORIA Southbound				56TH Westbound				PEORIA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	44	139	0	0	41	0	10	0	0	59	34	0	327
07:15 AM	0	0	0	0	32	108	0	0	35	0	8	0	0	48	33	0	264
07:30 AM	0	0	0	0	47	124	0	0	52	0	9	0	0	48	29	0	309
07:45 AM	0	0	0	0	54	146	0	0	70	0	12	0	0	52	25	0	359
Total	0	0	0	0	177	517	0	0	198	0	39	0	0	207	121	0	1259
08:00 AM	0	0	0	0	35	96	0	0	66	0	14	0	0	61	27	0	299
08:15 AM	0	0	0	0	42	88	0	0	31	0	23	0	0	41	40	0	265
08:30 AM	0	0	0	0	21	66	0	0	51	0	13	0	0	48	22	0	221
08:45 AM	0	0	0	0	26	59	0	0	12	0	27	0	0	39	25	0	188
Total	0	0	0	0	124	309	0	0	160	0	77	0	0	189	114	0	973
Grand Total	0	0	0	0	301	826	0	0	358	0	116	0	0	396	235	0	2232
Apprch %	0	0	0	0	26.7	73.3	0	0	75.5	0	24.5	0	0	62.8	37.2	0	
Total %	0	0	0	0	13.5	37	0	0	16	0	5.2	0	0	17.7	10.5	0	
Unshifted	0	0	0	0	290	776	0	0	332	0	105	0	0	335	198	0	2036
% Unshifted	0	0	0	0	96.3	93.9	0	0	92.7	0	90.5	0	0	84.6	84.3	0	91.2
TRUCKS	0	0	0	0	11	50	0	0	26	0	11	0	0	61	37	0	196
% TRUCKS	0	0	0	0	3.7	6.1	0	0	7.3	0	9.5	0	0	15.4	15.7	0	8.8



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

	PEORIA Southbound					56TH Westbound					PEORIA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	44	139	0	0	183	41	0	10	0	51	0	59	34	0	93	327
07:15 AM	0	0	0	0	0	32	108	0	0	140	35	0	8	0	43	0	48	33	0	81	264
07:30 AM	0	0	0	0	0	47	124	0	0	171	52	0	9	0	61	0	48	29	0	77	309
07:45 AM	0	0	0	0	0	54	146	0	0	200	70	0	12	0	82	0	52	25	0	77	359
Total Volume	0	0	0	0	0	177	517	0	0	694	198	0	39	0	237	0	207	121	0	328	1259
% App. Total	0	0	0	0		25.5	74.5	0	0		83.5	0	16.5	0		0	63.1	36.9	0		
PHF	.000	.000	.000	.000	.000	.819	.885	.000	.000	.868	.707	.000	.813	.000	.723	.000	.877	.890	.000	.882	.877

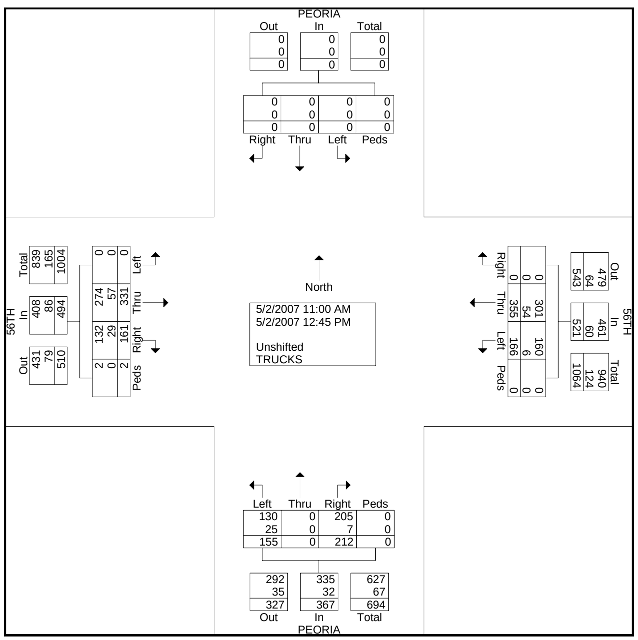


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : PEORIA&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

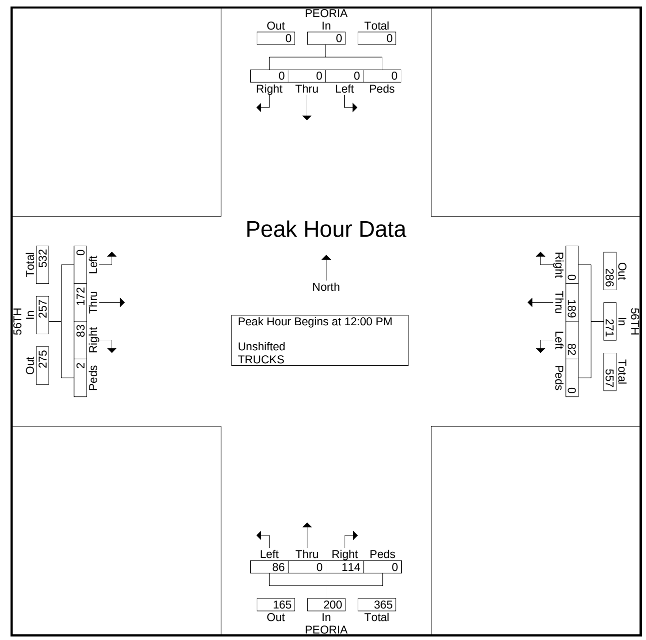
	PEORIA Southbound				56TH Westbound				PEORIA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	20	37	0	0	19	0	22	0	0	27	11	0	136
11:15 AM	0	0	0	0	18	41	0	0	13	0	22	0	0	49	25	0	168
11:30 AM	0	0	0	0	24	35	0	0	16	0	31	0	0	46	25	0	177
11:45 AM	0	0	0	0	22	53	0	0	21	0	23	0	0	37	17	0	173
Total	0	0	0	0	84	166	0	0	69	0	98	0	0	159	78	0	654
12:00 PM	0	0	0	0	17	46	0	0	23	0	26	0	0	48	26	1	187
12:15 PM	0	0	0	0	29	49	0	0	18	0	29	0	0	34	17	1	177
12:30 PM	0	0	0	0	17	42	0	0	22	0	28	0	0	51	21	0	181
12:45 PM	0	0	0	0	19	52	0	0	23	0	31	0	0	39	19	0	183
Total	0	0	0	0	82	189	0	0	86	0	114	0	0	172	83	2	728
Grand Total	0	0	0	0	166	355	0	0	155	0	212	0	0	331	161	2	1382
Apprch %	0	0	0	0	31.9	68.1	0	0	42.2	0	57.8	0	0	67	32.6	0.4	
Total %	0	0	0	0	12	25.7	0	0	11.2	0	15.3	0	0	24	11.6	0.1	
Unshifted	0	0	0	0	160	301	0	0	130	0	205	0	0	274	132	2	1204
% Unshifted	0	0	0	0	96.4	84.8	0	0	83.9	0	96.7	0	0	82.8	82	100	87.1
TRUCKS	0	0	0	0	6	54	0	0	25	0	7	0	0	57	29	0	178
% TRUCKS	0	0	0	0	3.6	15.2	0	0	16.1	0	3.3	0	0	17.2	18	0	12.9



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : PEORIA&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	PEORIA Southbound					56TH Westbound					PEORIA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	0	0	17	46	0	0	63	23	0	26	0	49	0	48	26	1	75	187
12:15 PM	0	0	0	0	0	29	49	0	0	78	18	0	29	0	47	0	34	17	1	52	177
12:30 PM	0	0	0	0	0	17	42	0	0	59	22	0	28	0	50	0	51	21	0	72	181
12:45 PM	0	0	0	0	0	19	52	0	0	71	23	0	31	0	54	0	39	19	0	58	183
Total Volume	0	0	0	0	0	82	189	0	0	271	86	0	114	0	200	0	172	83	2	257	728
% App. Total	0	0	0	0		30.3	69.7	0	0		43	0	57	0		0	66.9	32.3	0.8		
PHF	.000	.000	.000	.000	.000	.707	.909	.000	.000	.869	.935	.000	.919	.000	.926	.000	.843	.798	.500	.857	.973

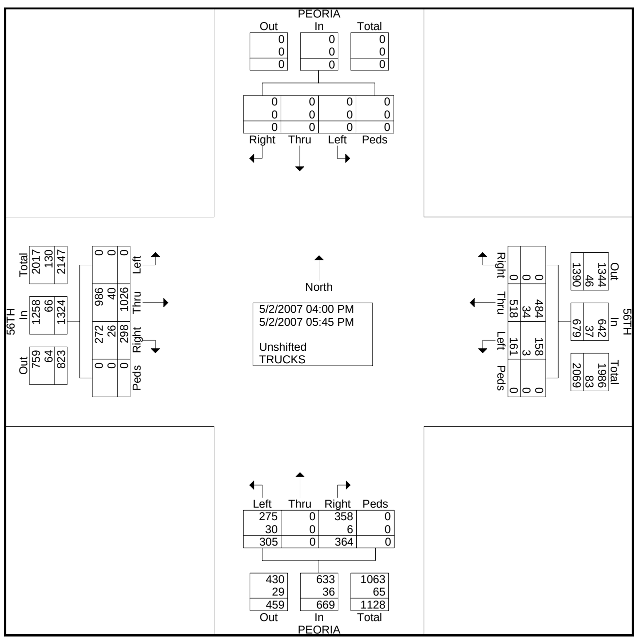


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : PEORIA&56THPM
Site Code : 00000000
Start Date : 5/2/2007

Groups Printed- Unshifted - TRUCKS

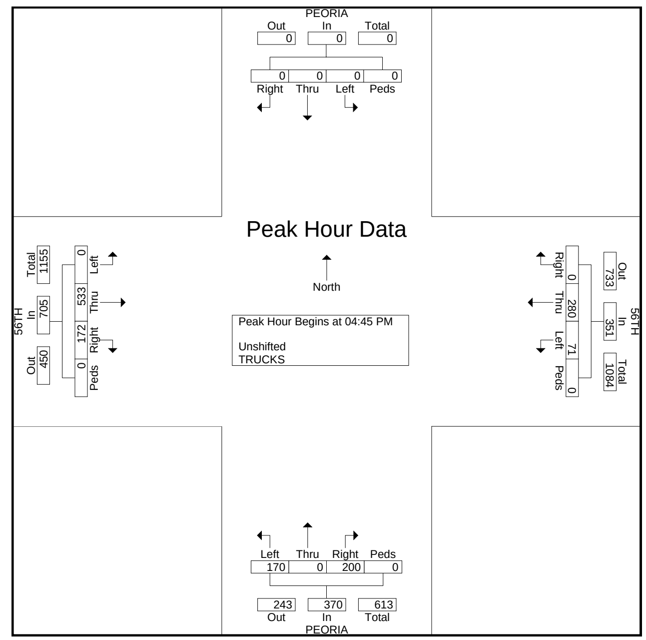
	PEORIA Southbound				56TH Westbound				PEORIA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	0	0	0	21	74	0	0	33	0	47	0	0	145	27	0	347
04:15 PM	0	0	0	0	26	57	0	0	36	0	40	0	0	122	39	0	320
04:30 PM	0	0	0	0	21	47	0	0	37	0	50	0	0	136	26	0	317
04:45 PM	0	0	0	0	20	78	0	0	32	0	41	0	0	146	49	0	366
Total	0	0	0	0	88	256	0	0	138	0	178	0	0	549	141	0	1350
05:00 PM	0	0	0	0	12	65	0	0	58	0	61	0	0	145	54	0	395
05:15 PM	0	0	0	0	15	67	0	0	45	0	42	0	0	138	37	0	344
05:30 PM	0	0	0	0	24	70	0	0	35	0	56	0	0	104	32	0	321
05:45 PM	0	0	0	0	22	60	0	0	29	0	27	0	0	90	34	0	262
Total	0	0	0	0	73	262	0	0	167	0	186	0	0	477	157	0	1322
Grand Total	0	0	0	0	161	518	0	0	305	0	364	0	0	1026	298	0	2672
Apprch %	0	0	0	0	23.7	76.3	0	0	45.6	0	54.4	0	0	77.5	22.5	0	
Total %	0	0	0	0	6	19.4	0	0	11.4	0	13.6	0	0	38.4	11.2	0	
Unshifted	0	0	0	0	158	484	0	0	275	0	358	0	0	986	272	0	2533
% Unshifted	0	0	0	0	98.1	93.4	0	0	90.2	0	98.4	0	0	96.1	91.3	0	94.8
TRUCKS	0	0	0	0	3	34	0	0	30	0	6	0	0	40	26	0	139
% TRUCKS	0	0	0	0	1.9	6.6	0	0	9.8	0	1.6	0	0	3.9	8.7	0	5.2



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : PEORIA&56THPM
Site Code : 00000000
Start Date : 5/2/2007

	PEORIA Southbound					56TH Westbound					PEORIA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	20	78	0	0	98	32	0	41	0	73	0	146	49	0	195	366
05:00 PM	0	0	0	0	0	12	65	0	0	77	58	0	61	0	119	0	145	54	0	199	395
05:15 PM	0	0	0	0	0	15	67	0	0	82	45	0	42	0	87	0	138	37	0	175	344
05:30 PM	0	0	0	0	0	24	70	0	0	94	35	0	56	0	91	0	104	32	0	136	321
Total Volume	0	0	0	0	0	71	280	0	0	351	170	0	200	0	370	0	533	172	0	705	1426
% App. Total	0	0	0	0		20.2	79.8	0	0		45.9	0	54.1	0		0	75.6	24.4	0		
PHF	.000	.000	.000	.000	.000	.740	.897	.000	.000	.895	.733	.000	.820	.000	.777	.000	.913	.796	.000	.886	.903

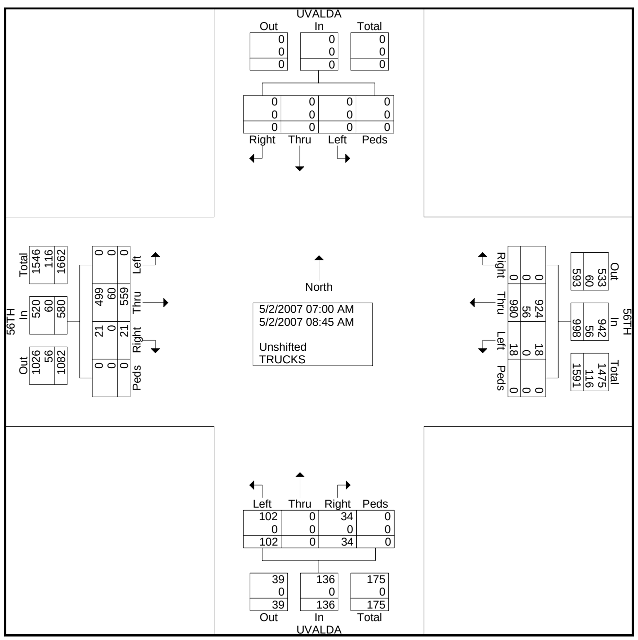


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : UVALDA&56THAM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

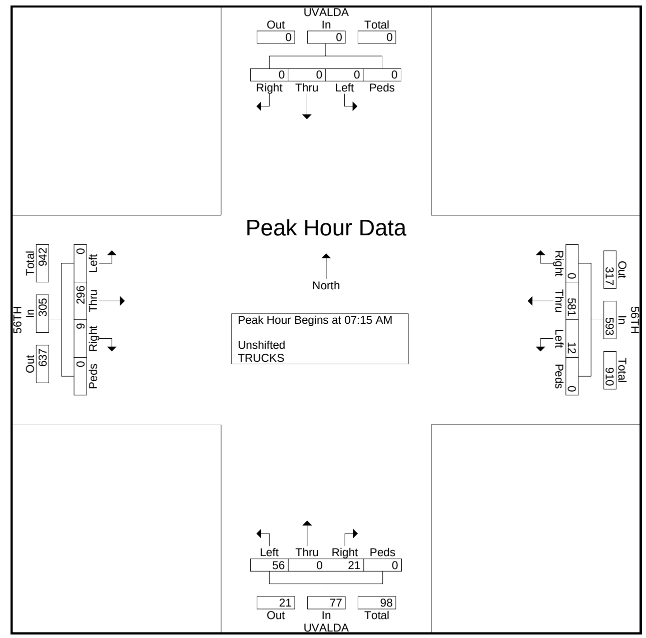
	UVALDA Southbound				56TH Westbound				UVALDA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	0	130	0	0	12	0	6	0	0	53	2	0	203
07:15 AM	0	0	0	0	3	128	0	0	11	0	5	0	0	71	1	0	219
07:30 AM	0	0	0	0	5	159	0	0	15	0	6	0	0	83	4	0	272
07:45 AM	0	0	0	0	2	166	0	0	18	0	5	0	0	67	2	0	260
Total	0	0	0	0	10	583	0	0	56	0	22	0	0	274	9	0	954
08:00 AM	0	0	0	0	2	128	0	0	12	0	5	0	0	75	2	0	224
08:15 AM	0	0	0	0	2	122	0	0	11	0	2	0	0	71	3	0	211
08:30 AM	0	0	0	0	1	87	0	0	15	0	3	0	0	75	2	0	183
08:45 AM	0	0	0	0	3	60	0	0	8	0	2	0	0	64	5	0	142
Total	0	0	0	0	8	397	0	0	46	0	12	0	0	285	12	0	760
Grand Total	0	0	0	0	18	980	0	0	102	0	34	0	0	559	21	0	1714
Apprch %	0	0	0	0	1.8	98.2	0	0	75	0	25	0	0	96.4	3.6	0	
Total %	0	0	0	0	1.1	57.2	0	0	6	0	2	0	0	32.6	1.2	0	
Unshifted	0	0	0	0	18	924	0	0	102	0	34	0	0	499	21	0	1598
% Unshifted	0	0	0	0	100	94.3	0	0	100	0	100	0	0	89.3	100	0	93.2
TRUCKS	0	0	0	0	0	56	0	0	0	0	0	0	0	60	0	0	116
% TRUCKS	0	0	0	0	0	5.7	0	0	0	0	0	0	0	10.7	0	0	6.8



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : UVALDA&56THAM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	UVALDA Southbound					56TH Westbound					UVALDA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	3	128	0	0	131	11	0	5	0	16	0	71	1	0	72	219
07:30 AM	0	0	0	0	0	5	159	0	0	164	15	0	6	0	21	0	83	4	0	87	272
07:45 AM	0	0	0	0	0	2	166	0	0	168	18	0	5	0	23	0	67	2	0	69	260
08:00 AM	0	0	0	0	0	2	128	0	0	130	12	0	5	0	17	0	75	2	0	77	224
Total Volume	0	0	0	0	0	12	581	0	0	593	56	0	21	0	77	0	296	9	0	305	975
% App. Total	0	0	0	0		2	98	0	0		72.7	0	27.3	0		0	97	3	0		
PHF	.000	.000	.000	.000	.000	.600	.875	.000	.000	.882	.778	.000	.875	.000	.837	.000	.892	.563	.000	.876	.896

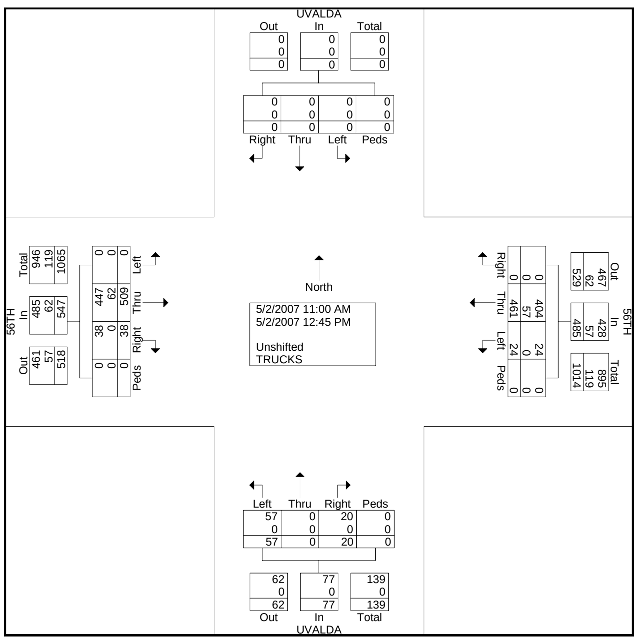


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : UVALDA&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

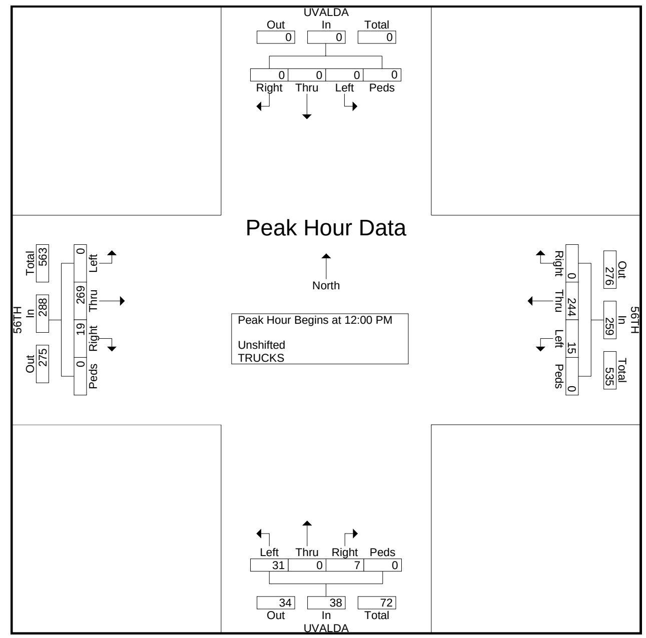
	UVALDA Southbound				56TH Westbound				UVALDA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	1	53	0	0	5	0	5	0	0	50	4	0	118
11:15 AM	0	0	0	0	2	56	0	0	5	0	2	0	0	63	7	0	135
11:30 AM	0	0	0	0	3	50	0	0	5	0	0	0	0	70	5	0	133
11:45 AM	0	0	0	0	3	58	0	0	11	0	6	0	0	57	3	0	138
Total	0	0	0	0	9	217	0	0	26	0	13	0	0	240	19	0	524
12:00 PM	0	0	0	0	4	58	0	0	7	0	1	0	0	78	5	0	153
12:15 PM	0	0	0	0	1	63	0	0	11	0	1	0	0	60	3	0	139
12:30 PM	0	0	0	0	5	56	0	0	4	0	1	0	0	70	7	0	143
12:45 PM	0	0	0	0	5	67	0	0	9	0	4	0	0	61	4	0	150
Total	0	0	0	0	15	244	0	0	31	0	7	0	0	269	19	0	585
Grand Total	0	0	0	0	24	461	0	0	57	0	20	0	0	509	38	0	1109
Apprch %	0	0	0	0	4.9	95.1	0	0	74	0	26	0	0	93.1	6.9	0	
Total %	0	0	0	0	2.2	41.6	0	0	5.1	0	1.8	0	0	45.9	3.4	0	
Unshifted	0	0	0	0	24	404	0	0	57	0	20	0	0	447	38	0	990
% Unshifted	0	0	0	0	100	87.6	0	0	100	0	100	0	0	87.8	100	0	89.3
TRUCKS	0	0	0	0	0	57	0	0	0	0	0	0	0	62	0	0	119
% TRUCKS	0	0	0	0	0	12.4	0	0	0	0	0	0	0	12.2	0	0	10.7



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : UVALDA&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

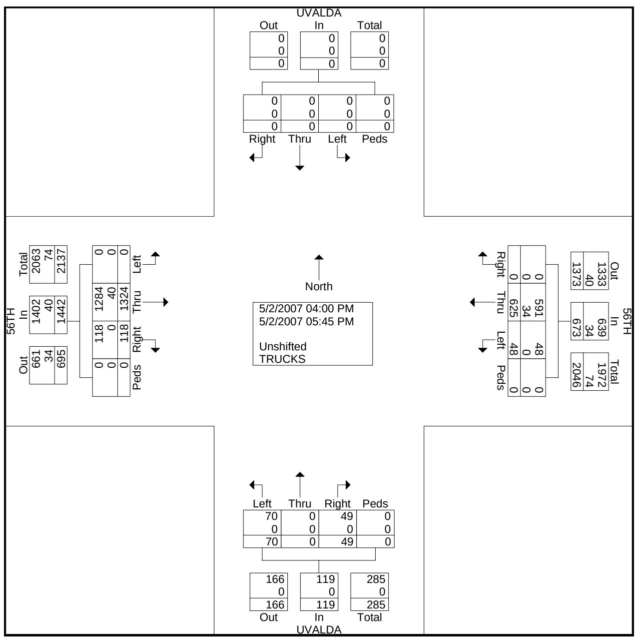
	UVALDA Southbound					56TH Westbound					UVALDA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	0	0	4	58	0	0	62	7	0	1	0	8	0	78	5	0	83	153
12:15 PM	0	0	0	0	0	1	63	0	0	64	11	0	1	0	12	0	60	3	0	63	139
12:30 PM	0	0	0	0	0	5	56	0	0	61	4	0	1	0	5	0	70	7	0	77	143
12:45 PM	0	0	0	0	0	5	67	0	0	72	9	0	4	0	13	0	61	4	0	65	150
Total Volume	0	0	0	0	0	15	244	0	0	259	31	0	7	0	38	0	269	19	0	288	585
% App. Total	0	0	0	0		5.8	94.2	0	0		81.6	0	18.4	0		0	93.4	6.6	0		
PHF	.000	.000	.000	.000	.000	.750	.910	.000	.000	.899	.705	.000	.438	.000	.731	.000	.862	.679	.000	.867	.956



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

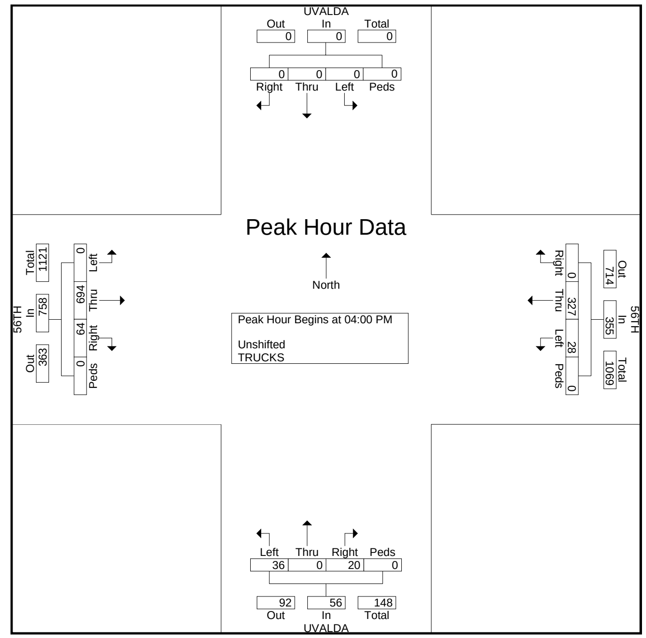
Groups Printed- Unshifted - TRUCKS

	UVALDA Southbound				56TH Westbound				UVALDA Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	0	0	0	10	97	0	0	9	0	5	0	0	184	11	0	316
04:15 PM	0	0	0	0	3	79	0	0	4	0	9	0	0	156	18	0	269
04:30 PM	0	0	0	0	9	65	0	0	7	0	3	0	0	169	18	0	271
04:45 PM	0	0	0	0	6	86	0	0	16	0	3	0	0	185	17	0	313
Total	0	0	0	0	28	327	0	0	36	0	20	0	0	694	64	0	1169
05:00 PM	0	0	0	0	2	71	0	0	6	0	10	0	0	191	14	0	294
05:15 PM	0	0	0	0	9	60	0	0	11	0	4	0	0	170	18	0	272
05:30 PM	0	0	0	0	7	86	0	0	6	0	8	0	0	149	15	0	271
05:45 PM	0	0	0	0	2	81	0	0	11	0	7	0	0	120	7	0	228
Total	0	0	0	0	20	298	0	0	34	0	29	0	0	630	54	0	1065
Grand Total	0	0	0	0	48	625	0	0	70	0	49	0	0	1324	118	0	2234
Apprch %	0	0	0	0	7.1	92.9	0	0	58.8	0	41.2	0	0	91.8	8.2	0	
Total %	0	0	0	0	2.1	28	0	0	3.1	0	2.2	0	0	59.3	5.3	0	
Unshifted	0	0	0	0	48	591	0	0	70	0	49	0	0	1284	118	0	2160
% Unshifted	0	0	0	0	100	94.6	0	0	100	0	100	0	0	97	100	0	96.7
TRUCKS	0	0	0	0	0	34	0	0	0	0	0	0	0	40	0	0	74
% TRUCKS	0	0	0	0	0	5.4	0	0	0	0	0	0	0	3	0	0	3.3



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

	UVALDA Southbound					56TH Westbound					UVALDA Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	10	97	0	0	107	9	0	5	0	14	0	184	11	0	195	316
04:15 PM	0	0	0	0	0	3	79	0	0	82	4	0	9	0	13	0	156	18	0	174	269
04:30 PM	0	0	0	0	0	9	65	0	0	74	7	0	3	0	10	0	169	18	0	187	271
04:45 PM	0	0	0	0	0	6	86	0	0	92	16	0	3	0	19	0	185	17	0	202	313
Total Volume	0	0	0	0	0	28	327	0	0	355	36	0	20	0	56	0	694	64	0	758	1169
% App. Total	0	0	0	0		7.9	92.1	0	0		64.3	0	35.7	0		0	91.6	8.4	0		
PHF	.000	.000	.000	.000	.000	.700	.843	.000	.000	.829	.563	.000	.556	.000	.737	.000	.938	.889	.000	.938	.925

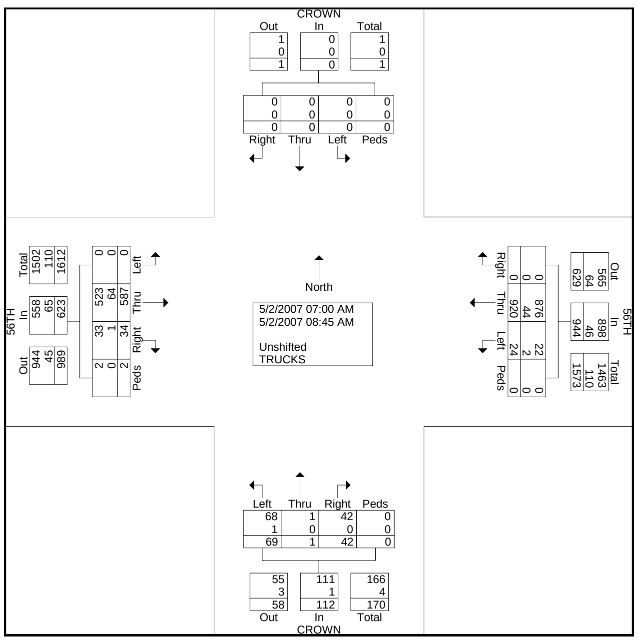


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CROWN&56THAM
Site Code : 00000000
Start Date : 5/2/2007

Groups Printed- Unshifted - TRUCKS

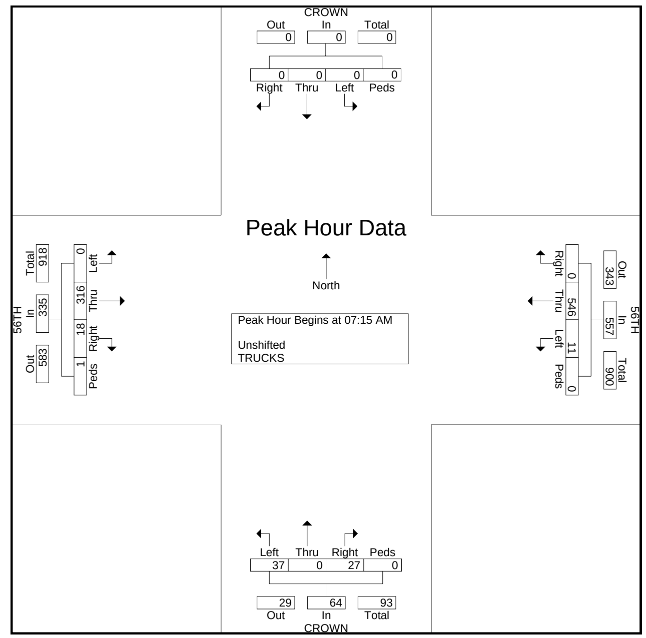
	CROWN Southbound				56TH Westbound				CROWN Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	2	112	0	0	12	0	5	0	0	61	6	1	199
07:15 AM	0	0	0	0	7	113	0	0	11	0	11	0	0	84	4	1	231
07:30 AM	0	0	0	0	1	155	0	0	9	0	4	0	0	73	6	0	248
07:45 AM	0	0	0	0	2	157	0	0	11	0	7	0	0	95	4	0	276
Total	0	0	0	0	12	537	0	0	43	0	27	0	0	313	20	2	954
08:00 AM	0	0	0	0	1	121	0	0	6	0	5	0	0	64	4	0	201
08:15 AM	0	0	0	0	3	112	0	0	8	0	1	0	0	72	1	0	197
08:30 AM	0	0	0	0	3	87	0	0	7	0	5	0	0	71	2	0	175
08:45 AM	0	0	0	0	5	63	0	0	5	1	4	0	0	67	7	0	152
Total	0	0	0	0	12	383	0	0	26	1	15	0	0	274	14	0	725
Grand Total	0	0	0	0	24	920	0	0	69	1	42	0	0	587	34	2	1679
Apprch %	0	0	0	0	2.5	97.5	0	0	61.6	0.9	37.5	0	0	94.2	5.5	0.3	
Total %	0	0	0	0	1.4	54.8	0	0	4.1	0.1	2.5	0	0	35	2	0.1	
Unshifted	0	0	0	0	22	876	0	0	68	1	42	0	0	523	33	2	1567
% Unshifted	0	0	0	0	91.7	95.2	0	0	98.6	100	100	0	0	89.1	97.1	100	93.3
TRUCKS	0	0	0	0	2	44	0	0	1	0	0	0	0	64	1	0	112
% TRUCKS	0	0	0	0	8.3	4.8	0	0	1.4	0	0	0	0	10.9	2.9	0	6.7



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CROWN&56THAM
Site Code : 00000000
Start Date : 5/2/2007

	CROWN Southbound					56TH Westbound					CROWN Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	7	113	0	0	120	11	0	11	0	22	0	84	4	1	89	231
07:30 AM	0	0	0	0	0	1	155	0	0	156	9	0	4	0	13	0	73	6	0	79	248
07:45 AM	0	0	0	0	0	2	157	0	0	159	11	0	7	0	18	0	95	4	0	99	276
08:00 AM	0	0	0	0	0	1	121	0	0	122	6	0	5	0	11	0	64	4	0	68	201
Total Volume	0	0	0	0	0	11	546	0	0	557	37	0	27	0	64	0	316	18	1	335	956
% App. Total	0	0	0	0		2	98	0	0		57.8	0	42.2	0		0	94.3	5.4	0.3		
PHF	.000	.000	.000	.000	.000	.393	.869	.000	.000	.876	.841	.000	.614	.000	.727	.000	.832	.750	.250	.846	.866

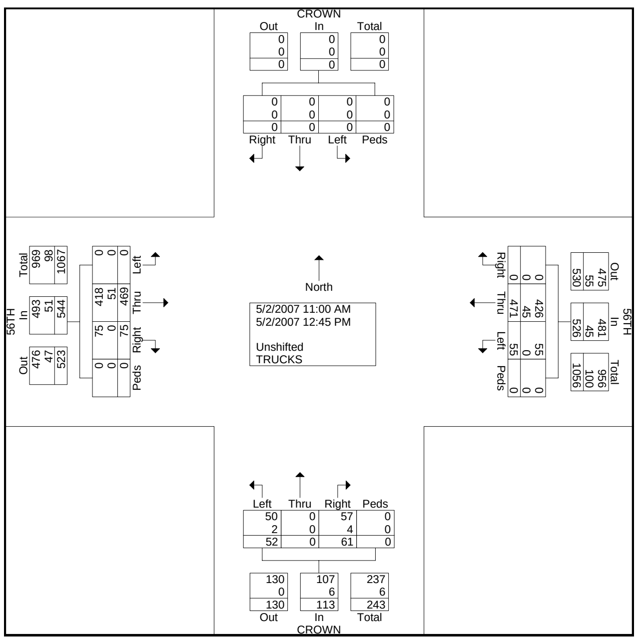


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CROWN&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

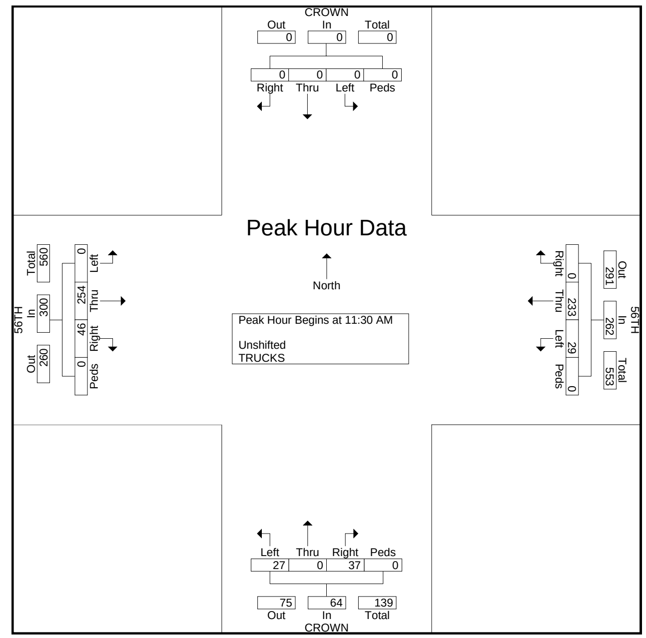
	CROWN Southbound				56TH Westbound				CROWN Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	7	57	0	0	3	0	3	0	0	58	6	0	134
11:15 AM	0	0	0	0	4	66	0	0	6	0	7	0	0	59	5	0	147
11:30 AM	0	0	0	0	6	58	0	0	9	0	5	0	0	59	8	0	145
11:45 AM	0	0	0	0	7	55	0	0	6	0	12	0	0	72	12	0	164
Total	0	0	0	0	24	236	0	0	24	0	27	0	0	248	31	0	590
12:00 PM	0	0	0	0	10	63	0	0	7	0	11	0	0	67	11	0	169
12:15 PM	0	0	0	0	6	57	0	0	5	0	9	0	0	56	15	0	148
12:30 PM	0	0	0	0	8	56	0	0	8	0	8	0	0	53	9	0	142
12:45 PM	0	0	0	0	7	59	0	0	8	0	6	0	0	45	9	0	134
Total	0	0	0	0	31	235	0	0	28	0	34	0	0	221	44	0	593
Grand Total	0	0	0	0	55	471	0	0	52	0	61	0	0	469	75	0	1183
Apprch %	0	0	0	0	10.5	89.5	0	0	46	0	54	0	0	86.2	13.8	0	
Total %	0	0	0	0	4.6	39.8	0	0	4.4	0	5.2	0	0	39.6	6.3	0	
Unshifted	0	0	0	0	55	426	0	0	50	0	57	0	0	418	75	0	1081
% Unshifted	0	0	0	0	100	90.4	0	0	96.2	0	93.4	0	0	89.1	100	0	91.4
TRUCKS	0	0	0	0	0	45	0	0	2	0	4	0	0	51	0	0	102
% TRUCKS	0	0	0	0	0	9.6	0	0	3.8	0	6.6	0	0	10.9	0	0	8.6



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CROWN&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	CROWN Southbound					56TH Westbound					CROWN Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	0	0	0	6	58	0	0	64	9	0	5	0	14	0	59	8	0	67	145
11:45 AM	0	0	0	0	0	7	55	0	0	62	6	0	12	0	18	0	72	12	0	84	164
12:00 PM	0	0	0	0	0	10	63	0	0	73	7	0	11	0	18	0	67	11	0	78	169
12:15 PM	0	0	0	0	0	6	57	0	0	63	5	0	9	0	14	0	56	15	0	71	148
Total Volume	0	0	0	0	0	29	233	0	0	262	27	0	37	0	64	0	254	46	0	300	626
% App. Total	0	0	0	0		11.1	88.9	0	0		42.2	0	57.8	0		0	84.7	15.3	0		
PHF	.000	.000	.000	.000	.000	.725	.925	.000	.000	.897	.750	.000	.771	.000	.889	.000	.882	.767	.000	.893	.926

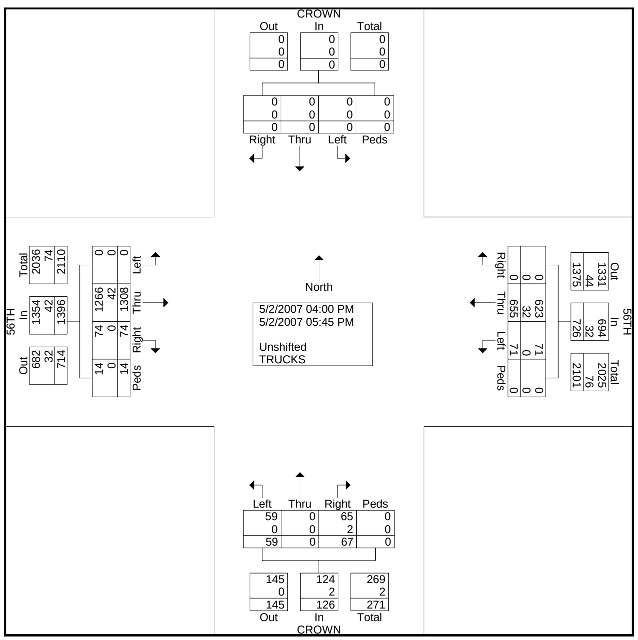


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CROWN&56THPM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

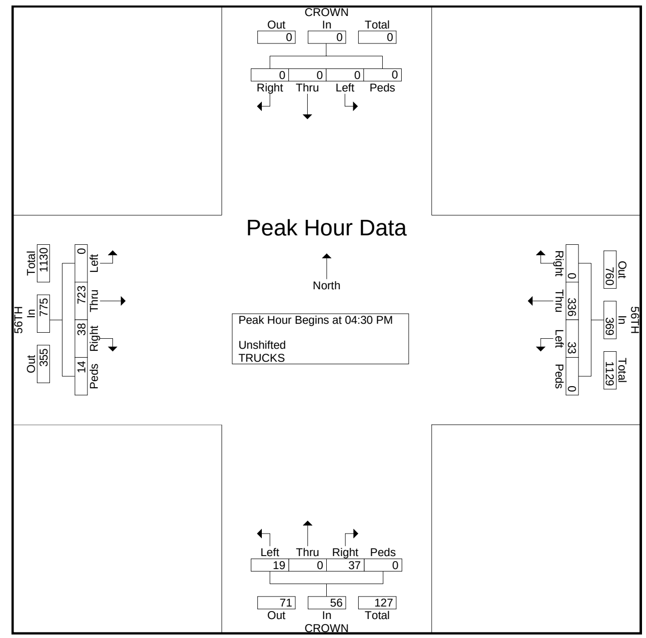
	CROWN Southbound				56TH Westbound				CROWN Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	0	0	0	7	92	0	0	7	0	4	0	0	162	14	0	286
04:15 PM	0	0	0	0	13	77	0	0	6	0	8	0	0	153	4	0	261
04:30 PM	0	0	0	0	7	83	0	0	9	0	7	0	0	174	4	0	284
04:45 PM	0	0	0	0	5	92	0	0	5	0	8	0	0	195	8	0	313
Total	0	0	0	0	32	344	0	0	27	0	27	0	0	684	30	0	1144
05:00 PM	0	0	0	0	7	77	0	0	3	0	14	0	0	193	10	6	310
05:15 PM	0	0	0	0	14	84	0	0	2	0	8	0	0	161	16	8	293
05:30 PM	0	0	0	0	12	68	0	0	12	0	10	0	0	147	8	0	257
05:45 PM	0	0	0	0	6	82	0	0	15	0	8	0	0	123	10	0	244
Total	0	0	0	0	39	311	0	0	32	0	40	0	0	624	44	14	1104
Grand Total	0	0	0	0	71	655	0	0	59	0	67	0	0	1308	74	14	2248
Apprch %	0	0	0	0	9.8	90.2	0	0	46.8	0	53.2	0	0	93.7	5.3	1	
Total %	0	0	0	0	3.2	29.1	0	0	2.6	0	3	0	0	58.2	3.3	0.6	
Unshifted	0	0	0	0	71	623	0	0	59	0	65	0	0	1266	74	14	2172
% Unshifted	0	0	0	0	100	95.1	0	0	100	0	97	0	0	96.8	100	100	96.6
TRUCKS	0	0	0	0	0	32	0	0	0	0	2	0	0	42	0	0	76
% TRUCKS	0	0	0	0	0	4.9	0	0	0	0	3	0	0	3.2	0	0	3.4



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CROWN&56THPM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	CROWN Southbound					56TH Westbound					CROWN Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	7	83	0	0	90	9	0	7	0	16	0	174	4	0	178	284
04:45 PM	0	0	0	0	0	5	92	0	0	97	5	0	8	0	13	0	195	8	0	203	313
05:00 PM	0	0	0	0	0	7	77	0	0	84	3	0	14	0	17	0	193	10	6	209	310
05:15 PM	0	0	0	0	0	14	84	0	0	98	2	0	8	0	10	0	161	16	8	185	293
Total Volume	0	0	0	0	0	33	336	0	0	369	19	0	37	0	56	0	723	38	14	775	1200
% App. Total	0	0	0	0		8.9	91.1	0	0		33.9	0	66.1	0		0	93.3	4.9	1.8		
PHF	.000	.000	.000	.000	.000	.589	.913	.000	.000	.941	.528	.000	.661	.000	.824	.000	.927	.594	.438	.927	.958

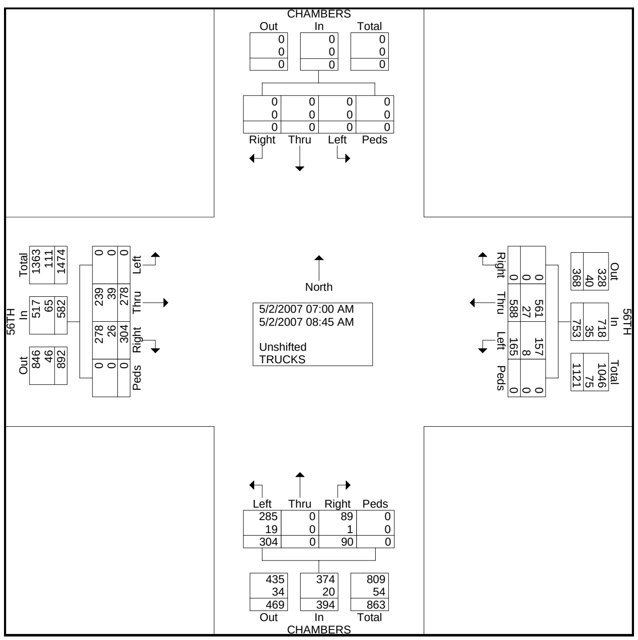


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CHAMBERS&56THAM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

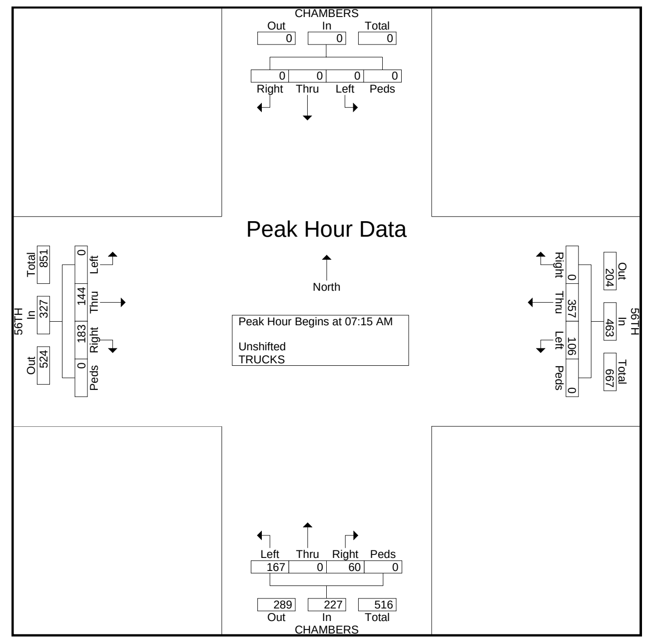
	CHAMBERS Southbound				56TH Westbound				CHAMBERS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	17	79	0	0	43	0	6	0	0	31	38	0	214
07:15 AM	0	0	0	0	38	90	0	0	27	0	16	0	0	40	50	0	261
07:30 AM	0	0	0	0	22	93	0	0	54	0	14	0	0	24	45	0	252
07:45 AM	0	0	0	0	23	103	0	0	44	0	17	0	0	46	54	0	287
Total	0	0	0	0	100	365	0	0	168	0	53	0	0	141	187	0	1014
08:00 AM	0	0	0	0	23	71	0	0	42	0	13	0	0	34	34	0	217
08:15 AM	0	0	0	0	16	57	0	0	42	0	7	0	0	26	29	0	177
08:30 AM	0	0	0	0	12	51	0	0	29	0	11	0	0	44	28	0	175
08:45 AM	0	0	0	0	14	44	0	0	23	0	6	0	0	33	26	0	146
Total	0	0	0	0	65	223	0	0	136	0	37	0	0	137	117	0	715
Grand Total	0	0	0	0	165	588	0	0	304	0	90	0	0	278	304	0	1729
Apprch %	0	0	0	0	21.9	78.1	0	0	77.2	0	22.8	0	0	47.8	52.2	0	
Total %	0	0	0	0	9.5	34	0	0	17.6	0	5.2	0	0	16.1	17.6	0	
Unshifted	0	0	0	0	157	561	0	0	285	0	89	0	0	239	278	0	1609
% Unshifted	0	0	0	0	95.2	95.4	0	0	93.8	0	98.9	0	0	86	91.4	0	93.1
TRUCKS	0	0	0	0	8	27	0	0	19	0	1	0	0	39	26	0	120
% TRUCKS	0	0	0	0	4.8	4.6	0	0	6.2	0	1.1	0	0	14	8.6	0	6.9



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CHAMBERS&56THAM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	CHAMBERS Southbound					56TH Westbound					CHAMBERS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	38	90	0	0	128	27	0	16	0	43	0	40	50	0	90	261
07:30 AM	0	0	0	0	0	22	93	0	0	115	54	0	14	0	68	0	24	45	0	69	252
07:45 AM	0	0	0	0	0	23	103	0	0	126	44	0	17	0	61	0	46	54	0	100	287
08:00 AM	0	0	0	0	0	23	71	0	0	94	42	0	13	0	55	0	34	34	0	68	217
Total Volume	0	0	0	0	0	106	357	0	0	463	167	0	60	0	227	0	144	183	0	327	1017
% App. Total	0	0	0	0		22.9	77.1	0	0		73.6	0	26.4	0		0	44	56	0		
PHF	.000	.000	.000	.000	.000	.697	.867	.000	.000	.904	.773	.000	.882	.000	.835	.000	.783	.847	.000	.818	.886

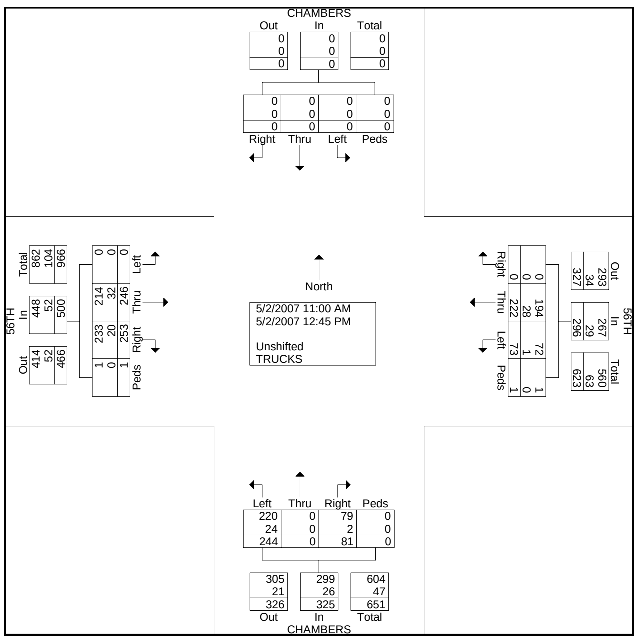


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CHAMBERS&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

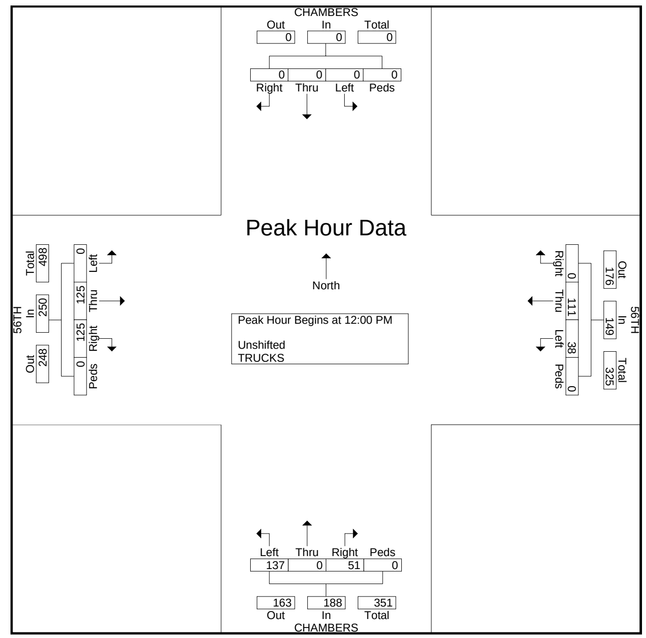
	CHAMBERS Southbound				56TH Westbound				CHAMBERS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	11	26	0	0	28	0	6	0	0	32	21	0	124
11:15 AM	0	0	0	0	4	30	0	1	27	0	5	0	0	28	40	1	136
11:30 AM	0	0	0	0	6	26	0	0	17	0	9	0	0	33	32	0	123
11:45 AM	0	0	0	0	14	29	0	0	35	0	10	0	0	28	35	0	151
Total	0	0	0	0	35	111	0	1	107	0	30	0	0	121	128	1	534
12:00 PM	0	0	0	0	11	23	0	0	35	0	7	0	0	36	32	0	144
12:15 PM	0	0	0	0	9	42	0	0	22	0	14	0	0	33	26	0	146
12:30 PM	0	0	0	0	12	17	0	0	39	0	12	0	0	22	35	0	137
12:45 PM	0	0	0	0	6	29	0	0	41	0	18	0	0	34	32	0	160
Total	0	0	0	0	38	111	0	0	137	0	51	0	0	125	125	0	587
Grand Total	0	0	0	0	73	222	0	1	244	0	81	0	0	246	253	1	1121
Apprch %	0	0	0	0	24.7	75	0	0.3	75.1	0	24.9	0	0	49.2	50.6	0.2	
Total %	0	0	0	0	6.5	19.8	0	0.1	21.8	0	7.2	0	0	21.9	22.6	0.1	
Unshifted	0	0	0	0	72	194	0	1	220	0	79	0	0	214	233	1	1014
% Unshifted	0	0	0	0	98.6	87.4	0	100	90.2	0	97.5	0	0	87	92.1	100	90.5
TRUCKS	0	0	0	0	1	28	0	0	24	0	2	0	0	32	20	0	107
% TRUCKS	0	0	0	0	1.4	12.6	0	0	9.8	0	2.5	0	0	13	7.9	0	9.5



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CHAMBERS&56THNOON
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	CHAMBERS Southbound					56TH Westbound					CHAMBERS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	0	0	11	23	0	0	34	35	0	7	0	42	0	36	32	0	68	144
12:15 PM	0	0	0	0	0	9	42	0	0	51	22	0	14	0	36	0	33	26	0	59	146
12:30 PM	0	0	0	0	0	12	17	0	0	29	39	0	12	0	51	0	22	35	0	57	137
12:45 PM	0	0	0	0	0	6	29	0	0	35	41	0	18	0	59	0	34	32	0	66	160
Total Volume	0	0	0	0	0	38	111	0	0	149	137	0	51	0	188	0	125	125	0	250	587
% App. Total	0	0	0	0		25.5	74.5	0	0		72.9	0	27.1	0		0	50	50	0		
PHF	.000	.000	.000	.000	.000	.792	.661	.000	.000	.730	.835	.000	.708	.000	.797	.000	.868	.893	.000	.919	.917

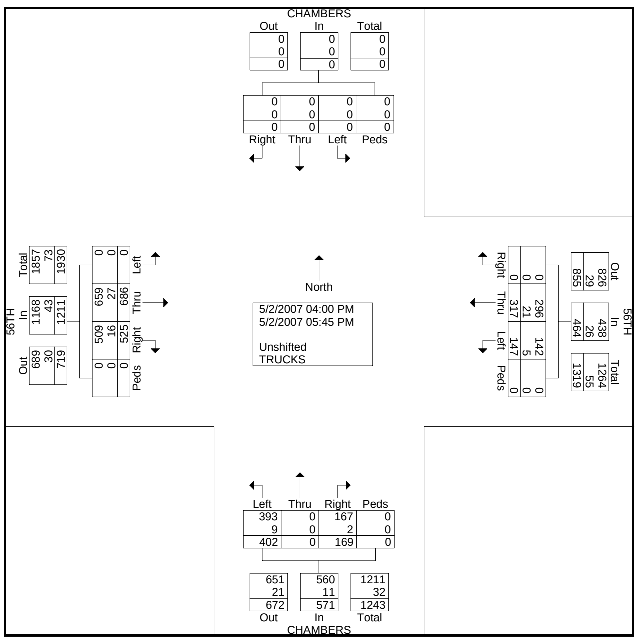


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CHAMBERS&56THPM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

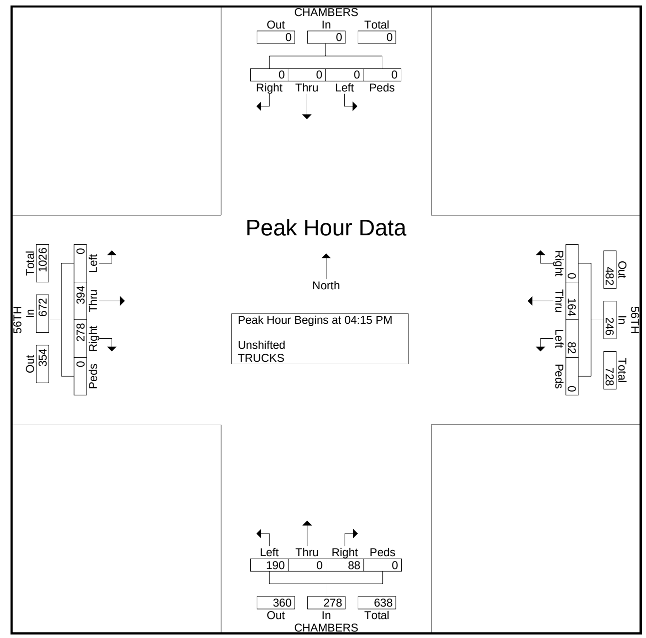
	CHAMBERS Southbound				56TH Westbound				CHAMBERS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	0	0	0	16	45	0	0	54	0	23	0	0	65	55	0	258
04:15 PM	0	0	0	0	23	45	0	0	51	0	28	0	0	95	70	0	312
04:30 PM	0	0	0	0	15	45	0	0	38	0	15	0	0	94	61	0	268
04:45 PM	0	0	0	0	20	38	0	0	56	0	20	0	0	99	74	0	307
Total	0	0	0	0	74	173	0	0	199	0	86	0	0	353	260	0	1145
05:00 PM	0	0	0	0	24	36	0	0	45	0	25	0	0	106	73	0	309
05:15 PM	0	0	0	0	19	42	0	0	52	0	31	0	0	88	61	0	293
05:30 PM	0	0	0	0	16	37	0	0	58	0	12	0	0	70	79	0	272
05:45 PM	0	0	0	0	14	29	0	0	48	0	15	0	0	69	52	0	227
Total	0	0	0	0	73	144	0	0	203	0	83	0	0	333	265	0	1101
Grand Total	0	0	0	0	147	317	0	0	402	0	169	0	0	686	525	0	2246
Apprch %	0	0	0	0	31.7	68.3	0	0	70.4	0	29.6	0	0	56.6	43.4	0	
Total %	0	0	0	0	6.5	14.1	0	0	17.9	0	7.5	0	0	30.5	23.4	0	
Unshifted	0	0	0	0	142	296	0	0	393	0	167	0	0	659	509	0	2166
% Unshifted	0	0	0	0	96.6	93.4	0	0	97.8	0	98.8	0	0	96.1	97	0	96.4
TRUCKS	0	0	0	0	5	21	0	0	9	0	2	0	0	27	16	0	80
% TRUCKS	0	0	0	0	3.4	6.6	0	0	2.2	0	1.2	0	0	3.9	3	0	3.6



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : CHAMBERS&56THPM
Site Code : 00000000
Start Date : 5/2/2007
Page No : 2

	CHAMBERS Southbound					56TH Westbound					CHAMBERS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	23	45	0	0	68	51	0	28	0	79	0	95	70	0	165	312
04:30 PM	0	0	0	0	0	15	45	0	0	60	38	0	15	0	53	0	94	61	0	155	268
04:45 PM	0	0	0	0	0	20	38	0	0	58	56	0	20	0	76	0	99	74	0	173	307
05:00 PM	0	0	0	0	0	24	36	0	0	60	45	0	25	0	70	0	106	73	0	179	309
Total Volume	0	0	0	0	0	82	164	0	0	246	190	0	88	0	278	0	394	278	0	672	1196
% App. Total	0	0	0	0		33.3	66.7	0	0		68.3	0	31.7	0		0	58.6	41.4	0		
PHF	.000	.000	.000	.000	.000	.854	.911	.000	.000	.904	.848	.000	.786	.000	.880	.000	.929	.939	.000	.939	.958

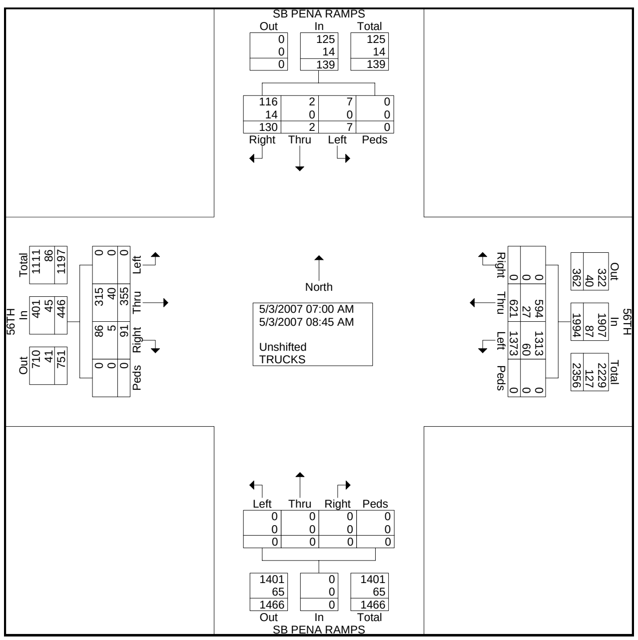


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SBRAMPS&56THAM
Site Code : 00000000
Start Date : 5/3/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

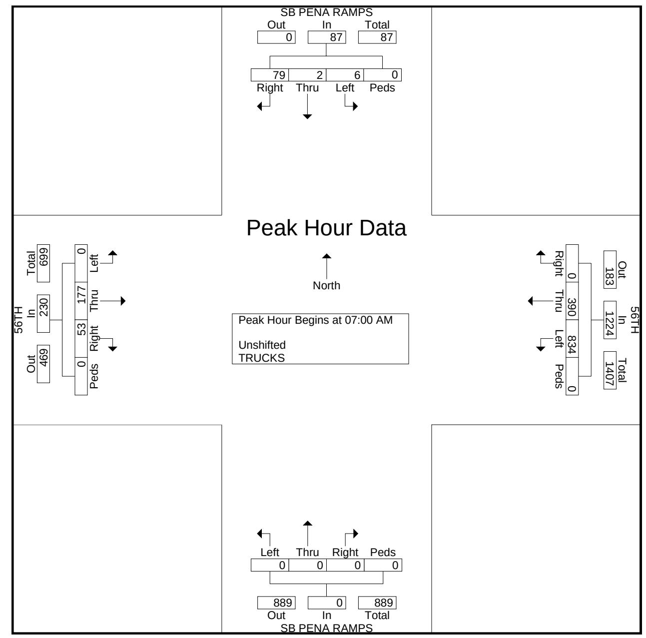
	SB PENA RAMPS Southbound				56TH Westbound				SB PENA RAMPS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	1	1	17	0	211	89	0	0	0	0	0	0	0	29	20	0	368
07:15 AM	2	0	20	0	223	98	0	0	0	0	0	0	0	45	16	0	404
07:30 AM	2	1	20	0	214	105	0	0	0	0	0	0	0	42	11	0	395
07:45 AM	1	0	22	0	186	98	0	0	0	0	0	0	0	61	6	0	374
Total	6	2	79	0	834	390	0	0	0	0	0	0	0	177	53	0	1541
08:00 AM	0	0	15	0	159	75	0	0	0	0	0	0	0	48	9	0	306
08:15 AM	0	0	14	0	138	60	0	0	0	0	0	0	0	32	12	0	256
08:30 AM	0	0	13	0	127	58	0	0	0	0	0	0	0	60	12	0	270
08:45 AM	1	0	9	0	115	38	0	0	0	0	0	0	0	38	5	0	206
Total	1	0	51	0	539	231	0	0	0	0	0	0	0	178	38	0	1038
Grand Total	7	2	130	0	1373	621	0	0	0	0	0	0	0	355	91	0	2579
Apprch %	5	1.4	93.5	0	68.9	31.1	0	0	0	0	0	0	0	79.6	20.4	0	
Total %	0.3	0.1	5	0	53.2	24.1	0	0	0	0	0	0	0	13.8	3.5	0	
Unshifted	7	2	116	0	1313	594	0	0	0	0	0	0	0	315	86	0	2433
% Unshifted	100	100	89.2	0	95.6	95.7	0	0	0	0	0	0	0	88.7	94.5	0	94.3
TRUCKS	0	0	14	0	60	27	0	0	0	0	0	0	0	40	5	0	146
% TRUCKS	0	0	10.8	0	4.4	4.3	0	0	0	0	0	0	0	11.3	5.5	0	5.7



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SBRAMPS&56THAM
Site Code : 00000000
Start Date : 5/3/2007
Page No : 2

	SB PENA RAMPS Southbound					56TH Westbound					SB PENA RAMPS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	1	17	0	19	211	89	0	0	300	0	0	0	0	0	0	29	20	0	49	368
07:15 AM	2	0	20	0	22	223	98	0	0	321	0	0	0	0	0	0	45	16	0	61	404
07:30 AM	2	1	20	0	23	214	105	0	0	319	0	0	0	0	0	0	42	11	0	53	395
07:45 AM	1	0	22	0	23	186	98	0	0	284	0	0	0	0	0	0	61	6	0	67	374
Total Volume	6	2	79	0	87	834	390	0	0	1224	0	0	0	0	0	0	177	53	0	230	1541
% App. Total	6.9	2.3	90.8	0		68.1	31.9	0	0		0	0	0	0		0	77	23	0		
PHF	.750	.500	.898	.000	.946	.935	.929	.000	.000	.953	.000	.000	.000	.000	.000	.000	.725	.663	.000	.858	.954

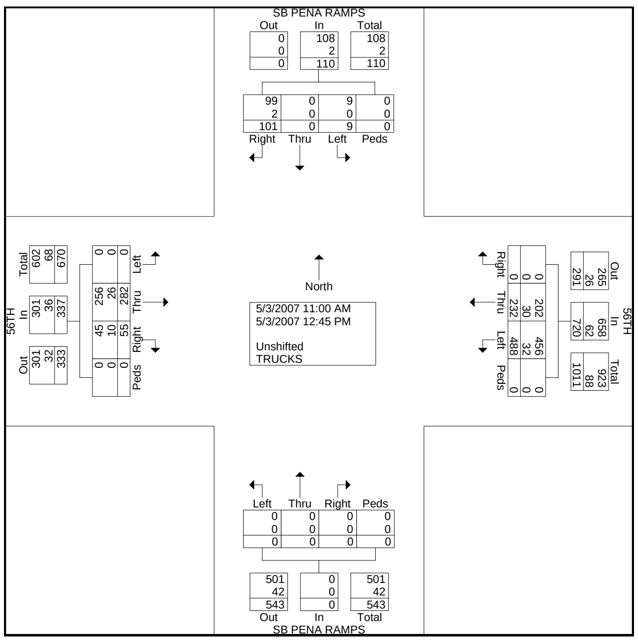


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SBRAMPS&56THNOON
Site Code : 00000000
Start Date : 5/3/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

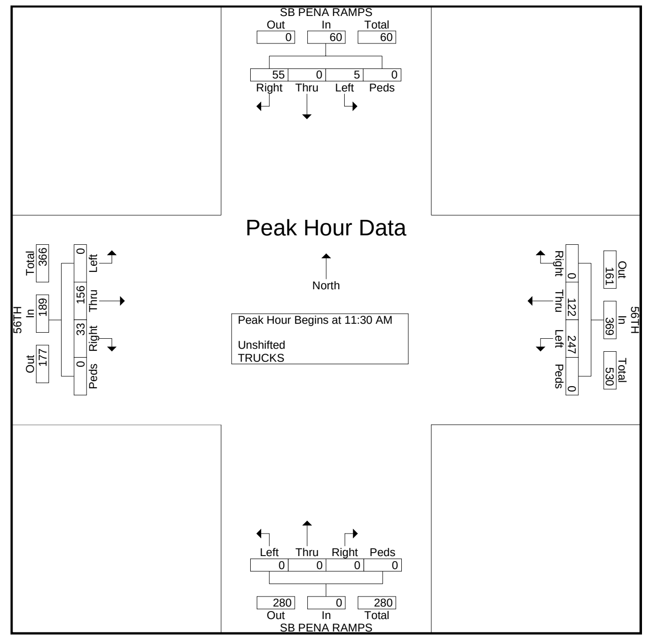
	SB PENA RAMPS Southbound				56TH Westbound				SB PENA RAMPS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	1	0	12	0	52	28	0	0	0	0	0	0	0	34	5	0	132
11:15 AM	0	0	16	0	58	27	0	0	0	0	0	0	0	36	5	0	142
11:30 AM	0	0	17	0	63	33	0	0	0	0	0	0	0	30	9	0	152
11:45 AM	2	0	14	0	51	25	0	0	0	0	0	0	0	42	6	0	140
Total	3	0	59	0	224	113	0	0	0	0	0	0	0	142	25	0	566
12:00 PM	1	0	10	0	65	32	0	0	0	0	0	0	0	41	14	0	163
12:15 PM	2	0	14	0	68	32	0	0	0	0	0	0	0	43	4	0	163
12:30 PM	2	0	5	0	68	29	0	0	0	0	0	0	0	27	7	0	138
12:45 PM	1	0	13	0	63	26	0	0	0	0	0	0	0	29	5	0	137
Total	6	0	42	0	264	119	0	0	0	0	0	0	0	140	30	0	601
Grand Total	9	0	101	0	488	232	0	0	0	0	0	0	0	282	55	0	1167
Apprch %	8.2	0	91.8	0	67.8	32.2	0	0	0	0	0	0	0	83.7	16.3	0	
Total %	0.8	0	8.7	0	41.8	19.9	0	0	0	0	0	0	0	24.2	4.7	0	
Unshifted	9	0	99	0	456	202	0	0	0	0	0	0	0	256	45	0	1067
% Unshifted	100	0	98	0	93.4	87.1	0	0	0	0	0	0	0	90.8	81.8	0	91.4
TRUCKS	0	0	2	0	32	30	0	0	0	0	0	0	0	26	10	0	100
% TRUCKS	0	0	2	0	6.6	12.9	0	0	0	0	0	0	0	9.2	18.2	0	8.6



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SBRAMPS&56THNOON
Site Code : 00000000
Start Date : 5/3/2007
Page No : 2

	SB PENA RAMPS Southbound					56TH Westbound					SB PENA RAMPS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	17	0	17	63	33	0	0	96	0	0	0	0	0	0	30	9	0	39	152
11:45 AM	2	0	14	0	16	51	25	0	0	76	0	0	0	0	0	0	42	6	0	48	140
12:00 PM	1	0	10	0	11	65	32	0	0	97	0	0	0	0	0	0	41	14	0	55	163
12:15 PM	2	0	14	0	16	68	32	0	0	100	0	0	0	0	0	0	43	4	0	47	163
Total Volume	5	0	55	0	60	247	122	0	0	369	0	0	0	0	0	0	156	33	0	189	618
% App. Total	8.3	0	91.7	0		66.9	33.1	0	0		0	0	0	0		0	82.5	17.5	0		
PHF	.625	.000	.809	.000	.882	.908	.924	.000	.000	.923	.000	.000	.000	.000	.000	.000	.907	.589	.000	.859	.948

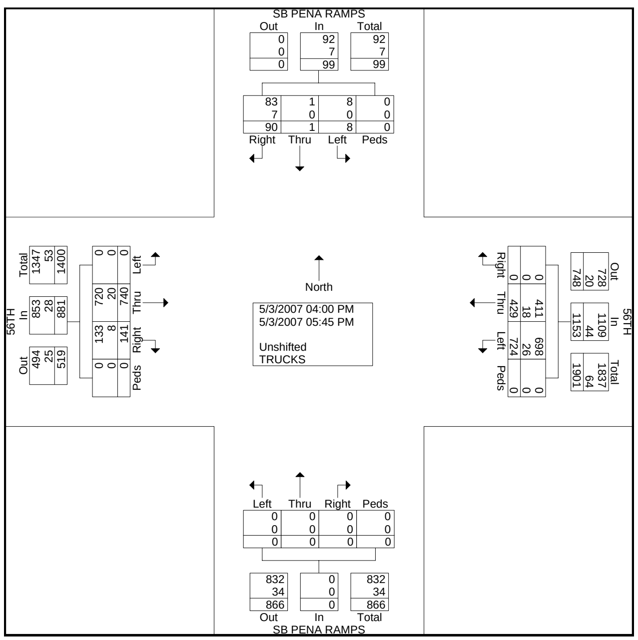


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SBRAMPS&56THPM
Site Code : 00000000
Start Date : 5/3/2007

Groups Printed- Unshifted - TRUCKS

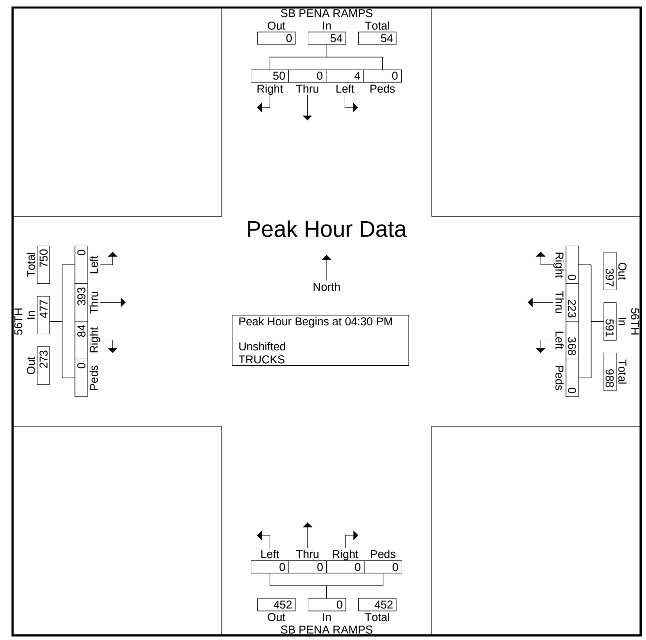
	SB PENA RAMPS Southbound				56TH Westbound				SB PENA RAMPS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	1	0	12	0	78	48	0	0	0	0	0	0	0	95	16	0	250
04:15 PM	1	1	14	0	88	55	0	0	0	0	0	0	0	102	12	0	273
04:30 PM	0	0	13	0	95	57	0	0	0	0	0	0	0	75	23	0	263
04:45 PM	1	0	17	0	72	50	0	0	0	0	0	0	0	102	17	0	259
Total	3	1	56	0	333	210	0	0	0	0	0	0	0	374	68	0	1045
05:00 PM	1	0	8	0	99	56	0	0	0	0	0	0	0	102	31	0	297
05:15 PM	2	0	12	0	102	60	0	0	0	0	0	0	0	114	13	0	303
05:30 PM	2	0	4	0	100	57	0	0	0	0	0	0	0	72	17	0	252
05:45 PM	0	0	10	0	90	46	0	0	0	0	0	0	0	78	12	0	236
Total	5	0	34	0	391	219	0	0	0	0	0	0	0	366	73	0	1088
Grand Total	8	1	90	0	724	429	0	0	0	0	0	0	0	740	141	0	2133
Apprch %	8.1	1	90.9	0	62.8	37.2	0	0	0	0	0	0	0	84	16	0	
Total %	0.4	0	4.2	0	33.9	20.1	0	0	0	0	0	0	0	34.7	6.6	0	
Unshifted	8	1	83	0	698	411	0	0	0	0	0	0	0	720	133	0	2054
% Unshifted	100	100	92.2	0	96.4	95.8	0	0	0	0	0	0	0	97.3	94.3	0	96.3
TRUCKS	0	0	7	0	26	18	0	0	0	0	0	0	0	20	8	0	79
% TRUCKS	0	0	7.8	0	3.6	4.2	0	0	0	0	0	0	0	2.7	5.7	0	3.7



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SBRAMPS&56THPM
Site Code : 00000000
Start Date : 5/3/2007

	SB PENA RAMPS Southbound					56TH Westbound					SB PENA RAMPS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	13	0	13	95	57	0	0	152	0	0	0	0	0	0	75	23	0	98	263
04:45 PM	1	0	17	0	18	72	50	0	0	122	0	0	0	0	0	0	102	17	0	119	259
05:00 PM	1	0	8	0	9	99	56	0	0	155	0	0	0	0	0	0	102	31	0	133	297
05:15 PM	2	0	12	0	14	102	60	0	0	162	0	0	0	0	0	0	114	13	0	127	303
Total Volume	4	0	50	0	54	368	223	0	0	591	0	0	0	0	0	0	393	84	0	477	1122
% App. Total	7.4	0	92.6	0		62.3	37.7	0	0		0	0	0	0		0	82.4	17.6	0		
PHF	.500	.000	.735	.000	.750	.902	.929	.000	.000	.912	.000	.000	.000	.000	.000	.000	.862	.677	.000	.897	.926

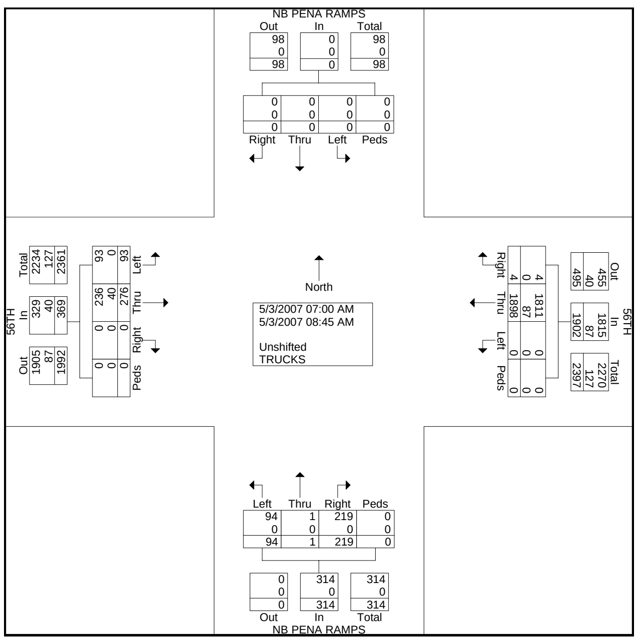


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : NBRAMPS&56THAM
Site Code : 00000000
Start Date : 5/3/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

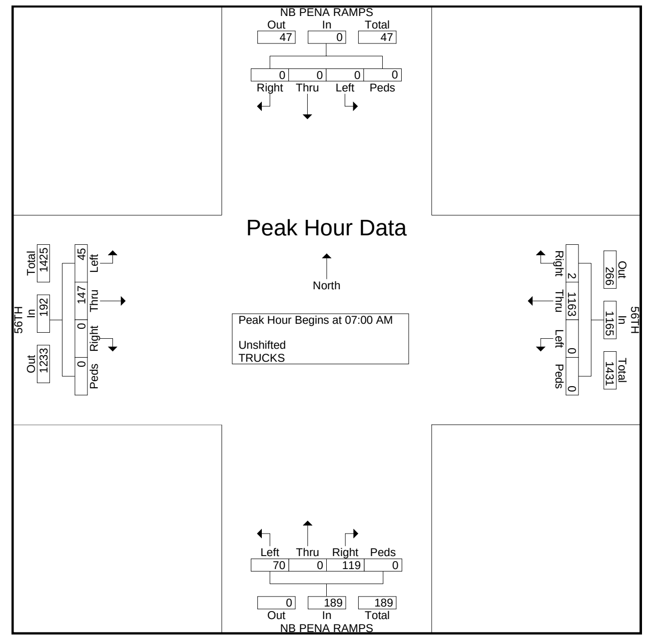
	NB PENA RAMPS Southbound				56TH Westbound				NB PENA RAMPS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	0	296	1	0	19	0	23	0	8	19	0	0	366
07:15 AM	0	0	0	0	0	299	0	0	18	0	27	0	16	35	0	0	395
07:30 AM	0	0	0	0	0	285	1	0	22	0	35	0	7	36	0	0	386
07:45 AM	0	0	0	0	0	283	0	0	11	0	34	0	14	57	0	0	399
Total	0	0	0	0	0	1163	2	0	70	0	119	0	45	147	0	0	1546
08:00 AM	0	0	0	0	0	227	1	0	6	0	34	0	11	39	0	0	318
08:15 AM	0	0	0	0	0	174	1	0	8	0	20	0	9	23	0	0	235
08:30 AM	0	0	0	0	0	189	0	0	4	1	21	0	13	42	0	0	270
08:45 AM	0	0	0	0	0	145	0	0	6	0	25	0	15	25	0	0	216
Total	0	0	0	0	0	735	2	0	24	1	100	0	48	129	0	0	1039
Grand Total	0	0	0	0	0	1898	4	0	94	1	219	0	93	276	0	0	2585
Apprch %	0	0	0	0	0	99.8	0.2	0	29.9	0.3	69.7	0	25.2	74.8	0	0	
Total %	0	0	0	0	0	73.4	0.2	0	3.6	0	8.5	0	3.6	10.7	0	0	
Unshifted	0	0	0	0	0	1811	4	0	94	1	219	0	93	236	0	0	2458
% Unshifted	0	0	0	0	0	95.4	100	0	100	100	100	0	100	85.5	0	0	95.1
TRUCKS	0	0	0	0	0	87	0	0	0	0	0	0	0	40	0	0	127
% TRUCKS	0	0	0	0	0	4.6	0	0	0	0	0	0	0	14.5	0	0	4.9



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : NBRAMPS&56THAM
Site Code : 00000000
Start Date : 5/3/2007
Page No : 2

	NB PENA RAMPS Southbound					56TH Westbound					NB PENA RAMPS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	296	1	0	297	19	0	23	0	42	8	19	0	0	27	366
07:15 AM	0	0	0	0	0	0	299	0	0	299	18	0	27	0	45	16	35	0	0	51	395
07:30 AM	0	0	0	0	0	0	285	1	0	286	22	0	35	0	57	7	36	0	0	43	386
07:45 AM	0	0	0	0	0	0	283	0	0	283	11	0	34	0	45	14	57	0	0	71	399
Total Volume	0	0	0	0	0	0	1163	2	0	1165	70	0	119	0	189	45	147	0	0	192	1546
% App. Total	0	0	0	0		0	99.8	0.2	0		37	0	63	0		23.4	76.6	0	0		
PHF	.000	.000	.000	.000	.000	.000	.972	.500	.000	.974	.795	.000	.850	.000	.829	.703	.645	.000	.000	.676	.969

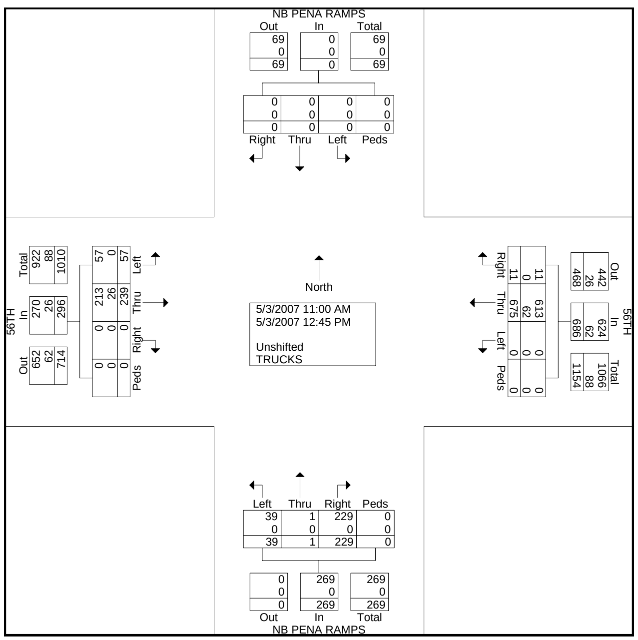


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : NBRAMPS&56THNOON
Site Code : 00000000
Start Date : 5/3/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

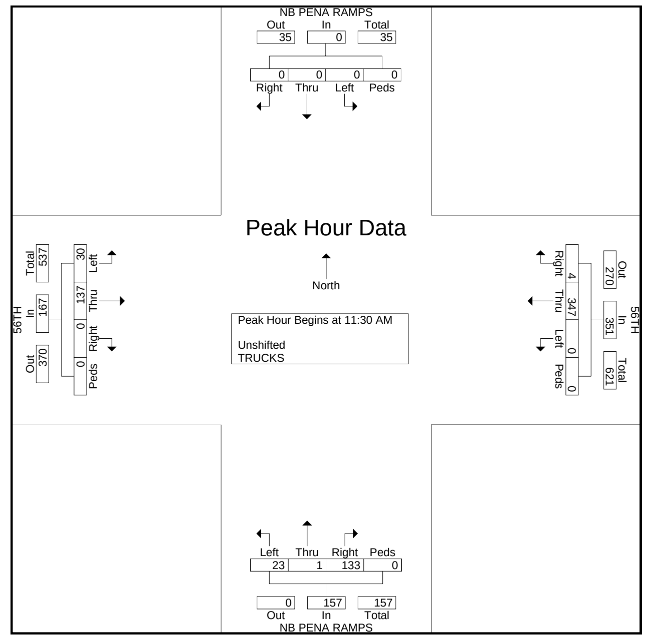
	NB PENA RAMPS Southbound				56TH Westbound				NB PENA RAMPS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	0	80	0	0	1	0	24	0	8	27	0	0	140
11:15 AM	0	0	0	0	0	86	2	0	2	0	26	0	8	33	0	0	157
11:30 AM	0	0	0	0	0	92	1	0	4	1	31	0	6	34	0	0	169
11:45 AM	0	0	0	0	0	72	1	0	5	0	33	0	8	37	0	0	156
Total	0	0	0	0	0	330	4	0	12	1	114	0	30	131	0	0	622
12:00 PM	0	0	0	0	0	87	1	0	5	0	33	0	6	35	0	0	167
12:15 PM	0	0	0	0	0	96	1	0	9	0	36	0	10	31	0	0	183
12:30 PM	0	0	0	0	0	84	3	0	9	0	25	0	5	21	0	0	147
12:45 PM	0	0	0	0	0	78	2	0	4	0	21	0	6	21	0	0	132
Total	0	0	0	0	0	345	7	0	27	0	115	0	27	108	0	0	629
Grand Total	0	0	0	0	0	675	11	0	39	1	229	0	57	239	0	0	1251
Apprch %	0	0	0	0	0	98.4	1.6	0	14.5	0.4	85.1	0	19.3	80.7	0	0	
Total %	0	0	0	0	0	54	0.9	0	3.1	0.1	18.3	0	4.6	19.1	0	0	
Unshifted	0	0	0	0	0	613	11	0	39	1	229	0	57	213	0	0	1163
% Unshifted	0	0	0	0	0	90.8	100	0	100	100	100	0	100	89.1	0	0	93
TRUCKS	0	0	0	0	0	62	0	0	0	0	0	0	0	26	0	0	88
% TRUCKS	0	0	0	0	0	9.2	0	0	0	0	0	0	0	10.9	0	0	7



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : NBRAMPS&56THNOON
Site Code : 00000000
Start Date : 5/3/2007
Page No : 2

	NB PENA RAMPS Southbound					56TH Westbound					NB PENA RAMPS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	0	0	0	0	92	1	0	93	4	1	31	0	36	6	34	0	0	40	169
11:45 AM	0	0	0	0	0	0	72	1	0	73	5	0	33	0	38	8	37	0	0	45	156
12:00 PM	0	0	0	0	0	0	87	1	0	88	5	0	33	0	38	6	35	0	0	41	167
12:15 PM	0	0	0	0	0	0	96	1	0	97	9	0	36	0	45	10	31	0	0	41	183
Total Volume	0	0	0	0	0	0	347	4	0	351	23	1	133	0	157	30	137	0	0	167	675
% App. Total	0	0	0	0		0	98.9	1.1	0		14.6	0.6	84.7	0		18	82	0	0		
PHF	.000	.000	.000	.000	.000	.000	.904	1.000	.000	.905	.639	.250	.924	.000	.872	.750	.926	.000	.000	.928	.922

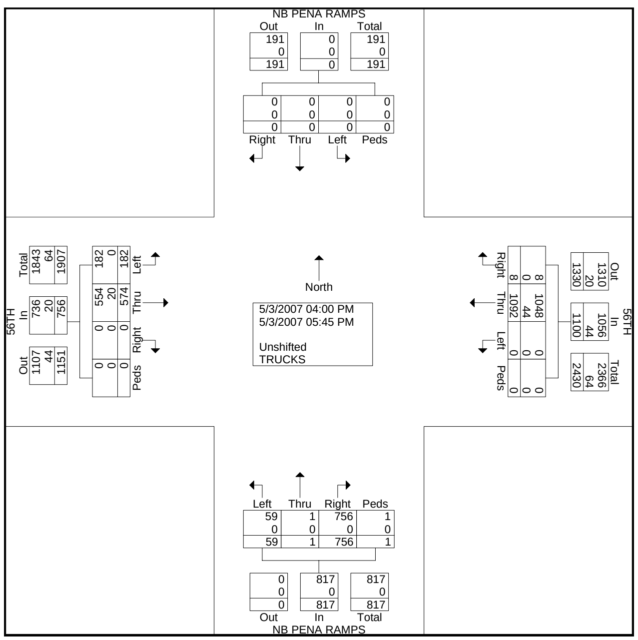


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : NBRAMPS&56THPM
Site Code : 00000000
Start Date : 5/3/2007
Page No : 1

Groups Printed- Unshifted - TRUCKS

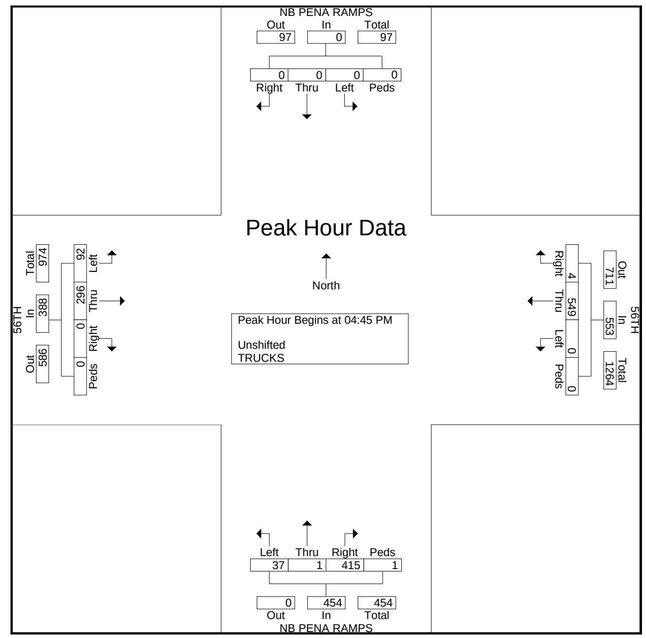
	NB PENA RAMPS Southbound				56TH Westbound				NB PENA RAMPS Northbound				56TH Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	0	0	0	0	123	0	0	10	0	86	0	25	71	0	0	315
04:15 PM	0	0	0	0	0	146	1	0	5	0	77	0	25	89	0	0	343
04:30 PM	0	0	0	0	0	146	0	0	2	0	90	0	20	61	0	0	319
04:45 PM	0	0	0	0	0	119	1	0	10	0	98	0	26	81	0	0	335
Total	0	0	0	0	0	534	2	0	27	0	351	0	96	302	0	0	1312
05:00 PM	0	0	0	0	0	135	2	0	8	0	100	1	19	85	0	0	350
05:15 PM	0	0	0	0	0	153	1	0	10	1	110	0	31	79	0	0	385
05:30 PM	0	0	0	0	0	142	0	0	9	0	107	0	16	51	0	0	325
05:45 PM	0	0	0	0	0	128	3	0	5	0	88	0	20	57	0	0	301
Total	0	0	0	0	0	558	6	0	32	1	405	1	86	272	0	0	1361
Grand Total	0	0	0	0	0	1092	8	0	59	1	756	1	182	574	0	0	2673
Apprch %	0	0	0	0	0	99.3	0.7	0	7.2	0.1	92.5	0.1	24.1	75.9	0	0	
Total %	0	0	0	0	0	40.9	0.3	0	2.2	0	28.3	0	6.8	21.5	0	0	
Unshifted	0	0	0	0	0	1048	8	0	59	1	756	1	182	554	0	0	2609
% Unshifted	0	0	0	0	0	96	100	0	100	100	100	100	100	96.5	0	0	97.6
TRUCKS	0	0	0	0	0	44	0	0	0	0	0	0	0	20	0	0	64
% TRUCKS	0	0	0	0	0	4	0	0	0	0	0	0	0	3.5	0	0	2.4



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : NBRAMPS&56THPM
Site Code : 00000000
Start Date : 5/3/2007
Page No : 2

	NB PENA RAMPS Southbound					56TH Westbound					NB PENA RAMPS Northbound					56TH Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	0	119	1	0	120	10	0	98	0	108	26	81	0	0	107	335
05:00 PM	0	0	0	0	0	0	135	2	0	137	8	0	100	1	109	19	85	0	0	104	350
05:15 PM	0	0	0	0	0	0	153	1	0	154	10	1	110	0	121	31	79	0	0	110	385
05:30 PM	0	0	0	0	0	0	142	0	0	142	9	0	107	0	116	16	51	0	0	67	325
Total Volume	0	0	0	0	0	0	549	4	0	553	37	1	415	1	454	92	296	0	0	388	1395
% App. Total	0	0	0	0		0	99.3	0.7	0		8.1	0.2	91.4	0.2		23.7	76.3	0	0		
PHF	.000	.000	.000	.000	.000	.000	.897	.500	.000	.898	.925	.250	.943	.250	.938	.742	.871	.000	.000	.882	.906



EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	1	31	8	0	2	1	0	0	2	0	0	0	0	45
01:00	0	21	1	0	0	0	0	1	2	0	0	0	0	25
02:00	1	25	4	1	4	0	0	2	1	0	0	0	0	38
03:00	0	28	8	0	0	2	0	0	2	0	0	0	0	40
04:00	0	29	5	0	3	3	0	1	2	0	0	0	0	43
05:00	0	82	19	3	7	3	0	2	9	**1**	0	0	0	126
06:00	0	168	60	**8**	18	8	0	6	7	0	**1**	0	0	276
07:00	2	**190**	62	4	**37**	9	**1**	**9**	3	1	0	**1**	0	**319**
08:00	**6**	177	60	6	23	**12**	0	9	**19**	0	0	0	**1**	313
09:00	3	110	**63**	2	14	9	1	9	7	0	0	0	0	218
10:00	3	132	61	6	20	10	0	4	4	0	0	0	0	240
11:00	2	188	46	3	17	9	0	3	8	0	0	0	0	276
12 PM	1	210	65	8	14	6	0	7	7	0	**1**	0	0	319
13:00	2	199	57	**11**	19	6	**1**	1	7	0	0	0	**1**	304
14:00	3	274	81	1	17	**9**	0	5	**10**	0	0	0	0	400
15:00	**6**	397	85	7	20	5	0	8	8	0	0	0	1	537
16:00	6	**514**	**109**	4	**29**	7	0	**9**	5	0	0	0	1	**684**
17:00	4	512	103	3	19	6	0	5	2	0	0	**1**	0	655
18:00	3	260	55	1	14	3	0	5	4	0	0	0	0	345
19:00	1	207	50	1	12	2	0	7	5	0	0	0	1	286
20:00	0	152	33	1	1	3	0	5	5	0	1	0	0	201
21:00	0	92	25	0	3	2	0	0	5	0	0	0	0	127
22:00	0	98	15	0	2	1	0	3	4	0	0	0	0	123
23:00	0	44	6	0	2	0	0	0	2	0	0	0	0	54
Day Total	44	4140	1081	70	297	116	3	101	130	2	3	2	5	5994
Percent	0.7%	69.1%	18.0%	1.2%	5.0%	1.9%	0.1%	1.7%	2.2%	0.0%	0.1%	0.0%	0.1%	
AM Peak	08:00	07:00	09:00	06:00	07:00	08:00	07:00	07:00	08:00	05:00	06:00	07:00	08:00	07:00
Vol.	6	190	63	8	37	12	1	9	19	1	1	1	1	319
PM Peak	15:00	16:00	16:00	13:00	16:00	14:00	13:00	16:00	14:00		12:00	17:00	13:00	16:00
Vol.	6	514	109	11	29	9	1	9	10		1	1	1	684

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	36	7	0	0	0	0	0	3	0	0	0	0	46
01:00	0	22	4	0	1	0	0	0	3	0	0	0	0	30
02:00	0	27	7	0	1	1	0	0	2	0	0	0	0	38
03:00	0	15	4	0	0	1	0	2	1	0	0	0	0	23
04:00	0	28	8	0	2	3	0	1	3	0	0	0	0	45
05:00	3	87	28	1	8	2	0	2	6	0	0	**1**	0	138
06:00	2	176	43	**8**	**25**	11	0	2	5	0	**1**	0	0	273
07:00	**6**	**190**	60	6	19	**12**	0	7	13	**1**	0	0	**1**	**315**
08:00	0	142	**63**	2	17	1	0	**14**	13	0	1	0	0	253
09:00	2	119	49	7	23	3	0	9	14	0	0	0	0	226
10:00	1	127	59	6	16	7	0	11	12	0	1	0	0	240
11:00	2	146	50	7	17	4	0	4	**16**	1	1	0	0	248
12 PM	1	199	49	4	15	6	0	7	**13**	0	0	0	**1**	295
13:00	4	183	60	4	15	7	0	7	13	0	0	0	0	293
14:00	**8**	285	58	3	15	6	**1**	8	8	0	0	0	1	393
15:00	1	359	91	3	23	5	1	9	8	0	0	0	0	500
16:00	4	**543**	98	3	19	**9**	0	**12**	8	1	**1**	**1**	0	**699**
17:00	3	494	**100**	**5**	**27**	7	0	4	6	**3**	1	1	0	651
18:00	4	277	53	1	12	4	0	3	7	0	0	0	0	361
19:00	2	197	54	1	14	1	0	3	6	0	0	0	0	278
20:00	1	143	34	0	7	1	0	6	5	0	0	0	0	197
21:00	1	105	32	0	11	1	0	5	3	0	0	0	0	158
22:00	2	93	26	1	3	2	0	2	1	0	0	0	0	130
23:00	1	51	18	0	1	0	0	0	2	0	0	0	0	73
Day Total	48	4044	1055	62	291	94	2	118	171	6	6	3	3	5903
Percent	0.8%	68.5%	17.9%	1.1%	4.9%	1.6%	0.0%	2.0%	2.9%	0.1%	0.1%	0.1%	0.1%	
AM Peak	07:00	07:00	08:00	06:00	06:00	07:00		08:00	11:00	07:00	06:00	05:00	07:00	07:00
Vol.	6	190	63	8	25	12		14	16	1	1	1	1	315
PM Peak	14:00	16:00	17:00	17:00	17:00	16:00	14:00	16:00	12:00	17:00	16:00	16:00	12:00	16:00
Vol.	8	543	100	5	27	9	1	12	13	3	1	1	1	699
Grand Total	92	8184	2136	132	588	210	5	219	301	8	9	5	8	11897
Percent	0.8%	68.8%	18.0%	1.1%	4.9%	1.8%	0.0%	1.8%	2.5%	0.1%	0.1%	0.0%	0.1%	

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	1	13	4	0	1	0	0	0	1	0	0	0	0	20
01:00	0	13	1	0	2	0	0	1	1	0	0	0	0	18
02:00	1	15	3	0	0	0	0	0	2	0	0	**1**	0	22
03:00	0	12	3	0	0	0	0	2	3	0	0	0	0	20
04:00	0	51	21	0	8	0	0	1	4	0	0	0	0	85
05:00	6	190	79	0	21	2	**1**	3	4	0	0	0	**1**	307
06:00	**13**	344	123	4	42	4	0	3	6	0	0	0	0	539
07:00	4	**480**	**168**	6	**63**	8	0	**18**	9	0	0	1	0	**757**
08:00	5	218	101	**20**	38	**10**	0	11	9	0	0	0	0	412
09:00	2	113	57	9	13	7	0	8	**10**	0	**1**	0	0	220
10:00	1	120	65	10	20	3	0	9	9	0	0	0	0	237
11:00	3	113	58	6	21	9	0	5	9	0	0	1	0	225
12 PM	1	160	57	13	18	9	0	4	8	0	0	0	0	270
13:00	5	164	74	7	19	8	0	0	**9**	0	0	0	0	286
14:00	5	156	54	6	17	4	0	**9**	5	0	0	0	0	256
15:00	2	247	79	11	**29**	11	**1**	6	5	0	**1**	0	0	392
16:00	5	239	90	**20**	23	**12**	0	7	7	0	1	0	0	**404**
17:00	2	**248**	**95**	5	13	7	0	8	5	0	0	0	0	383
18:00	**6**	135	60	0	19	4	0	4	5	0	0	0	0	233
19:00	3	81	31	1	7	3	0	3	3	0	0	0	0	132
20:00	6	91	24	2	10	1	0	3	2	0	0	0	0	139
21:00	1	78	32	1	9	7	0	1	2	0	1	0	0	132
22:00	1	47	5	1	3	2	0	1	0	0	0	0	0	60
23:00	0	27	9	0	0	0	0	1	2	0	0	0	0	39
Day Total	73	3355	1293	122	396	111	2	108	120	0	4	3	1	5588
Percent	1.3%	60.0%	23.1%	2.2%	7.1%	2.0%	0.0%	1.9%	2.1%	0.0%	0.1%	0.1%	0.0%	
AM Peak	06:00	07:00	07:00	08:00	07:00	08:00	05:00	07:00	09:00		09:00	02:00	05:00	07:00
Vol.	13	480	168	20	63	10	1	18	10		1	1	1	757
PM Peak	18:00	17:00	17:00	16:00	15:00	16:00	15:00	14:00	13:00		15:00			16:00
Vol.	6	248	95	20	29	12	1	9	9		1			404

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	17	4	0	0	0	0	0	1	0	0	0	0	22
01:00	0	14	3	1	2	0	0	1	1	0	0	0	0	22
02:00	0	8	6	0	0	0	0	1	2	0	0	0	0	17
03:00	0	18	4	0	0	1	0	1	2	0	0	0	0	26
04:00	0	47	23	0	5	1	0	1	7	0	0	0	0	84
05:00	3	207	85	1	17	3	0	4	4	0	**1**	0	0	325
06:00	**5**	317	114	2	39	7	**2**	6	6	**1**	0	**1**	0	500
07:00	4	**442**	**172**	8	**48**	6	2	12	5	0	0	0	**1**	**700**
08:00	3	284	111	13	43	**13**	1	**15**	5	0	1	0	0	489
09:00	2	127	61	**15**	19	10	1	4	7	1	0	1	0	248
10:00	2	145	74	5	27	6	0	5	**9**	0	0	0	0	273
11:00	2	138	60	1	31	8	0	6	6	0	0	0	0	252
12 PM	2	167	68	7	**30**	7	0	11	3	0	0	0	0	295
13:00	4	146	62	6	24	9	0	4	**6**	0	0	0	0	261
14:00	3	165	74	12	21	11	**1**	5	4	0	0	**1**	0	297
15:00	**8**	**241**	**103**	10	26	**12**	0	2	5	0	**1**	0	0	**408**
16:00	3	225	69	**14**	25	6	0	**14**	2	0	0	0	0	358
17:00	4	239	85	6	19	7	1	12	5	0	0	0	0	378
18:00	2	175	70	4	17	4	0	10	0	0	0	0	0	282
19:00	4	83	42	3	12	1	0	3	1	0	0	0	0	149
20:00	4	70	43	2	5	0	0	5	1	0	0	0	**1**	131
21:00	2	67	33	3	8	1	0	2	3	0	0	0	0	119
22:00	0	37	11	0	2	3	0	2	2	0	0	0	0	57
23:00	1	28	7	1	1	3	0	0	1	0	0	0	0	42
Day Total	58	3407	1384	114	421	119	8	126	88	2	3	3	2	5735
Percent	1.0%	59.4%	24.1%	2.0%	7.3%	2.1%	0.1%	2.2%	1.5%	0.0%	0.1%	0.1%	0.0%	
AM Peak	06:00	07:00	07:00	09:00	07:00	08:00	06:00	08:00	10:00	06:00	05:00	06:00	07:00	07:00
Vol.	5	442	172	15	48	13	2	15	9	1	1	1	1	700
PM Peak	15:00	15:00	15:00	16:00	12:00	15:00	14:00	16:00	13:00		15:00	14:00	20:00	15:00
Vol.	8	241	103	14	30	12	1	14	6		1	1	1	408
Grand Total	131	6762	2677	236	817	230	10	234	208	2	7	6	3	11323
Percent	1.2%	59.7%	23.6%	2.1%	7.2%	2.0%	0.1%	2.1%	1.8%	0.0%	0.1%	0.1%	0.0%	

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	32	2	0	0	0	0	0	1	0	0	0	0	35
01:00	0	17	3	0	1	0	0	1	2	0	0	0	0	24
02:00	0	25	2	0	0	0	0	2	1	0	0	0	0	30
03:00	0	24	1	0	0	1	0	1	0	0	0	0	0	27
04:00	0	25	2	0	0	2	0	1	0	0	0	0	0	30
05:00	0	106	13	1	5	3	0	4	1	0	**2**	0	0	135
06:00	4	237	46	**7**	**13**	6	0	8	3	0	0	0	0	324
07:00	**8**	**252**	**72**	2	7	8	0	4	7	0	0	0	0	**360**
08:00	5	196	37	2	6	**9**	0	5	**13**	0	1	0	0	274
09:00	2	152	41	2	8	3	0	**10**	10	0	1	0	0	229
10:00	2	161	38	1	9	4	0	3	11	0	0	0	0	229
11:00	8	191	35	2	12	3	0	6	12	0	0	0	0	269
12 PM	3	196	38	3	10	0	0	3	**11**	0	0	0	**1**	265
13:00	1	192	47	2	6	3	0	**6**	11	0	0	0	0	268
14:00	2	280	57	**4**	13	**4**	0	5	4	0	0	0	0	369
15:00	5	407	65	3	11	0	0	2	4	0	0	0	0	497
16:00	**7**	**508**	**93**	2	**18**	3	0	4	4	**1**	**1**	0	0	**641**
17:00	7	497	89	3	10	1	0	4	4	0	0	0	0	615
18:00	2	279	43	2	5	1	0	4	3	0	0	0	0	339
19:00	2	186	28	2	1	2	0	3	2	0	0	0	0	226
20:00	0	145	34	0	1	0	0	5	4	0	0	0	0	189
21:00	3	119	18	0	0	0	0	2	1	0	0	0	0	143
22:00	0	81	8	0	0	0	0	1	2	0	0	0	0	92
23:00	0	42	4	0	0	0	0	2	1	0	0	0	0	49
Day Total	61	4350	816	38	136	53	0	86	112	1	5	0	1	5659
Percent	1.1%	76.9%	14.4%	0.7%	2.4%	0.9%	0.0%	1.5%	2.0%	0.0%	0.1%	0.0%	0.0%	
AM Peak	07:00	07:00	07:00	06:00	06:00	08:00		09:00	08:00		05:00			07:00
Vol.	8	252	72	7	13	9		10	13		2			360
PM Peak	16:00	16:00	16:00	14:00	16:00	14:00		13:00	12:00	16:00	16:00		12:00	16:00
Vol.	7	508	93	4	18	4		6	11	1	1		1	641

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	19	2	0	0	0	0	1	2	0	0	0	0	24
01:00	0	14	1	0	0	0	0	1	2	0	0	0	0	18
02:00	0	19	1	0	2	1	0	3	0	0	0	0	0	26
03:00	0	32	3	0	0	1	0	2	0	0	0	0	0	38
04:00	0	35	3	0	0	2	0	1	1	0	0	0	0	42
05:00	0	108	22	2	3	3	0	1	4	0	0	0	0	143
06:00	3	236	**48**	**4**	12	7	0	3	5	0	**1**	0	0	319
07:00	**5**	**238**	47	3	**19**	**10**	**1**	5	1	**1**	0	0	0	**330**
08:00	3	172	48	0	12	10	0	5	**13**	0	0	0	0	263
09:00	1	147	42	1	10	5	0	**6**	3	0	0	0	0	215
10:00	1	142	45	2	11	3	0	5	3	0	0	0	0	212
11:00	0	180	35	1	10	4	0	1	4	0	0	0	0	235
12 PM	0	209	59	**4**	7	1	0	6	3	0	0	0	0	289
13:00	0	189	31	1	10	3	0	2	5	0	0	0	0	241
14:00	**3**	272	51	1	6	2	0	**9**	2	0	0	0	0	346
15:00	2	440	51	4	8	**4**	0	8	2	0	0	0	0	519
16:00	2	499	65	3	**19**	1	0	8	0	0	0	0	0	597
17:00	3	**513**	**66**	2	8	0	0	6	3	0	0	0	0	**601**
18:00	2	274	37	0	7	1	0	5	1	0	0	0	0	327
19:00	0	181	37	0	7	2	0	6	2	0	0	0	0	235
20:00	1	176	21	1	1	0	0	4	**6**	0	**1**	0	0	211
21:00	0	122	9	0	2	2	0	4	1	0	0	0	0	140
22:00	0	89	12	0	2	0	0	1	1	0	0	0	0	105
23:00	0	42	6	0	0	0	0	1	1	0	0	0	0	50
Day Total	26	4348	742	29	156	62	1	94	65	1	2	0	0	5526
Percent	0.5%	78.7%	13.4%	0.5%	2.8%	1.1%	0.0%	1.7%	1.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	06:00	06:00	07:00	07:00	07:00	09:00	08:00	07:00	06:00			07:00
Vol.	5	238	48	4	19	10	1	6	13	1	1			330
PM Peak	14:00	17:00	17:00	12:00	16:00	15:00		14:00	20:00		20:00			17:00
Vol.	3	513	66	4	19	4		9	6		1			601
Grand Total	87	8698	1558	67	292	115	1	180	177	2	7	0	1	11185
Percent	0.8%	77.8%	13.9%	0.6%	2.6%	1.0%	0.0%	1.6%	1.6%	0.0%	0.1%	0.0%	0.0%	

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	2	23	15	0	2	0	0	0	0	0	0	0	0	42
01:00	1	6	10	0	2	0	0	2	1	0	0	0	0	22
02:00	0	13	7	0	1	0	0	0	2	0	0	0	0	23
03:00	1	6	4	0	3	0	0	1	1	0	0	0	0	16
04:00	1	23	15	1	9	0	0	0	2	0	0	0	0	51
05:00	2	79	65	1	27	2	0	1	3	0	0	0	0	180
06:00	2	193	121	6	59	5	0	3	3	0	0	0	0	392
07:00	**11**	**271**	**164**	5	**67**	6	0	**9**	4	0	0	0	0	**537**
08:00	6	177	110	**21**	39	6	**1**	5	4	**1**	0	0	0	370
09:00	2	81	51	7	19	3	0	5	**7**	0	**1**	0	0	176
10:00	1	84	66	14	25	3	0	4	3	0	0	0	0	200
11:00	4	88	63	9	25	**8**	0	4	5	0	0	**1**	0	207
12 PM	3	114	79	9	29	4	0	3	**5**	0	0	0	0	246
13:00	2	132	87	7	33	6	0	0	3	0	0	0	0	270
14:00	2	112	70	4	25	5	0	4	3	0	0	0	0	225
15:00	4	186	99	9	**44**	**10**	0	2	2	0	0	0	0	356
16:00	4	183	**112**	**13**	31	8	0	4	3	0	0	0	0	**358**
17:00	**6**	**197**	90	7	30	1	0	**6**	2	0	0	0	0	339
18:00	5	119	66	0	19	6	0	3	3	0	0	0	0	221
19:00	3	77	44	0	21	0	0	0	0	0	0	0	0	145
20:00	2	75	48	2	21	0	0	1	1	0	**1**	0	0	151
21:00	4	74	44	0	16	3	**1**	1	1	0	0	0	0	144
22:00	0	64	26	0	7	0	0	1	0	0	0	0	0	98
23:00	0	23	26	0	2	1	0	1	1	0	0	0	0	54
Day Total	68	2400	1482	115	556	77	2	60	59	1	2	1	0	4823
Percent	1.4%	49.8%	30.7%	2.4%	11.5%	1.6%	0.0%	1.2%	1.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	07:00	08:00	07:00	11:00	08:00	07:00	09:00	08:00	09:00	11:00		07:00
Vol.	11	271	164	21	67	8	1	9	7	1	1	1		537
PM Peak	17:00	17:00	16:00	16:00	15:00	15:00	21:00	17:00	12:00		20:00			16:00
Vol.	6	197	112	13	44	10	1	6	5		1			358

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	18	8	0	1	0	0	0	0	0	0	0	0	27
01:00	0	14	4	0	3	0	0	1	1	0	0	0	0	23
02:00	0	7	5	1	0	0	0	1	2	0	0	0	0	16
03:00	0	7	4	0	0	0	0	1	1	0	0	0	0	13
04:00	1	26	15	1	5	1	0	0	4	0	0	0	0	53
05:00	1	81	62	2	28	1	0	1	3	0	0	0	0	179
06:00	3	185	105	3	53	**6**	0	2	**8**	0	0	0	0	365
07:00	**5**	**286**	**173**	9	**60**	4	0	4	2	0	0	0	0	**543**
08:00	1	176	110	**18**	38	6	0	**10**	4	**1**	**1**	0	0	365
09:00	2	78	56	13	26	4	0	2	5	0	0	**1**	0	187
10:00	0	83	68	6	27	2	0	2	5	0	0	0	0	193
11:00	2	92	70	3	30	3	0	2	3	0	0	0	0	205
12 PM	1	103	82	7	33	3	0	4	**3**	0	0	0	0	236
13:00	2	112	65	5	34	**5**	0	2	3	0	0	0	0	228
14:00	6	144	76	12	**38**	4	0	3	2	**1**	0	0	0	286
15:00	**14**	216	**116**	**13**	38	5	0	1	2	0	0	0	0	**405**
16:00	13	**224**	95	13	38	3	**1**	**7**	0	0	0	0	0	394
17:00	7	208	90	5	27	4	0	6	2	0	0	0	0	349
18:00	8	135	82	3	22	3	0	2	1	0	0	0	0	256
19:00	3	86	61	3	13	0	0	2	1	0	0	0	0	169
20:00	4	87	46	2	26	0	0	1	2	0	**1**	0	0	169
21:00	1	81	43	2	15	1	0	2	0	0	0	0	0	145
22:00	0	53	30	0	5	1	1	1	3	0	0	0	0	94
23:00	0	34	20	2	2	1	0	0	1	0	0	0	0	60
Day Total	74	2536	1486	123	562	57	2	57	58	2	2	1	0	4960
Percent	1.5%	51.1%	30.0%	2.5%	11.3%	1.1%	0.0%	1.1%	1.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	07:00	08:00	07:00	06:00		08:00	06:00	08:00	08:00	09:00		07:00
Vol.	5	286	173	18	60	6		10	8	1	1	1		543
PM Peak	15:00	16:00	15:00	15:00	14:00	13:00	16:00	16:00	12:00	14:00	20:00			15:00
Vol.	14	224	116	13	38	5	1	7	3	1	1			405
Grand Total	142	4936	2968	238	1118	134	4	117	117	3	4	2	0	9783
Percent	1.5%	50.5%	30.3%	2.4%	11.4%	1.4%	0.0%	1.2%	1.2%	0.0%	0.0%	0.0%	0.0%	

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	27	5	0	1	0	0	0	2	0	0	0	0	35
01:00	0	27	1	0	0	0	0	1	0	0	0	0	0	29
02:00	0	19	1	0	0	0	0	0	0	0	0	0	0	20
03:00	0	9	0	0	1	0	0	0	0	0	0	0	0	10
04:00	0	29	3	0	2	1	0	1	1	0	0	0	0	37
05:00	0	113	3	0	2	0	0	0	1	0	0	0	0	119
06:00	4	248	14	0	3	0	0	2	1	0	0	0	0	272
07:00	**5**	**404**	8	1	5	**3**	0	3	0	0	0	0	0	**429**
08:00	3	275	12	2	**9**	0	0	6	1	0	0	0	0	308
09:00	0	134	13	1	7	2	0	4	3	0	**1**	0	0	165
10:00	0	118	20	**3**	2	0	0	8	**4**	0	0	0	0	155
11:00	0	125	**23**	2	8	1	0	**9**	1	0	0	0	0	169
12 PM	1	122	32	2	8	2	0	**5**	**3**	0	0	0	0	175
13:00	1	152	34	0	10	2	0	3	1	0	0	0	**1**	204
14:00	**2**	172	21	1	13	0	0	4	2	0	0	0	0	215
15:00	2	**221**	35	3	**17**	**3**	0	1	1	0	**1**	0	0	**284**
16:00	0	210	33	**4**	11	2	0	5	2	0	0	0	0	267
17:00	0	195	**36**	2	7	0	0	0	1	0	0	0	0	241
18:00	0	158	15	0	7	1	0	1	1	0	0	0	0	183
19:00	0	94	15	0	3	0	0	4	0	0	0	0	0	116
20:00	2	89	8	1	2	0	0	2	0	0	1	0	0	105
21:00	0	99	12	0	5	0	0	2	0	0	0	0	0	118
22:00	0	67	8	1	0	0	0	1	0	0	0	0	0	77
23:00	0	46	5	0	0	0	0	0	1	0	0	0	0	52
Day Total	20	3153	357	23	123	17	0	62	26	0	3	0	1	3785
Percent	0.5%	83.3%	9.4%	0.6%	3.2%	0.4%	0.0%	1.6%	0.7%	0.0%	0.1%	0.0%	0.0%	
AM Peak	07:00	07:00	11:00	10:00	08:00	07:00		11:00	10:00		09:00			07:00
Vol.	5	404	23	3	9	3		9	4		1			429
PM Peak	14:00	15:00	17:00	16:00	15:00	15:00		12:00	12:00		15:00		13:00	15:00
Vol.	2	221	36	4	17	3		5	3		1		1	284

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	30	0	0	0	1	0	0	0	0	0	0	0	31
01:00	0	23	2	0	1	0	0	1	0	0	0	0	0	27
02:00	0	20	0	0	0	0	0	1	0	0	0	0	0	21
03:00	0	6	1	0	0	0	0	0	0	0	0	0	0	7
04:00	0	35	2	0	0	1	0	1	**2**	0	0	0	0	41
05:00	0	122	7	0	1	0	0	2	0	0	0	0	0	132
06:00	3	257	14	0	3	1	0	2	2	0	0	0	0	282
07:00	**5**	**410**	16	1	6	0	0	0	0	0	0	0	0	**438**
08:00	2	257	11	2	6	1	0	**4**	0	0	**1**	0	0	284
09:00	0	115	20	**4**	12	1	0	3	0	0	0	**1**	0	156
10:00	0	110	21	2	6	2	0	3	1	0	0	0	0	145
11:00	1	121	**30**	1	**15**	**3**	0	4	1	0	0	0	0	176
12 PM	0	145	26	1	**19**	2	0	2	2	0	0	0	0	197
13:00	0	137	27	2	5	2	0	2	1	0	0	0	0	176
14:00	1	193	36	**4**	15	3	0	3	1	0	0	0	0	256
15:00	2	213	**43**	3	12	**6**	0	5	**4**	0	0	0	0	**288**
16:00	1	**226**	38	3	10	2	0	**6**	0	0	0	0	0	286
17:00	2	198	36	1	9	2	0	3	0	0	0	0	0	251
18:00	1	133	27	2	6	1	0	3	2	0	0	0	0	175
19:00	1	87	14	2	6	0	0	2	1	0	0	0	0	113
20:00	**3**	92	16	1	5	1	0	2	1	0	**1**	0	0	122
21:00	0	89	17	2	2	1	0	2	0	0	0	0	0	113
22:00	0	81	8	1	0	0	0	0	1	0	0	0	0	91
23:00	0	61	4	0	2	0	0	2	0	0	0	0	0	69
Day Total	22	3161	416	32	141	30	0	53	19	0	2	1	0	3877
Percent	0.6%	81.5%	10.7%	0.8%	3.6%	0.8%	0.0%	1.4%	0.5%	0.0%	0.1%	0.0%	0.0%	
AM Peak	07:00	07:00	11:00	09:00	11:00	11:00		08:00	04:00		08:00	09:00		07:00
Vol.	5	410	30	4	15	3		4	2		1	1		438
PM Peak	20:00	16:00	15:00	14:00	12:00	15:00		16:00	15:00		20:00			15:00
Vol.	3	226	43	4	19	6		6	4		1			288
Grand Total	42	6314	773	55	264	47	0	115	45	0	5	1	1	7662
Percent	0.5%	82.4%	10.1%	0.7%	3.4%	0.6%	0.0%	1.5%	0.6%	0.0%	0.1%	0.0%	0.0%	

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	1	26	6	0	1	0	0	0	1	0	0	0	0	35
01:00	0	13	5	0	1	0	0	1	1	0	0	0	0	21
02:00	0	16	4	0	2	0	0	2	1	0	0	0	0	25
03:00	0	22	1	0	1	0	0	1	0	0	0	0	0	25
04:00	1	30	6	0	0	1	0	1	0	0	0	0	0	39
05:00	2	84	22	3	11	1	0	2	1	0	**2**	0	0	128
06:00	11	162	**70**	8	**21**	2	0	3	1	0	0	0	0	278
07:00	**12**	**181**	60	5	19	**8**	0	**4**	5	0	0	0	0	**294**
08:00	6	132	50	11	14	5	0	2	6	0	1	0	0	227
09:00	1	93	50	4	12	3	0	0	5	0	0	0	0	168
10:00	1	92	45	8	14	3	0	2	**7**	0	0	0	0	172
11:00	2	82	58	**12**	14	2	0	2	4	**1**	0	0	0	177
12 PM	0	102	56	**8**	15	0	0	3	5	0	0	0	0	189
13:00	0	116	54	5	15	3	0	3	5	0	0	0	**1**	202
14:00	2	160	64	4	16	**4**	0	**6**	3	0	0	0	0	259
15:00	3	233	90	3	23	0	0	3	2	0	0	0	0	357
16:00	3	**314**	**119**	4	**27**	2	0	4	**6**	0	**1**	0	0	**480**
17:00	1	299	107	4	22	1	0	2	4	0	0	0	0	440
18:00	**6**	178	50	3	14	0	0	2	4	0	0	0	0	257
19:00	2	100	43	0	12	0	0	3	3	0	0	0	0	163
20:00	2	100	35	0	8	1	0	2	4	0	0	0	0	152
21:00	4	66	17	0	6	0	0	2	1	0	0	0	0	96
22:00	0	46	10	0	1	0	0	1	2	0	0	0	0	60
23:00	1	25	8	0	0	0	0	2	1	0	0	0	0	37
Day Total	61	2672	1030	82	269	36	0	53	72	1	4	0	1	4281
Percent	1.4%	62.4%	24.1%	1.9%	6.3%	0.8%	0.0%	1.2%	1.7%	0.0%	0.1%	0.0%	0.0%	
AM Peak	07:00	07:00	06:00	11:00	06:00	07:00		07:00	10:00	11:00	05:00			07:00
Vol.	12	181	70	12	21	8		4	7	1	2			294
PM Peak	18:00	16:00	16:00	12:00	16:00	14:00		14:00	16:00		16:00		13:00	16:00
Vol.	6	314	119	8	27	4		6	6		1		1	480

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	14	5	0	0	0	0	0	2	0	0	0	0	21
01:00	0	11	2	0	0	0	0	1	1	0	0	0	0	15
02:00	0	16	3	0	1	1	0	2	1	0	0	0	0	24
03:00	1	19	11	0	0	1	0	0	2	0	0	0	0	34
04:00	1	38	17	0	1	0	0	1	0	0	0	0	0	58
05:00	2	73	29	3	9	1	0	0	4	0	0	0	0	121
06:00	5	151	**70**	5	**18**	4	0	2	4	0	**1**	0	0	260
07:00	**16**	**162**	60	**8**	16	5	0	2	0	0	0	0	0	**269**
08:00	2	127	59	8	16	**7**	0	**6**	**6**	0	0	0	0	231
09:00	1	86	42	4	17	6	0	6	3	0	0	0	0	165
10:00	1	72	48	7	15	3	0	0	5	0	0	0	0	151
11:00	2	91	53	2	17	4	0	0	3	0	0	0	0	172
12 PM	1	121	58	**7**	17	2	0	2	4	0	0	0	0	212
13:00	0	110	44	4	8	2	0	5	6	0	0	0	0	179
14:00	2	157	66	3	10	1	0	3	6	0	0	0	0	248
15:00	1	268	106	6	**32**	1	0	**6**	5	0	0	0	0	425
16:00	3	**319**	**108**	1	27	0	0	4	5	0	0	0	0	**467**
17:00	**5**	306	92	3	30	**3**	0	1	**8**	0	0	0	0	448
18:00	2	150	64	3	18	1	0	4	5	0	0	0	0	247
19:00	5	96	34	3	18	1	0	2	2	0	0	0	0	161
20:00	2	102	37	1	9	0	0	2	4	0	**1**	0	0	158
21:00	1	72	31	0	8	2	0	0	4	0	0	0	0	118
22:00	1	50	18	1	5	2	0	1	0	0	0	0	0	78
23:00	0	30	13	0	0	0	0	0	2	0	0	0	0	45
Day Total	54	2641	1070	69	292	47	0	50	82	0	2	0	0	4307
Percent	1.3%	61.3%	24.8%	1.6%	6.8%	1.1%	0.0%	1.2%	1.9%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	06:00	07:00	06:00	08:00		08:00	08:00		06:00			07:00
Vol.	16	162	70	8	18	7		6	6		1			269
PM Peak	17:00	16:00	16:00	12:00	15:00	17:00		15:00	17:00		20:00			16:00
Vol.	5	319	108	7	32	3		6	8		1			467
Grand Total	115	5313	2100	151	561	83	0	103	154	1	6	0	1	8588
Percent	1.3%	61.9%	24.5%	1.8%	6.5%	1.0%	0.0%	1.2%	1.8%	0.0%	0.1%	0.0%	0.0%	

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	28	1	0	1	0	0	0	1	0	0	0	0	31
01:00	1	12	3	0	1	0	0	0	1	0	0	0	0	18
02:00	0	15	3	0	0	0	0	1	0	0	0	0	0	19
03:00	0	18	1	0	1	0	0	0	0	0	0	0	0	20
04:00	1	24	4	0	0	0	0	1	0	0	0	0	0	30
05:00	3	72	10	1	2	1	0	1	2	0	**2**	0	0	94
06:00	14	147	**19**	**2**	5	**2**	0	**2**	2	0	0	0	0	193
07:00	**27**	141	11	2	**6**	2	0	1	0	0	0	0	0	190
08:00	12	203	8	0	4	2	0	2	1	0	0	0	0	232
09:00	4	244	13	1	2	0	0	0	**4**	0	0	0	0	268
10:00	4	238	7	1	5	2	**1**	1	1	0	0	0	0	260
11:00	6	**277**	12	0	3	0	0	1	1	0	0	0	**1**	**301**
12 PM	2	267	9	**2**	4	1	0	**2**	**4**	**1**	0	0	0	292
13:00	3	312	11	1	3	**3**	0	1	4	0	0	0	0	338
14:00	4	368	15	1	**6**	1	0	2	2	0	0	0	0	399
15:00	12	464	9	0	3	0	0	1	0	1	0	0	0	490
16:00	**17**	**477**	**16**	0	5	1	0	1	2	0	0	0	0	**519**
17:00	13	426	8	0	0	0	0	0	0	0	0	0	0	447
18:00	4	256	4	0	0	0	0	0	0	0	0	0	0	264
19:00	3	153	0	0	0	0	0	0	0	0	0	0	0	156
20:00	2	124	1	0	0	0	0	0	0	0	0	0	0	127
21:00	0	95	2	0	0	0	0	0	0	0	0	0	0	97
22:00	1	51	0	0	0	0	0	0	0	0	0	0	0	52
23:00	0	35	0	0	0	0	0	0	0	0	0	0	0	35
Day Total	133	4447	167	11	51	15	1	17	25	2	2	0	1	4872
Percent	2.7%	91.3%	3.4%	0.2%	1.0%	0.3%	0.0%	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	11:00	06:00	06:00	07:00	06:00	10:00	06:00	09:00		05:00		11:00	11:00
Vol.	27	277	19	2	6	2	1	2	4		2		1	301
PM Peak	16:00	16:00	16:00	12:00	14:00	13:00		12:00	12:00	12:00				16:00
Vol.	17	477	16	2	6	3		2	4	1				519

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	21	0	0	0	0	0	0	0	0	0	0	0	21
01:00	0	11	0	0	0	0	0	0	0	0	0	0	0	11
02:00	0	17	1	0	0	0	0	0	0	0	0	0	0	18
03:00	0	29	0	0	0	0	0	0	0	0	0	0	0	29
04:00	0	42	0	0	0	0	0	0	0	0	0	0	0	42
05:00	3	90	1	0	0	0	0	0	0	0	0	0	0	94
06:00	13	163	4	1	3	0	0	**1**	0	0	0	0	0	185
07:00	**21**	142	0	1	**5**	**1**	0	0	0	0	0	0	0	170
08:00	11	175	**8**	1	3	0	0	0	0	0	0	0	0	198
09:00	4	305	3	0	1	1	0	1	0	0	0	0	0	315
10:00	1	349	6	**2**	3	0	0	0	0	0	0	0	0	361
11:00	1	**460**	2	0	0	0	**1**	0	0	0	0	0	0	**464**
12 PM	2	436	0	0	0	0	0	0	0	0	0	0	0	438
13:00	3	432	2	0	1	0	0	**1**	0	0	0	0	0	439
14:00	3	511	2	0	1	0	0	0	0	0	0	0	0	517
15:00	5	**597**	4	0	**2**	**1**	0	0	0	0	0	0	0	**609**
16:00	5	586	**8**	0	1	0	0	1	0	0	0	0	0	601
17:00	**8**	519	8	0	0	0	0	0	**1**	0	0	0	0	536
18:00	5	314	1	0	1	0	0	0	0	0	0	0	0	321
19:00	2	165	4	0	0	0	0	0	0	0	0	0	0	171
20:00	4	136	1	0	0	0	0	0	0	0	0	0	0	141
21:00	1	105	0	0	0	0	0	0	0	0	0	0	0	106
22:00	0	70	1	0	0	0	0	0	0	0	0	0	0	71
23:00	0	43	0	0	0	0	0	0	0	0	0	0	0	43
Day Total	92	5718	56	5	21	3	1	4	1	0	0	0	0	5901
Percent	1.6%	96.9%	0.9%	0.1%	0.4%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	11:00	08:00	10:00	07:00	07:00	11:00	06:00						11:00
Vol.	21	460	8	2	5	1	1	1						464
PM Peak	17:00	15:00	16:00		15:00	15:00		13:00	17:00					15:00
Vol.	8	597	8		2	1		1	1					609
Grand Total	225	10165	223	16	72	18	2	21	26	2	2	0	1	10773
Percent	2.1%	94.4%	2.1%	0.1%	0.7%	0.2%	0.0%	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	1	71	0	0	1	0	0	0	0	0	0	0	0	73
01:00	1	53	0	0	0	0	0	0	0	0	0	0	0	54
02:00	0	36	0	0	0	0	0	0	0	0	0	0	0	36
03:00	0	29	0	0	0	0	0	0	0	0	0	0	0	29
04:00	0	85	0	0	0	0	0	0	0	0	0	0	0	85
05:00	2	352	0	0	1	0	0	0	0	0	0	0	0	355
06:00	4	**685**	0	0	3	0	0	0	0	0	0	0	0	**692**
07:00	9	670	0	0	0	0	0	0	0	0	0	0	0	679
08:00	**14**	448	2	1	3	0	0	0	0	0	0	0	0	468
09:00	7	239	22	1	**16**	**10**	0	7	**8**	0	0	**1**	0	311
10:00	7	193	**34**	**3**	13	8	0	**15**	2	0	0	0	0	275
11:00	6	181	31	2	11	3	0	7	5	0	0	0	0	246
12 PM	5	176	34	**4**	**14**	**9**	0	**10**	**6**	0	0	0	0	**258**
13:00	3	**187**	**38**	3	5	2	0	5	0	0	0	0	0	243
14:00	**9**	181	25	1	11	4	0	2	2	0	0	0	0	235
15:00	5	167	15	2	9	3	0	2	1	0	**1**	0	0	205
16:00	3	180	8	1	3	0	0	0	0	0	0	0	0	195
17:00	5	105	2	0	3	0	0	0	0	0	0	0	0	115
18:00	1	48	0	0	1	0	0	0	0	0	0	0	0	50
19:00	0	21	0	0	0	0	0	0	0	0	0	0	0	21
20:00	0	15	0	0	0	0	0	0	0	0	0	0	0	15
21:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
22:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
23:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Day Total	82	4139	211	18	94	39	0	48	24	0	1	1	0	4657
Percent	1.8%	88.9%	4.5%	0.4%	2.0%	0.8%	0.0%	1.0%	0.5%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	06:00	10:00	10:00	09:00	09:00		10:00	09:00			09:00		06:00
Vol.	14	685	34	3	16	10		15	8			1		692
PM Peak	14:00	13:00	13:00	12:00	12:00	12:00		12:00	12:00		15:00			12:00
Vol.	9	187	38	4	14	9		10	6		1			258

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	64	0	0	0	0	1	0	0	0	0	0	0	65
01:00	0	48	0	0	0	0	0	0	0	0	0	0	0	48
02:00	0	32	0	0	0	0	0	0	0	0	0	0	0	32
03:00	1	26	0	0	0	0	0	0	0	0	0	0	0	27
04:00	2	76	0	0	0	0	0	0	0	0	0	0	0	78
05:00	1	317	0	0	1	1	1	0	0	0	0	0	0	321
06:00	1	**616**	4	2	2	1	1	0	3	0	0	0	0	**630**
07:00	6	603	11	1	0	0	0	0	2	0	0	0	0	623
08:00	**17**	538	12	0	1	1	**2**	0	5	0	0	0	0	576
09:00	8	287	26	2	15	**12**	0	**8**	2	0	0	**1**	0	361
10:00	8	232	**41**	**3**	19	10	0	2	5	0	0	0	0	320
11:00	7	217	37	2	**21**	4	0	2	**6**	0	0	0	0	296
12 PM	**6**	211	41	**5**	**20**	2	0	**2**	**2**	0	0	0	0	289
13:00	4	**224**	**46**	2	15	**3**	0	2	0	0	0	0	0	**296**
14:00	6	217	30	3	11	3	0	2	1	0	0	0	0	273
15:00	1	200	18	2	2	2	0	2	1	0	**1**	0	0	229
16:00	2	110	2	2	3	2	0	2	2	0	1	0	0	126
17:00	2	78	6	1	2	0	0	1	0	0	0	0	0	90
18:00	1	47	4	0	0	0	0	1	0	0	0	0	0	53
19:00	2	20	0	1	1	1	0	1	0	0	0	0	0	26
20:00	2	16	0	0	0	0	0	0	0	0	0	0	0	18
21:00	0	18	0	0	0	0	0	0	0	0	0	0	0	18
22:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
23:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
Day Total	77	4208	278	26	113	42	5	25	29	0	2	1	0	4806
Percent	1.6%	87.6%	5.8%	0.5%	2.4%	0.9%	0.1%	0.5%	0.6%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	06:00	10:00	10:00	11:00	09:00	08:00	09:00	11:00			09:00		06:00
Vol.	17	616	41	3	21	12	2	8	6			1		630
PM Peak	12:00	13:00	13:00	12:00	12:00	13:00		12:00	12:00		15:00			13:00
Vol.	6	224	46	5	20	3		2	2		1			296
Grand Total	159	8347	489	44	207	81	5	73	53	0	3	2	0	9463
Percent	1.7%	88.2%	5.2%	0.5%	2.2%	0.9%	0.1%	0.8%	0.6%	0.0%	0.0%	0.0%	0.0%	

All Traffic Data Services, Inc.
9660 W 44th Ave
Wheat Ridge, CO 80033
www.alltrafficdata.net

Site Code: 7

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	47	4	0	1	0	0	0	0	0	0	0	0	52
01:00	0	24	3	0	0	0	0	0	0	0	0	0	0	27
02:00	1	23	2	0	0	0	0	0	1	0	0	0	0	27
03:00	0	17	2	0	1	0	0	0	0	0	0	0	0	20
04:00	0	31	5	0	2	0	0	0	1	0	0	0	0	39
05:00	0	63	12	0	7	1	0	1	1	0	**2**	0	0	87
06:00	**2**	146	38	**5**	11	2	0	2	0	0	0	0	0	206
07:00	1	**202**	**44**	3	12	**8**	0	**4**	7	0	0	0	0	**281**
08:00	1	164	36	0	**16**	5	0	2	**9**	0	0	0	0	233
09:00	0	130	29	0	15	3	0	0	8	0	0	0	0	185
10:00	1	141	28	2	9	5	0	2	8	0	0	0	0	196
11:00	2	144	33	3	10	1	0	2	7	0	0	0	**1**	203
12 PM	0	161	42	**3**	11	1	0	3	5	0	0	0	0	226
13:00	3	194	40	3	9	2	0	1	**8**	0	0	0	0	260
14:00	3	224	42	2	**14**	3	0	**5**	4	0	0	0	0	297
15:00	5	380	64	1	12	2	0	3	2	0	0	0	0	469
16:00	**7**	556	90	0	10	**4**	0	3	7	0	0	**1**	0	678
17:00	7	**582**	**93**	1	11	3	0	2	1	0	0	0	0	**700**
18:00	4	391	54	1	5	0	0	0	4	0	0	0	0	459
19:00	0	247	39	0	3	0	0	0	2	0	0	0	**1**	292
20:00	2	240	29	0	2	0	0	0	2	0	0	0	0	275
21:00	3	180	25	0	3	0	0	0	1	0	0	0	0	212
22:00	0	114	9	0	1	0	0	1	1	0	0	0	0	126
23:00	0	79	8	0	0	0	0	0	0	0	0	0	0	87
Day Total	42	4480	771	24	165	40	0	31	79	0	2	1	2	5637
Percent	0.7%	79.5%	13.7%	0.4%	2.9%	0.7%	0.0%	0.5%	1.4%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	06:00	08:00	07:00		07:00	08:00		05:00		11:00	07:00
Vol.	2	202	44	5	16	8		4	9		2		1	281
PM Peak	16:00	17:00	17:00	12:00	14:00	16:00		14:00	13:00			16:00	19:00	17:00
Vol.	7	582	93	3	14	4		5	8			1	1	700

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EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	1	45	3	0	0	0	0	0	1	0	0	0	0	50
01:00	0	17	1	0	0	0	0	0	0	0	0	0	0	18
02:00	0	21	0	0	0	0	0	0	1	0	0	0	0	22
03:00	0	23	5	0	3	0	0	0	1	0	0	0	0	32
04:00	0	33	6	0	2	0	0	0	0	0	0	0	0	41
05:00	0	66	15	1	4	2	0	0	0	**1**	0	0	0	89
06:00	2	149	**41**	3	**18**	1	0	2	1	0	**1**	0	0	218
07:00	0	**198**	38	**4**	18	4	0	2	1	1	0	0	0	**266**
08:00	**4**	164	38	1	16	**7**	0	**6**	2	1	0	0	0	239
09:00	1	124	26	1	13	4	0	5	3	0	0	0	0	177
10:00	2	154	29	3	11	2	0	0	**4**	0	0	0	0	205
11:00	2	149	35	2	12	2	0	1	1	0	0	0	0	204
12 PM	0	177	38	1	8	2	0	2	2	0	0	0	0	230
13:00	2	183	35	**2**	8	1	0	**5**	5	0	0	0	0	241
14:00	1	233	33	2	11	2	0	0	2	0	0	0	0	284
15:00	0	443	68	2	**16**	**3**	0	2	6	0	0	0	**1**	541
16:00	4	561	**85**	1	14	3	0	3	1	0	0	0	0	672
17:00	3	**614**	79	0	11	2	0	4	**7**	**1**	0	0	0	**721**
18:00	**7**	407	60	0	11	2	0	3	2	0	0	0	0	492
19:00	0	254	40	1	7	0	0	1	1	0	0	0	0	304
20:00	2	246	35	0	2	0	0	1	3	0	0	0	0	289
21:00	2	219	29	0	2	0	0	0	1	0	0	0	0	253
22:00	0	144	16	0	2	0	0	0	0	0	0	0	0	162
23:00	0	76	13	0	0	0	0	0	0	0	0	0	0	89
Day Total	33	4700	768	24	189	37	0	37	45	4	1	0	1	5839
Percent	0.6%	80.5%	13.2%	0.4%	3.2%	0.6%	0.0%	0.6%	0.8%	0.1%	0.0%	0.0%	0.0%	
AM Peak	08:00	07:00	06:00	07:00	06:00	08:00		08:00	10:00	05:00	06:00			07:00
Vol.	4	198	41	4	18	7		6	4	1	1			266
PM Peak	18:00	17:00	16:00	13:00	15:00	15:00		13:00	17:00	17:00			15:00	17:00
Vol.	7	614	85	2	16	3		5	7	1			1	721
Grand Total	75	9180	1539	48	354	77	0	68	124	4	3	1	3	11476
Percent	0.7%	80.0%	13.4%	0.4%	3.1%	0.7%	0.0%	0.6%	1.1%	0.0%	0.0%	0.0%	0.0%	

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	28	15	1	6	1	0	0	0	0	0	0	0	51
01:00	0	22	12	1	4	1	0	0	0	0	0	0	0	40
02:00	0	20	16	0	7	2	0	0	0	0	0	0	0	45
03:00	0	13	10	1	3	1	0	0	0	0	0	0	0	28
04:00	1	56	45	1	14	1	0	1	1	0	0	0	0	120
05:00	3	234	136	1	60	3	0	0	4	1	0	0	0	442
06:00	**16**	528	265	8	**105**	8	0	10	4	0	0	0	0	944
07:00	10	**780**	**288**	9	62	**10**	0	**24**	10	**2**	0	0	0	**1195**
08:00	8	469	228	17	76	4	0	8	**17**	0	**1**	0	0	828
09:00	2	232	130	22	37	4	0	2	10	0	0	0	0	439
10:00	3	184	96	**24**	32	3	**1**	3	17	1	0	0	0	364
11:00	1	190	114	13	31	3	0	4	15	0	0	0	0	371
12 PM	1	231	112	15	34	3	0	2	**12**	0	0	0	0	410
13:00	2	193	127	8	32	3	0	4	10	0	0	0	0	379
14:00	**3**	203	119	**17**	43	3	0	**5**	12	0	0	0	0	405
15:00	2	245	**171**	10	45	**5**	0	5	7	**1**	0	0	0	491
16:00	2	298	157	14	52	1	0	2	3	0	0	0	0	529
17:00	3	**324**	142	4	**55**	3	**1**	3	8	0	**1**	0	0	**544**
18:00	0	257	140	4	50	1	0	4	5	0	0	0	0	461
19:00	0	163	118	3	32	0	0	2	2	0	0	0	0	320
20:00	3	163	71	1	35	2	0	2	0	0	0	0	0	277
21:00	1	156	75	1	21	3	0	1	2	0	0	0	0	260
22:00	0	121	51	2	12	2	0	2	0	0	0	0	0	190
23:00	0	84	35	1	8	1	0	0	0	0	0	0	0	129
Day Total	61	5194	2673	178	856	68	2	84	139	5	2	0	0	9262
Percent	0.7%	56.1%	28.9%	1.9%	9.2%	0.7%	0.0%	0.9%	1.5%	0.1%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	10:00	06:00	07:00	10:00	07:00	08:00	07:00	08:00			07:00
Vol.	16	780	288	24	105	10	1	24	17	2	1			1195
PM Peak	14:00	17:00	15:00	14:00	17:00	15:00	17:00	14:00	12:00	15:00	17:00			17:00
Vol.	3	324	171	17	55	5	1	5	12	1	1			544

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	54	24	2	7	0	0	0	1	0	0	0	0	88
01:00	1	28	16	2	3	0	0	0	1	0	0	0	0	51
02:00	0	30	11	0	6	1	0	0	0	0	**1**	0	0	49
03:00	0	19	8	0	8	0	0	0	1	0	0	0	0	36
04:00	0	59	30	0	12	0	0	0	0	0	0	0	0	101
05:00	1	214	138	0	58	2	0	1	2	0	0	0	0	416
06:00	**7**	494	254	6	**108**	5	0	8	8	0	0	0	0	890
07:00	5	**735**	**285**	14	94	6	0	**20**	**15**	**1**	0	0	0	**1175**
08:00	5	419	242	17	72	**8**	0	5	15	1	1	0	0	785
09:00	1	214	110	**21**	48	7	0	3	6	0	1	0	0	411
10:00	2	163	108	12	42	6	0	1	13	0	0	0	0	347
11:00	1	181	115	12	49	5	0	2	11	0	1	0	0	377
12 PM	2	171	119	9	41	**10**	0	5	**8**	0	0	0	0	365
13:00	3	210	106	9	34	9	0	2	8	0	0	0	0	381
14:00	**5**	214	142	**17**	50	9	0	3	3	0	0	0	0	443
15:00	1	219	**160**	12	**68**	3	0	5	3	0	0	0	0	471
16:00	0	**324**	120	11	50	2	0	**6**	5	0	0	0	0	518
17:00	4	324	140	4	49	1	0	4	2	0	0	0	0	**528**
18:00	5	250	113	3	43	1	0	5	3	0	0	0	0	423
19:00	1	174	101	5	34	0	0	2	3	0	0	0	0	320
20:00	2	123	77	1	25	0	0	1	4	0	0	0	0	233
21:00	2	127	79	2	24	0	0	2	0	0	0	0	0	236
22:00	0	82	52	3	10	2	0	1	1	0	0	0	0	151
23:00	0	70	38	2	8	1	0	1	0	0	0	0	0	120
Day Total	48	4898	2588	164	943	78	0	77	113	2	4	0	0	8915
Percent	0.5%	54.9%	29.0%	1.8%	10.6%	0.9%	0.0%	0.9%	1.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	09:00	06:00	08:00		07:00	07:00	07:00	02:00			07:00
Vol.	7	735	285	21	108	8		20	15	1	1			1175
PM Peak	14:00	16:00	15:00	14:00	15:00	12:00		16:00	12:00					17:00
Vol.	5	324	160	17	68	10		6	8					528
Grand Total	109	10092	5261	342	1799	146	2	161	252	7	6	0	0	18177
Percent	0.6%	55.5%	28.9%	1.9%	9.9%	0.8%	0.0%	0.9%	1.4%	0.0%	0.0%	0.0%	0.0%	

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	3	13	3	0	0	3	0	0	0	0	0	0	0	22
01:00	3	7	3	0	2	3	0	0	0	0	0	0	0	18
02:00	1	12	3	0	0	1	0	0	0	0	0	0	0	17
03:00	1	9	4	0	2	2	0	0	1	0	0	0	0	19
04:00	2	14	5	0	1	1	0	0	2	0	0	0	0	25
05:00	5	47	18	1	5	8	0	2	1	0	0	0	0	87
06:00	5	107	27	**8**	18	6	0	1	3	0	0	0	0	175
07:00	7	**114**	**37**	3	**22**	11	0	1	4	0	0	0	0	**199**
08:00	10	91	27	3	22	**14**	0	**3**	6	0	**1**	0	0	177
09:00	8	59	32	8	12	10	0	2	5	0	0	0	0	136
10:00	**13**	97	32	8	17	10	0	3	**8**	0	0	0	**2**	190
11:00	11	89	24	5	14	13	0	1	7	0	0	**1**	0	165
12 PM	9	101	28	**6**	15	**14**	0	4	**6**	0	0	0	0	183
13:00	11	115	35	5	10	14	0	2	4	0	0	0	0	196
14:00	5	117	50	6	**20**	8	0	3	4	**1**	0	0	0	214
15:00	9	226	49	1	16	11	0	6	4	0	0	0	0	322
16:00	13	**280**	**57**	6	17	6	**1**	**8**	2	1	0	0	0	**391**
17:00	**18**	269	50	6	11	9	0	7	4	0	0	0	0	374
18:00	10	108	26	2	10	6	0	4	2	0	0	0	0	168
19:00	8	56	13	0	3	5	0	2	2	0	**1**	0	0	90
20:00	3	40	3	3	3	3	0	1	3	0	1	0	0	60
21:00	1	29	6	3	2	1	0	1	3	0	0	0	0	46
22:00	4	16	1	0	1	3	0	1	1	0	0	0	0	27
23:00	2	21	7	0	0	2	0	1	0	0	0	0	0	33
Day Total	162	2037	540	74	223	164	1	53	72	2	3	1	2	3334
Percent	4.9%	61.1%	16.2%	2.2%	6.7%	4.9%	0.0%	1.6%	2.2%	0.1%	0.1%	0.0%	0.1%	
AM Peak	10:00	07:00	07:00	06:00	07:00	08:00		08:00	10:00		08:00	11:00	10:00	07:00
Vol.	13	114	37	8	22	14		3	8		1	1	2	199
PM Peak	17:00	16:00	16:00	12:00	14:00	12:00	16:00	16:00	12:00	14:00	19:00			16:00
Vol.	18	280	57	6	20	14	1	8	6	1	1			391

All Traffic Data Services, Inc.
9660 W 44th Ave
Wheat Ridge, CO 80033
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NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	3	8	3	0	1	2	0	0	1	0	0	0	0	18
01:00	1	8	0	1	2	0	0	0	0	0	0	0	0	12
02:00	2	10	2	1	1	4	0	0	0	0	0	0	0	20
03:00	0	8	4	0	1	1	0	0	0	0	0	0	0	14
04:00	0	14	5	0	1	1	0	0	1	0	0	0	0	22
05:00	5	46	18	3	5	4	0	3	0	0	0	0	0	84
06:00	4	110	29	**5**	21	4	0	3	5	0	0	0	0	181
07:00	7	**117**	**39**	5	16	12	0	2	**6**	0	0	0	0	**204**
08:00	7	107	27	4	**26**	8	0	**9**	3	0	0	0	**1**	192
09:00	8	92	31	5	15	11	0	2	2	0	0	0	0	166
10:00	6	83	37	4	17	10	0	2	1	0	0	0	0	160
11:00	**13**	109	35	5	14	**13**	0	1	1	0	0	**1**	0	192
12 PM	7	121	34	4	**24**	8	0	7	5	0	0	0	0	210
13:00	5	96	38	1	15	9	0	6	3	0	0	0	0	173
14:00	**9**	163	35	9	17	**10**	0	6	**10**	**2**	0	0	0	261
15:00	8	269	53	**11**	20	10	**1**	6	4	1	**3**	**1**	**1**	388
16:00	8	**288**	**55**	9	23	7	0	**9**	5	0	0	0	0	**404**
17:00	9	243	44	5	11	9	0	9	1	0	0	0	0	331
18:00	5	84	22	2	6	5	0	3	2	0	0	0	0	129
19:00	4	63	8	2	2	3	0	1	4	0	0	0	0	87
20:00	2	46	8	3	0	4	0	3	3	0	0	0	0	69
21:00	6	23	8	0	1	9	0	0	1	0	1	0	0	49
22:00	5	26	3	0	0	5	0	1	0	0	0	0	0	40
23:00	3	14	4	0	0	3	0	0	0	0	0	0	0	24
Day Total	127	2148	542	79	239	152	1	73	58	3	4	2	2	3430
Percent	3.7%	62.6%	15.8%	2.3%	7.0%	4.4%	0.0%	2.1%	1.7%	0.1%	0.1%	0.1%	0.1%	
AM Peak	11:00	07:00	07:00	06:00	08:00	11:00		08:00	07:00			11:00	08:00	07:00
Vol.	13	117	39	5	26	13		9	6			1	1	204
PM Peak	14:00	16:00	16:00	15:00	12:00	14:00	15:00	16:00	14:00	14:00	15:00	15:00	15:00	16:00
Vol.	9	288	55	11	24	10	1	9	10	2	3	1	1	404
Grand Total	289	4185	1082	153	462	316	2	126	130	5	7	3	4	6764
Percent	4.3%	61.9%	16.0%	2.3%	6.8%	4.7%	0.0%	1.9%	1.9%	0.1%	0.1%	0.0%	0.1%	

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	1	6	1	0	1	1	0	0	0	0	0	0	0	10
01:00	1	4	5	0	2	0	0	0	1	0	0	0	0	13
02:00	1	11	5	0	2	0	0	2	1	0	1	0	0	23
03:00	0	20	4	1	2	1	0	1	0	0	0	0	0	29
04:00	0	20	12	0	4	2	0	0	1	0	1	0	0	40
05:00	1	76	38	1	15	1	0	3	7	0	0	0	0	142
06:00	4	184	72	4	24	5	**1**	3	6	0	0	0	0	303
07:00	3	**248**	**91**	5	**34**	1	0	**14**	10	**1**	2	0	0	**409**
08:00	4	108	50	**17**	33	4	1	10	**15**	0	**4**	0	0	246
09:00	**5**	63	39	10	14	1	0	8	8	0	1	**1**	0	150
10:00	5	71	23	10	14	**8**	0	6	13	0	0	0	0	150
11:00	1	71	33	6	19	3	0	7	10	0	1	0	0	151
12 PM	3	87	27	7	16	2	0	**6**	**12**	0	0	0	0	160
13:00	2	97	29	5	19	6	0	6	6	0	0	0	0	170
14:00	**4**	84	45	5	**22**	6	0	3	12	0	0	0	0	181
15:00	3	98	**50**	9	18	4	0	3	6	0	**3**	0	0	194
16:00	2	**126**	50	**11**	21	5	0	6	3	0	0	0	0	**224**
17:00	4	117	34	2	11	**7**	0	6	4	0	0	0	0	185
18:00	0	61	28	1	9	1	0	5	4	0	0	**1**	0	110
19:00	1	45	17	0	2	0	0	2	2	0	0	0	0	69
20:00	3	27	12	3	4	3	0	1	2	0	0	0	0	55
21:00	2	25	8	4	4	4	0	1	3	0	1	0	0	52
22:00	0	27	4	0	3	0	0	1	0	0	1	0	0	36
23:00	1	9	3	0	1	4	0	0	1	0	0	0	0	19
Day Total	51	1685	680	101	294	69	2	94	127	1	15	2	0	3121
Percent	1.6%	54.0%	21.8%	3.2%	9.4%	2.2%	0.1%	3.0%	4.1%	0.0%	0.5%	0.1%	0.0%	
AM Peak	09:00	07:00	07:00	08:00	07:00	10:00	06:00	07:00	08:00	07:00	08:00	09:00		07:00
Vol.	5	248	91	17	34	8	1	14	15	1	4	1		409
PM Peak	14:00	16:00	15:00	16:00	14:00	17:00		12:00	12:00		15:00	18:00		16:00
Vol.	4	126	50	11	22	7		6	12		3	1		224

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	2	13	5	0	0	2	0	0	1	0	0	0	0	23
01:00	1	7	2	0	3	1	0	0	0	0	0	0	**1**	15
02:00	2	13	7	0	3	2	0	2	2	0	0	0	0	31
03:00	0	11	5	1	1	2	0	1	1	0	0	0	0	22
04:00	0	25	11	1	4	1	0	0	4	0	1	0	0	47
05:00	1	75	27	1	19	1	0	2	1	0	0	0	0	127
06:00	3	194	78	2	16	4	0	4	3	0	1	**1**	0	306
07:00	1	**231**	**87**	5	25	4	0	**13**	7	0	**3**	0	0	**376**
08:00	6	114	57	**17**	**36**	**10**	0	11	9	0	0	0	0	260
09:00	7	72	40	12	19	7	0	6	**11**	0	2	0	0	176
10:00	1	77	36	5	14	4	0	8	5	0	0	0	0	150
11:00	**9**	69	47	6	22	9	0	4	5	0	0	0	0	171
12 PM	4	90	26	7	20	5	0	4	5	0	0	0	0	161
13:00	3	76	34	9	16	4	0	5	**8**	0	0	0	0	155
14:00	5	91	**48**	9	**24**	**9**	0	3	6	0	0	0	0	195
15:00	1	112	45	10	21	4	0	4	6	0	**1**	0	0	204
16:00	**7**	**129**	31	**11**	19	6	0	**6**	6	0	0	0	0	**215**
17:00	1	100	35	5	12	2	0	4	5	0	1	0	0	165
18:00	4	52	25	1	11	4	0	3	4	0	0	0	0	104
19:00	2	41	17	4	2	0	0	4	1	0	0	0	0	71
20:00	1	31	13	6	5	2	0	0	3	0	1	0	0	62
21:00	0	18	13	0	1	0	0	0	1	0	0	0	0	33
22:00	0	21	5	0	0	3	0	1	1	0	1	0	0	32
23:00	2	8	5	1	0	5	0	0	1	0	1	0	0	23
Day Total	63	1670	699	113	293	91	0	85	96	0	12	1	1	3124
Percent	2.0%	53.5%	22.4%	3.6%	9.4%	2.9%	0.0%	2.7%	3.1%	0.0%	0.4%	0.0%	0.0%	
AM Peak	11:00	07:00	07:00	08:00	08:00	08:00		07:00	09:00		07:00	06:00	01:00	07:00
Vol.	9	231	87	17	36	10		13	11		3	1	1	376
PM Peak	16:00	16:00	14:00	16:00	14:00	14:00		16:00	13:00		15:00			16:00
Vol.	7	129	48	11	24	9		6	8		1			215
Grand Total	114	3355	1379	214	587	160	2	179	223	1	27	3	1	6245
Percent	1.8%	53.7%	22.1%	3.4%	9.4%	2.6%	0.0%	2.9%	3.6%	0.0%	0.4%	0.0%	0.0%	

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	15	0	0	0	0	0	0	0	0	0	0	0	15
01:00	0	13	3	0	0	0	0	0	0	0	0	0	0	16
02:00	0	8	1	0	0	0	0	0	0	0	0	**1**	0	10
03:00	0	9	0	0	0	0	0	0	2	0	0	0	0	11
04:00	1	25	5	0	2	0	0	0	0	0	**1**	0	0	34
05:00	1	77	13	0	4	1	0	0	2	0	0	0	0	98
06:00	1	146	47	2	6	2	0	0	0	0	0	0	0	204
07:00	**3**	**210**	**63**	2	**19**	3	0	**9**	**7**	**1**	0	0	0	**317**
08:00	1	139	35	**4**	17	2	0	4	4	0	0	0	0	206
09:00	1	97	26	1	14	4	0	1	2	0	0	0	0	146
10:00	1	121	36	1	15	3	0	5	4	0	0	0	0	186
11:00	2	112	31	1	11	**7**	0	0	4	0	0	0	0	168
12 PM	0	153	28	5	5	**7**	0	3	0	0	0	0	0	201
13:00	1	124	23	1	10	1	0	1	5	0	0	0	0	166
14:00	4	145	28	**7**	8	2	0	4	2	0	0	0	0	200
15:00	3	**286**	**60**	5	**13**	1	0	**7**	2	0	0	0	0	**377**
16:00	**6**	280	44	4	9	4	0	4	**6**	0	0	0	0	357
17:00	1	269	57	2	5	6	0	5	4	0	0	0	0	349
18:00	2	162	30	1	6	2	0	4	3	0	0	0	0	210
19:00	0	109	24	1	5	3	0	1	3	0	0	0	0	146
20:00	5	108	16	0	5	0	0	1	1	0	0	0	0	136
21:00	1	70	18	1	3	0	0	0	3	0	0	0	0	96
22:00	2	65	3	0	1	2	0	1	0	0	0	0	0	74
23:00	0	37	4	0	0	0	0	0	1	0	0	0	0	42
Day Total	36	2780	595	38	158	50	0	50	55	1	1	1	0	3765
Percent	1.0%	73.8%	15.8%	1.0%	4.2%	1.3%	0.0%	1.3%	1.5%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	07:00	08:00	07:00	11:00		07:00	07:00	07:00	04:00	02:00		07:00
Vol.	3	210	63	4	19	7		9	7	1	1	1		317
PM Peak	16:00	15:00	15:00	14:00	15:00	12:00		15:00	16:00					15:00
Vol.	6	286	60	7	13	7		7	6					377

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	12	2	0	0	0	0	0	0	0	0	0	0	14
01:00	0	14	0	0	1	0	0	0	0	0	0	0	0	15
02:00	1	10	3	0	1	0	0	0	0	0	0	0	0	15
03:00	0	10	1	1	0	1	0	1	0	0	0	0	0	14
04:00	0	23	4	0	3	1	0	0	1	0	0	0	0	32
05:00	0	82	20	1	5	2	0	0	0	0	0	0	0	110
06:00	1	141	33	1	8	1	0	3	0	0	0	0	**1**	189
07:00	0	**176**	39	3	**17**	1	0	3	2	0	0	0	0	241
08:00	2	170	**47**	3	13	2	0	**9**	1	0	0	0	0	**247**
09:00	0	84	20	**6**	13	2	0	0	3	0	0	0	0	128
10:00	**4**	125	37	2	9	**4**	0	1	2	0	0	0	0	184
11:00	1	126	39	2	13	3	0	4	**4**	0	0	0	0	192
12 PM	0	159	36	2	**14**	1	0	2	1	0	0	0	0	215
13:00	0	127	31	3	5	2	0	2	2	0	0	0	0	172
14:00	3	158	26	**5**	10	5	0	2	3	0	0	**1**	0	213
15:00	1	256	**54**	1	13	5	0	4	3	0	0	0	0	**337**
16:00	2	219	36	3	7	**6**	0	6	2	0	0	0	**1**	282
17:00	4	**262**	45	0	11	3	0	**7**	**4**	0	0	0	0	336
18:00	**5**	176	23	4	7	2	0	7	1	0	0	0	0	225
19:00	2	121	23	0	2	2	0	1	1	0	0	0	0	152
20:00	1	125	20	1	4	0	0	3	1	0	0	0	0	155
21:00	1	89	15	1	2	1	0	0	1	0	0	0	0	110
22:00	0	55	5	0	0	1	0	1	0	0	0	0	0	62
23:00	1	38	4	0	0	0	0	0	1	0	0	0	0	44
Day Total	29	2758	563	39	158	45	0	56	33	0	0	1	2	3684
Percent	0.8%	74.9%	15.3%	1.1%	4.3%	1.2%	0.0%	1.5%	0.9%	0.0%	0.0%	0.0%	0.1%	
AM Peak	10:00	07:00	08:00	09:00	07:00	10:00		08:00	11:00				06:00	08:00
Vol.	4	176	47	6	17	4		9	4				1	247
PM Peak	18:00	17:00	15:00	14:00	12:00	16:00		17:00	17:00			14:00	16:00	15:00
Vol.	5	262	54	5	14	6		7	4			1	1	337
Grand Total	65	5538	1158	77	316	95	0	106	88	1	1	2	2	7449
Percent	0.9%	74.3%	15.5%	1.0%	4.2%	1.3%	0.0%	1.4%	1.2%	0.0%	0.0%	0.0%	0.0%	

All Traffic Data Services, Inc.
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Wheat Ridge, CO 80033
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Site Code: 11.5

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	1	11	5	0	1	1	0	0	0	0	0	0	0	19
01:00	0	6	5	0	0	0	0	0	0	0	0	0	0	11
02:00	0	3	3	0	1	1	0	0	0	0	0	0	0	8
03:00	0	8	5	0	2	1	0	0	0	0	0	0	0	16
04:00	0	19	11	1	6	0	0	0	0	0	0	0	0	37
05:00	2	77	38	0	14	1	0	2	2	0	0	0	0	136
06:00	1	132	73	9	37	0	0	3	2	0	0	0	0	257
07:00	**5**	**137**	**101**	5	**44**	5	**2**	4	1	0	0	0	**1**	**305**
08:00	3	115	77	**11**	37	2	0	**6**	**7**	0	0	0	0	258
09:00	5	59	58	9	22	1	0	3	4	0	0	0	0	161
10:00	4	77	57	5	22	2	0	2	5	0	0	0	0	174
11:00	0	78	44	3	17	**7**	0	1	4	**1**	0	**1**	0	156
12 PM	5	86	41	**7**	26	**6**	0	1	0	0	0	0	0	172
13:00	1	85	56	2	31	3	0	2	4	0	0	0	0	184
14:00	2	77	53	5	31	2	0	4	3	0	0	0	0	177
15:00	0	105	78	2	31	3	0	3	3	0	0	0	0	225
16:00	0	**118**	**83**	1	20	1	0	**5**	2	0	0	0	0	**230**
17:00	0	113	61	4	**32**	4	0	4	3	0	0	0	0	221
18:00	0	90	57	1	17	3	0	4	**5**	0	0	0	0	177
19:00	0	70	43	1	12	0	0	0	2	0	0	0	0	128
20:00	**6**	58	30	0	8	3	**1**	1	0	0	0	0	0	107
21:00	0	46	24	0	6	0	0	0	1	0	0	0	0	77
22:00	1	28	20	0	5	0	0	1	0	0	0	0	0	55
23:00	0	19	12	0	2	0	0	0	1	0	0	0	0	34
Day Total	36	1617	1035	66	424	46	3	46	49	1	0	1	1	3325
Percent	1.1%	48.6%	31.1%	2.0%	12.8%	1.4%	0.1%	1.4%	1.5%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	07:00	08:00	07:00	11:00	07:00	08:00	08:00	11:00		11:00	07:00	07:00
Vol.	5	137	101	11	44	7	2	6	7	1		1	1	305
PM Peak	20:00	16:00	16:00	12:00	17:00	12:00	20:00	16:00	18:00					16:00
Vol.	6	118	83	7	32	6	1	5	5					230

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SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	13	5	0	1	0	0	0	0	0	0	0	0	19
01:00	0	9	3	0	0	0	0	0	0	0	0	0	0	12
02:00	0	5	6	2	2	0	0	0	0	0	0	0	0	15
03:00	0	13	8	0	0	1	0	0	0	0	0	0	0	22
04:00	0	21	8	0	7	0	0	0	0	0	0	0	0	36
05:00	0	59	40	2	12	1	0	1	**6**	0	0	0	0	121
06:00	1	141	72	5	37	2	0	4	1	0	0	0	0	263
07:00	6	**143**	**88**	4	**51**	1	**1**	2	2	0	0	0	0	**298**
08:00	**8**	110	86	**8**	26	4	0	4	4	**3**	0	0	0	253
09:00	1	57	47	5	27	2	0	**5**	3	0	0	0	0	147
10:00	3	81	53	5	21	3	0	3	2	0	0	0	0	171
11:00	3	73	71	5	33	**6**	0	3	2	0	0	0	0	196
12 PM	1	103	63	**7**	25	2	0	**8**	0	0	0	0	0	209
13:00	1	84	65	6	25	2	0	1	2	0	0	0	0	186
14:00	1	86	60	4	25	0	0	4	3	0	0	0	0	183
15:00	1	112	**83**	6	21	0	1	4	**4**	0	0	0	0	232
16:00	1	**126**	75	3	**36**	1	**2**	3	1	0	0	0	0	**248**
17:00	0	124	82	1	29	1	0	1	1	0	0	0	0	239
18:00	0	97	57	1	17	1	0	1	1	0	0	0	0	175
19:00	1	86	52	1	11	1	0	1	1	0	0	0	0	154
20:00	**2**	70	25	1	13	**4**	1	0	1	0	0	0	0	117
21:00	1	40	32	1	4	1	0	2	1	0	0	0	0	82
22:00	1	40	21	0	5	2	0	1	1	0	0	0	0	71
23:00	0	13	8	0	3	0	0	0	1	0	0	0	0	25
Day Total	32	1706	1110	67	431	35	5	48	37	3	0	0	0	3474
Percent	0.9%	49.1%	32.0%	1.9%	12.4%	1.0%	0.1%	1.4%	1.1%	0.1%	0.0%	0.0%	0.0%	
AM Peak	08:00	07:00	07:00	08:00	07:00	11:00	07:00	09:00	05:00	08:00				07:00
Vol.	8	143	88	8	51	6	1	5	6	3				298
PM Peak	20:00	16:00	15:00	12:00	16:00	20:00	16:00	12:00	15:00					16:00
Vol.	2	126	83	7	36	4	2	8	4					248
Grand Total	68	3323	2145	133	855	81	8	94	86	4	0	1	1	6799
Percent	1.0%	48.9%	31.5%	2.0%	12.6%	1.2%	0.1%	1.4%	1.3%	0.1%	0.0%	0.0%	0.0%	

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	5	1	0	0	0	0	0	0	0	0	0	0	6
01:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
02:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
03:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
04:00	0	24	1	0	0	0	0	0	0	0	0	0	0	25
05:00	1	46	7	0	0	0	0	0	0	0	0	0	0	54
06:00	1	73	18	0	2	0	0	0	0	0	0	0	0	94
07:00	0	60	14	0	1	0	0	0	0	0	0	0	0	75
08:00	0	38	4	0	2	0	0	0	0	0	0	0	0	44
09:00	0	28	10	0	3	0	0	0	0	0	0	0	0	41
10:00	0	37	2	0	0	0	0	0	0	0	0	0	0	39
11:00	0	29	7	0	1	0	0	0	0	0	0	0	0	37
12 PM	0	29	7	0	0	0	0	0	0	0	0	0	0	36
13:00	0	35	7	0	0	0	0	0	0	0	0	0	0	42
14:00	0	37	7	0	0	0	0	0	0	0	0	0	0	44
15:00	0	28	12	0	3	0	0	0	0	0	0	0	0	43
16:00	0	45	5	0	0	0	0	0	0	0	0	0	0	50
17:00	0	49	8	1	1	0	0	0	0	0	0	0	0	59
18:00	0	54	10	0	0	1	0	0	0	0	0	0	0	65
19:00	0	50	8	0	0	0	0	0	0	0	0	0	0	58
20:00	0	21	12	0	1	0	0	0	0	0	0	0	0	34
21:00	1	21	1	0	1	0	0	0	0	0	0	0	0	24
22:00	0	22	2	0	0	0	0	0	0	0	0	0	0	24
23:00	0	6	2	0	0	0	0	0	0	0	0	0	0	8
Day Total	3	754	146	1	15	1	0	0	0	0	0	0	0	920
Percent	0.3%	82.0%	15.9%	0.1%	1.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	05:00	06:00	06:00		09:00									06:00
Vol.	1	73	18		3									94
PM Peak	21:00	18:00	15:00	17:00	15:00	18:00								18:00
Vol.	1	54	12	1	3	1								65

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	6	0	0	0	0	0	0	0	0	0	0	0	6
01:00	0	9	0	0	0	0	0	0	0	0	0	0	0	9
02:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
03:00	0	9	0	0	0	0	0	0	0	0	0	0	0	9
04:00	0	12	0	0	0	0	0	0	0	0	0	0	0	12
05:00	0	49	0	0	0	0	0	0	0	0	0	0	0	49
06:00	0	60	0	0	0	0	0	0	0	0	0	0	0	60
07:00	0	77	0	0	0	0	0	0	0	0	0	0	0	77
08:00	0	36	0	0	0	0	0	0	0	0	0	0	0	36
09:00	0	27	1	0	0	0	0	0	0	0	0	0	0	28
10:00	0	37	7	0	1	0	0	0	0	0	0	0	0	45
11:00	0	25	8	0	1	0	0	0	0	0	0	0	0	34
12 PM	0	34	5	0	2	0	0	0	0	0	0	0	0	41
13:00	0	27	5	0	0	0	0	0	0	0	0	0	0	32
14:00	0	34	8	0	0	0	0	0	0	0	0	0	0	42
15:00	1	42	11	0	0	0	0	0	0	0	0	0	0	54
16:00	0	47	8	0	0	0	0	0	0	0	0	0	0	55
17:00	0	52	7	1	1	0	0	0	0	0	0	0	0	61
18:00	0	41	9	0	1	0	0	0	0	0	0	0	0	51
19:00	0	40	8	0	2	0	0	0	0	0	0	0	0	50
20:00	0	29	5	0	2	0	0	0	0	0	0	0	0	36
21:00	0	29	4	0	0	0	0	0	0	0	0	0	0	33
22:00	0	11	0	0	0	0	0	0	0	0	0	0	0	11
23:00	0	10	1	0	0	0	0	0	0	0	0	0	0	11
Day Total	1	747	87	1	10	0	0	0	0	0	0	0	0	846
Percent	0.1%	88.3%	10.3%	0.1%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00	11:00		10:00									07:00
Vol.		77	8		1									77
PM Peak	15:00	17:00	15:00	17:00	12:00									17:00
Vol.	1	52	11	1	2									61
Grand Total	4	1501	233	2	25	1	0	0	0	0	0	0	0	1766
Percent	0.2%	85.0%	13.2%	0.1%	1.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	12	2	0	0	0	0	0	0	0	0	0	0	14
01:00	0	3	3	0	0	0	0	0	0	0	0	0	0	6
02:00	0	6	1	0	0	1	0	0	0	0	0	0	0	8
03:00	0	1	1	0	0	0	0	0	0	0	0	0	0	2
04:00	0	6	0	0	0	0	0	0	0	0	0	0	**1**	7
05:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
06:00	**1**	19	5	**1**	0	0	0	0	0	0	0	0	0	26
07:00	1	**34**	8	0	**4**	0	0	0	0	0	0	0	0	**47**
08:00	1	22	**12**	0	1	**2**	0	0	0	0	0	0	0	38
09:00	0	22	6	0	2	1	0	0	0	0	0	0	0	31
10:00	1	20	5	0	1	0	0	**1**	0	0	0	0	0	28
11:00	0	25	4	0	0	1	0	0	0	0	0	0	0	30
12 PM	1	24	7	0	0	0	0	0	0	0	0	0	0	32
13:00	**2**	30	9	0	2	0	0	0	0	0	0	0	0	43
14:00	1	39	8	**2**	3	1	0	0	0	0	0	0	0	54
15:00	0	47	**27**	1	**4**	0	0	0	0	0	0	0	0	79
16:00	0	**78**	19	0	2	1	0	0	0	0	0	0	0	**100**
17:00	2	58	20	0	2	**3**	0	0	0	0	0	0	0	85
18:00	2	62	17	0	2	0	0	0	0	0	0	0	0	83
19:00	0	33	15	0	0	1	0	0	0	0	0	0	0	49
20:00	0	35	6	0	0	1	0	0	0	0	0	0	0	42
21:00	0	27	13	0	0	0	0	0	0	0	0	0	0	40
22:00	0	30	3	0	0	0	0	0	0	0	0	0	0	33
23:00	0	10	1	0	0	1	0	0	0	0	0	0	0	12
Day Total	12	645	192	4	23	13	0	1	0	0	0	0	1	891
Percent	1.3%	72.4%	21.5%	0.4%	2.6%	1.5%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	
AM Peak	06:00	07:00	08:00	06:00	07:00	08:00		10:00					04:00	07:00
Vol.	1	34	12	1	4	2		1					1	47
PM Peak	13:00	16:00	15:00	14:00	15:00	17:00								16:00
Vol.	2	78	27	2	4	3								100

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	12	2	0	**1**	**1**	0	0	0	0	0	0	0	16
01:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	7	1	0	0	0	0	0	0	0	0	0	0	8
04:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
05:00	0	10	1	0	0	0	0	0	0	0	0	0	0	11
06:00	**1**	14	5	**1**	1	1	0	0	0	0	0	0	0	23
07:00	1	21	5	0	1	0	0	0	0	0	0	0	0	28
08:00	0	23	**9**	1	1	0	0	0	0	0	0	0	0	**34**
09:00	1	14	5	0	0	0	0	0	0	0	0	0	0	20
10:00	0	**25**	4	0	0	1	0	0	0	0	0	0	0	30
11:00	0	20	9	0	1	0	0	0	0	0	0	0	0	30
12 PM	0	22	10	0	1	1	0	0	0	0	0	0	0	34
13:00	0	24	9	**2**	1	0	0	0	0	0	0	0	0	36
14:00	1	41	10	1	**3**	0	0	0	0	0	0	0	0	56
15:00	0	50	19	0	2	1	0	0	0	0	0	0	0	72
16:00	1	**71**	18	1	1	**4**	0	0	0	0	0	0	0	**96**
17:00	0	64	**25**	1	2	0	0	0	0	0	0	0	0	92
18:00	**3**	58	10	1	0	0	0	0	0	0	0	0	0	72
19:00	0	53	10	0	2	2	0	0	0	0	0	0	0	67
20:00	0	32	7	0	3	0	0	0	0	0	0	0	0	42
21:00	0	30	9	0	0	1	0	0	0	0	0	0	0	40
22:00	1	23	6	0	0	1	0	0	0	0	0	0	0	31
23:00	0	17	3	0	1	1	0	0	0	0	0	0	0	22
Day Total	9	642	177	8	21	14	0	0	0	0	0	0	0	871
Percent	1.0%	73.7%	20.3%	0.9%	2.4%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	10:00	08:00	06:00	00:00	00:00								08:00
Vol.	1	25	9	1	1	1								34
PM Peak	18:00	16:00	17:00	13:00	14:00	16:00								16:00
Vol.	3	71	25	2	3	4								96
Grand Total	21	1287	369	12	44	27	0	1	0	0	0	0	1	1762
Percent	1.2%	73.0%	20.9%	0.7%	2.5%	1.5%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	10	0	0	0	0	0	0	0	0	0	0	0	10
01:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3
02:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
04:00	0	13	3	0	0	0	0	0	0	0	0	0	0	16
05:00	0	44	9	0	1	0	0	0	0	0	0	0	0	54
06:00	0	48	15	0	3	0	0	1	0	0	0	0	0	67
07:00	0	47	14	1	4	0	0	0	0	0	0	0	0	66
08:00	1	45	6	0	2	0	0	0	0	0	0	0	0	54
09:00	0	33	5	0	0	0	0	0	0	0	0	0	0	38
10:00	0	23	4	0	1	0	0	0	0	0	0	0	0	28
11:00	0	27	2	0	2	0	0	0	0	0	0	0	0	31
12 PM	0	25	2	0	2	0	0	0	0	0	0	0	0	29
13:00	0	32	1	0	1	0	0	0	0	0	0	0	0	34
14:00	0	40	2	0	1	0	0	0	0	0	0	0	0	43
15:00	2	56	11	0	2	0	0	0	0	0	0	0	0	71
16:00	0	38	6	1	0	0	0	0	0	0	0	0	0	45
17:00	0	43	7	0	2	0	0	0	0	0	0	0	0	52
18:00	0	37	7	0	0	0	0	0	0	0	0	0	0	44
19:00	0	31	4	0	0	0	0	0	0	0	0	0	0	35
20:00	0	32	6	0	0	0	0	0	0	0	0	0	0	38
21:00	0	26	2	0	0	0	0	0	0	0	0	0	0	28
22:00	0	11	1	0	0	0	0	0	0	0	0	0	0	12
23:00	0	4	3	0	0	0	0	0	0	0	0	0	0	7
Day Total	3	676	111	2	21	0	0	1	0	0	0	0	0	814
Percent	0.4%	83.0%	13.6%	0.2%	2.6%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	06:00	06:00	07:00	07:00			06:00						06:00
Vol.	1	48	15	1	4			1						67
PM Peak	15:00	15:00	15:00	16:00	12:00									15:00
Vol.	2	56	11	1	2									71

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	8	2	0	0	0	0	0	0	0	0	0	0	10
01:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
04:00	0	13	3	0	0	0	0	0	0	0	0	0	0	16
05:00	0	44	8	0	0	0	0	0	0	0	0	0	0	52
06:00	0	**54**	**11**	0	0	0	0	0	0	0	0	0	0	**65**
07:00	0	53	10	**1**	1	0	0	0	0	0	0	0	0	65
08:00	0	44	8	0	1	0	0	0	0	0	0	0	0	53
09:00	0	31	6	0	2	0	0	0	0	0	0	0	0	39
10:00	0	23	4	0	4	0	0	0	0	0	0	0	0	31
11:00	0	25	5	0	**5**	0	0	0	0	0	0	0	0	35
12 PM	0	23	5	0	**3**	0	0	0	0	0	0	0	0	31
13:00	0	28	5	0	2	0	0	0	0	0	0	0	0	35
14:00	0	35	7	0	2	0	0	0	0	0	0	0	0	44
15:00	0	**58**	**11**	**1**	1	0	0	0	0	0	0	0	0	**71**
16:00	0	36	7	0	0	0	0	0	0	0	0	0	0	43
17:00	0	42	8	0	0	0	0	0	0	0	0	0	0	50
18:00	0	36	7	0	0	0	0	0	0	0	0	0	0	43
19:00	0	28	5	0	0	0	0	0	0	0	0	0	0	33
20:00	0	31	6	0	0	0	0	0	0	0	0	0	0	37
21:00	0	23	4	0	0	0	0	0	0	0	0	0	0	27
22:00	0	10	2	0	0	0	0	0	0	0	0	0	0	12
23:00	0	6	1	0	0	0	0	0	0	0	0	0	0	7
Day Total	0	660	126	2	21	0	0	0	0	0	0	0	0	809
Percent	0.0%	81.6%	15.6%	0.2%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		06:00	06:00	07:00	11:00									06:00
Vol.		54	11	1	5									65
PM Peak		15:00	15:00	15:00	12:00									15:00
Vol.		58	11	1	3									71
Grand Total	3	1336	237	4	42	0	0	1	0	0	0	0	0	1623
Percent	0.2%	82.3%	14.6%	0.2%	2.6%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	12	4	0	1	0	0	0	0	0	0	0	0	17
01:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
02:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
03:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
04:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
05:00	0	3	2	0	0	0	0	0	0	0	0	0	0	5
06:00	0	6	2	0	1	0	0	0	0	0	0	0	0	9
07:00	0	17	**8**	**2**	1	0	0	0	0	0	0	0	0	**28**
08:00	0	**20**	3	0	1	0	0	0	0	0	0	0	0	24
09:00	0	17	4	0	**2**	0	0	0	0	0	0	0	0	23
10:00	0	19	1	0	2	0	0	0	0	0	0	0	0	22
11:00	0	17	5	0	0	0	0	0	**1**	0	0	0	0	23
12 PM	0	21	2	0	1	0	0	0	0	0	0	0	0	24
13:00	0	23	4	0	1	0	0	0	0	0	0	0	0	28
14:00	0	30	3	0	1	0	0	0	0	0	0	0	0	34
15:00	1	51	**15**	**1**	1	0	0	**1**	0	0	0	0	0	70
16:00	1	**56**	13	0	1	0	0	0	0	0	0	0	0	**71**
17:00	0	46	9	0	**3**	**1**	0	0	0	0	0	0	0	59
18:00	0	38	8	0	0	0	0	0	0	0	0	0	0	46
19:00	**3**	42	7	0	1	0	0	0	0	0	0	0	0	53
20:00	0	43	4	0	1	0	0	0	0	0	0	0	0	48
21:00	1	30	8	0	1	0	0	0	0	0	0	0	0	40
22:00	0	21	4	0	1	0	0	0	0	0	0	0	0	26
23:00	0	9	2	0	0	0	0	0	0	0	0	0	0	11
Day Total	6	539	108	3	20	1	0	1	1	0	0	0	0	679
Percent	0.9%	79.4%	15.9%	0.4%	2.9%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak		08:00	07:00	07:00	09:00				11:00					07:00
Vol.		20	8	2	2				1					28
PM Peak	19:00	16:00	15:00	15:00	17:00	17:00		15:00						16:00
Vol.	3	56	15	1	3	1		1						71

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	14	4	0	0	0	0	0	0	0	0	0	0	18
01:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
02:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
03:00	0	3	1	0	0	0	0	0	0	0	0	0	0	4
04:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
05:00	0	4	1	**1**	0	0	0	0	0	0	0	0	0	6
06:00	0	8	2	0	0	0	0	0	0	0	0	0	0	10
07:00	0	**24**	**7**	1	1	0	0	0	0	0	0	0	0	**33**
08:00	0	20	6	0	0	0	0	0	0	0	0	0	0	26
09:00	0	19	6	0	2	0	0	0	0	0	0	0	0	27
10:00	0	18	5	0	**3**	0	0	0	0	0	0	0	0	26
11:00	0	19	6	0	2	0	0	0	0	0	0	0	0	27
12 PM	0	20	6	0	1	0	0	0	0	0	0	0	0	27
13:00	0	24	7	0	0	0	0	0	0	0	0	0	0	31
14:00	0	29	8	0	1	0	0	0	0	0	0	0	0	38
15:00	0	59	**17**	**1**	0	0	0	0	0	0	0	0	0	77
16:00	0	**60**	17	1	1	0	0	0	0	0	0	0	0	**79**
17:00	0	50	14	0	0	0	0	0	0	0	0	0	0	64
18:00	0	39	11	0	1	0	0	0	0	0	0	0	0	51
19:00	0	45	13	0	1	0	0	0	0	0	0	0	0	59
20:00	0	40	12	0	1	0	0	0	0	0	0	0	0	53
21:00	0	34	10	0	**2**	0	0	0	0	0	0	0	0	46
22:00	0	22	6	0	0	0	0	0	0	0	0	0	0	28
23:00	0	9	3	0	0	0	0	0	0	0	0	0	0	12
Day Total	0	572	165	4	16	0	0	0	0	0	0	0	0	757
Percent	0.0%	75.6%	21.8%	0.5%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00	07:00	05:00	10:00									07:00
Vol.		24	7	1	3									33
PM Peak		16:00	15:00	15:00	21:00									16:00
Vol.		60	17	1	2									79
Grand Total	6	1111	273	7	36	1	0	1	1	0	0	0	0	1436
Percent	0.4%	77.4%	19.0%	0.5%	2.5%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	16	7	0	1	0	0	0	0	0	0	0	0	24
01:00	0	2	3	0	1	0	0	1	0	0	0	0	0	7
02:00	0	9	4	0	1	0	0	0	0	0	0	0	0	14
03:00	0	6	1	0	1	0	0	0	0	0	0	0	0	8
04:00	1	14	9	0	2	0	0	0	0	0	0	0	0	26
05:00	2	42	29	0	14	1	0	2	0	0	0	0	0	90
06:00	0	88	59	3	**25**	0	0	**6**	0	0	0	0	0	181
07:00	**4**	**105**	**80**	2	24	2	0	3	2	**1**	0	0	0	**223**
08:00	2	75	47	**9**	22	3	0	3	**3**	0	0	0	0	164
09:00	0	42	44	3	9	0	0	2	1	0	0	0	0	101
10:00	1	60	52	5	16	1	0	1	2	0	0	0	0	138
11:00	2	50	46	6	17	**4**	0	5	1	0	0	**1**	0	132
12 PM	1	80	70	6	18	1	**1**	3	**2**	0	0	0	0	182
13:00	0	88	57	6	24	1	0	2	0	0	**1**	0	0	179
14:00	0	81	56	5	13	1	0	**8**	0	0	0	0	0	164
15:00	1	135	82	**7**	19	1	0	5	2	0	0	0	0	252
16:00	**2**	143	**99**	4	**27**	**2**	1	1	0	0	0	0	0	**279**
17:00	1	**144**	98	2	25	1	0	5	0	0	0	**1**	0	277
18:00	0	119	64	0	11	0	1	0	0	0	0	0	0	195
19:00	1	67	50	0	19	1	0	0	1	0	0	0	0	139
20:00	0	63	44	0	13	0	0	0	0	0	0	0	0	120
21:00	0	65	36	0	9	1	0	0	0	0	0	0	0	111
22:00	0	43	24	0	2	1	0	0	1	0	0	0	0	71
23:00	1	17	8	0	1	0	0	0	0	0	0	0	0	27
Day Total	19	1554	1069	58	314	21	3	47	15	1	1	2	0	3104
Percent	0.6%	50.1%	34.4%	1.9%	10.1%	0.7%	0.1%	1.5%	0.5%	0.0%	0.0%	0.1%	0.0%	
AM Peak	07:00	07:00	07:00	08:00	06:00	11:00		06:00	08:00	07:00		11:00		07:00
Vol.	4	105	80	9	25	4		6	3	1		1		223
PM Peak	16:00	17:00	16:00	15:00	16:00	16:00	12:00	14:00	12:00		13:00	17:00		16:00
Vol.	2	144	99	7	27	2	1	8	2		1	1		279

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	11	6	0	1	0	0	0	0	0	0	0	0	18
01:00	0	5	2	0	1	0	0	0	0	0	0	0	0	8
02:00	0	8	3	0	0	0	0	0	0	0	0	0	0	11
03:00	0	8	5	0	1	0	0	1	0	0	0	0	0	15
04:00	1	20	15	0	3	0	0	0	1	0	0	0	0	40
05:00	**2**	38	33	0	9	0	0	0	0	0	0	0	0	82
06:00	1	84	48	4	24	3	0	**3**	0	0	0	0	0	167
07:00	2	**94**	**80**	0	24	0	0	3	0	0	0	0	0	**203**
08:00	2	78	51	**9**	25	**5**	0	2	2	0	0	0	0	174
09:00	1	45	39	6	20	0	0	1	**4**	0	0	0	0	116
10:00	0	42	45	5	15	3	0	0	1	0	0	0	0	111
11:00	0	60	31	3	**28**	0	0	1	2	0	0	0	0	125
12 PM	0	72	57	2	19	1	0	7	**3**	0	0	0	0	161
13:00	0	68	49	4	17	3	0	2	1	0	0	0	0	144
14:00	3	92	48	**5**	23	2	0	4	2	0	0	0	0	179
15:00	1	**139**	**90**	4	24	**7**	**1**	5	2	0	0	0	**1**	**274**
16:00	**4**	133	69	3	**26**	3	0	**10**	1	0	0	0	0	249
17:00	4	134	87	5	25	5	0	5	0	0	0	0	0	265
18:00	1	118	71	3	22	1	0	0	0	0	0	0	0	216
19:00	0	82	53	0	13	1	1	0	0	0	0	0	0	150
20:00	0	69	49	0	19	0	0	3	0	0	0	0	0	140
21:00	0	63	48	0	13	0	0	1	0	0	0	0	0	125
22:00	3	49	18	1	3	0	0	0	1	0	0	0	0	75
23:00	0	25	12	1	2	0	0	0	0	0	0	0	0	40
Day Total	25	1537	1009	55	357	34	2	48	20	0	0	0	1	3088
Percent	0.8%	49.8%	32.7%	1.8%	11.6%	1.1%	0.1%	1.6%	0.6%	0.0%	0.0%	0.0%	0.0%	
AM Peak	05:00	07:00	07:00	08:00	11:00	08:00		06:00	09:00					07:00
Vol.	2	94	80	9	28	5		3	4					203
PM Peak	16:00	15:00	15:00	14:00	16:00	15:00	15:00	16:00	12:00				15:00	15:00
Vol.	4	139	90	5	26	7	1	10	3				1	274
Grand Total	44	3091	2078	113	671	55	5	95	35	1	1	2	1	6192
Percent	0.7%	49.9%	33.6%	1.8%	10.8%	0.9%	0.1%	1.5%	0.6%	0.0%	0.0%	0.0%	0.0%	

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	15	3	0	0	0	0	0	0	0	0	0	0	18
01:00	0	12	2	0	1	0	0	0	0	0	0	0	0	15
02:00	0	13	4	0	0	0	0	0	0	0	0	0	0	17
03:00	0	11	2	0	0	1	0	0	0	0	0	0	0	14
04:00	0	14	2	0	0	1	0	0	0	0	0	0	0	17
05:00	0	51	26	0	6	0	0	0	0	0	0	0	0	83
06:00	2	133	46	2	8	**2**	**1**	3	2	0	0	0	0	199
07:00	2	**184**	**76**	**5**	**17**	1	0	4	4	**1**	0	0	0	**294**
08:00	0	125	52	1	10	2	1	4	**5**	0	0	0	0	200
09:00	3	90	38	4	9	0	0	**8**	3	0	**1**	0	0	156
10:00	0	80	43	2	12	1	1	6	3	0	0	0	0	148
11:00	**4**	106	35	4	7	2	0	1	3	0	0	0	**1**	163
12 PM	1	117	40	1	5	1	**1**	3	**4**	0	0	0	0	173
13:00	0	113	42	1	9	3	0	2	3	0	0	0	**1**	174
14:00	**2**	145	65	4	13	4	0	3	1	0	0	0	0	237
15:00	1	212	61	**6**	9	**5**	0	**6**	1	0	0	0	0	301
16:00	2	229	**78**	2	18	4	0	4	1	0	0	0	0	338
17:00	1	**239**	74	4	**24**	2	0	4	1	0	0	0	0	**349**
18:00	0	168	46	0	10	2	0	4	2	0	0	0	0	232
19:00	1	101	40	2	3	2	0	1	0	0	0	0	0	150
20:00	1	78	27	0	3	0	0	0	0	0	0	0	0	109
21:00	0	81	23	0	7	0	0	0	0	0	0	0	0	111
22:00	0	48	14	0	1	0	0	0	1	0	0	0	0	64
23:00	0	27	5	0	1	0	0	0	0	0	0	0	0	33
Day Total	20	2392	844	38	173	33	4	53	34	1	1	0	2	3595
Percent	0.6%	66.5%	23.5%	1.1%	4.8%	0.9%	0.1%	1.5%	0.9%	0.0%	0.0%	0.0%	0.1%	
AM Peak	11:00	07:00	07:00	07:00	07:00	06:00	06:00	09:00	08:00	07:00	09:00		11:00	07:00
Vol.	4	184	76	5	17	2	1	8	5	1	1		1	294
PM Peak	14:00	17:00	16:00	15:00	17:00	15:00	12:00	15:00	12:00				13:00	17:00
Vol.	2	239	78	6	24	5	1	6	4				1	349

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	14	4	0	0	0	0	1	0	0	0	0	0	19
01:00	0	12	2	0	0	0	0	0	0	0	0	0	0	14
02:00	0	9	2	0	1	0	0	0	0	0	0	0	0	12
03:00	0	13	4	0	0	0	0	1	0	0	0	0	0	18
04:00	0	11	4	0	0	2	0	0	0	0	0	0	0	17
05:00	0	59	26	1	7	1	0	0	1	0	0	0	0	95
06:00	**3**	124	**64**	1	**17**	2	0	2	0	0	0	0	0	213
07:00	2	**184**	55	3	15	**8**	0	4	4	0	0	0	0	**275**
08:00	3	123	46	**4**	13	6	0	3	**7**	0	0	0	0	205
09:00	0	70	30	2	8	3	0	4	3	0	0	0	0	120
10:00	0	75	39	2	8	2	0	1	2	0	0	0	0	129
11:00	1	101	34	1	12	8	0	**5**	4	0	0	0	0	166
12 PM	1	123	52	2	12	1	0	4	**4**	0	0	0	0	199
13:00	1	107	43	1	6	4	0	2	2	0	0	0	0	166
14:00	0	153	53	3	8	**5**	**1**	2	2	0	**1**	0	0	228
15:00	2	192	84	**7**	11	5	0	**7**	0	0	0	0	0	308
16:00	3	222	64	2	12	4	0	6	0	**1**	0	0	0	314
17:00	**4**	**224**	**88**	3	**17**	4	0	1	0	0	0	0	0	**341**
18:00	2	151	46	3	14	1	0	2	0	0	0	0	0	219
19:00	0	113	34	1	8	2	0	2	0	0	0	0	0	160
20:00	0	109	27	0	4	0	0	0	1	0	0	0	0	141
21:00	0	79	21	1	4	2	0	0	0	0	0	0	0	107
22:00	0	57	15	1	0	0	0	0	1	0	0	0	0	74
23:00	0	21	15	0	1	0	0	1	0	0	0	0	0	38
Day Total	22	2346	852	38	178	60	1	48	31	1	1	0	0	3578
Percent	0.6%	65.6%	23.8%	1.1%	5.0%	1.7%	0.0%	1.3%	0.9%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	06:00	08:00	06:00	07:00		11:00	08:00					07:00
Vol.	3	184	64	4	17	8		5	7					275
PM Peak	17:00	17:00	17:00	15:00	17:00	14:00	14:00	15:00	12:00	16:00	14:00			17:00
Vol.	4	224	88	7	17	5	1	7	4	1	1			341
Grand Total	42	4738	1696	76	351	93	5	101	65	2	2	0	2	7173
Percent	0.6%	66.1%	23.6%	1.1%	4.9%	1.3%	0.1%	1.4%	0.9%	0.0%	0.0%	0.0%	0.0%	

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	27	0	0	0	0	0	0	0	0	0	0	0	27
01:00	0	11	0	0	0	0	0	0	0	0	0	0	0	11
02:00	0	10	0	0	0	0	0	0	0	0	0	0	0	10
03:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
04:00	0	12	0	0	0	0	0	0	0	0	0	0	0	12
05:00	0	23	0	0	0	0	0	0	0	0	0	0	0	23
06:00	0	64	0	0	0	0	0	0	0	0	0	0	0	64
07:00	0	**87**	0	**1**	0	0	0	0	0	0	0	0	0	**88**
08:00	0	75	0	0	0	0	0	0	0	0	0	0	0	75
09:00	0	33	0	1	0	0	0	0	0	0	0	0	0	34
10:00	0	52	0	0	0	0	0	0	0	0	0	0	0	52
11:00	0	39	0	0	0	0	0	0	0	0	0	0	0	39
12 PM	0	30	0	0	0	0	0	0	0	0	0	0	0	30
13:00	0	54	0	0	**1**	0	0	0	0	0	0	0	0	55
14:00	0	74	0	0	0	0	0	0	0	0	0	0	0	74
15:00	0	**83**	0	**1**	0	0	0	0	0	0	0	0	0	**84**
16:00	0	66	0	1	0	0	0	0	0	0	0	0	0	67
17:00	0	42	0	0	0	0	0	0	0	0	0	0	0	42
18:00	0	45	0	0	0	0	0	0	0	0	0	0	0	45
19:00	0	31	0	1	0	0	0	0	0	0	0	0	0	32
20:00	0	32	0	1	0	0	0	0	0	0	0	0	0	33
21:00	0	44	0	0	0	0	0	0	0	0	0	0	0	44
22:00	0	36	0	0	0	0	0	0	0	0	0	0	0	36
23:00	0	28	0	0	0	0	0	0	0	0	0	0	0	28
Day Total	0	1002	0	6	1	0	0	0	0	0	0	0	0	1009
Percent	0.0%	99.3%	0.0%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00		07:00										07:00
Vol.		87		1										88
PM Peak		15:00		15:00	13:00									15:00
Vol.		83		1	1									84

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	18	0	0	0	0	0	0	0	0	0	0	0	18
01:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
02:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
03:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
04:00	0	15	0	0	0	0	0	0	0	0	0	0	0	15
05:00	0	22	0	0	0	0	0	0	0	0	0	0	0	22
06:00	0	65	0	0	**1**	0	0	0	0	0	0	0	0	66
07:00	0	**92**	0	0	0	0	0	0	0	0	0	0	0	**92**
08:00	0	53	0	0	0	0	0	0	0	0	0	0	0	53
09:00	0	47	0	**1**	0	0	0	0	0	0	0	0	0	48
10:00	0	45	0	0	0	0	0	0	0	0	0	0	0	45
11:00	0	60	0	0	0	0	0	0	0	0	0	0	0	60
12 PM	0	52	0	0	**2**	0	0	0	0	0	0	0	0	54
13:00	0	54	0	0	0	0	0	0	0	0	0	0	0	54
14:00	0	73	0	0	0	0	0	0	0	0	0	0	0	73
15:00	0	80	0	0	1	0	0	0	0	0	0	0	0	81
16:00	**1**	**87**	0	0	1	0	0	0	0	0	0	0	0	**89**
17:00	0	59	0	0	1	0	0	0	0	0	0	0	0	60
18:00	0	39	0	0	1	0	0	0	0	0	0	0	0	40
19:00	0	21	0	0	0	0	0	0	0	0	0	0	0	21
20:00	0	29	0	0	0	0	0	0	0	0	0	0	0	29
21:00	0	35	0	0	0	0	0	0	0	0	0	0	0	35
22:00	0	48	0	0	0	0	0	0	0	0	0	0	0	48
23:00	0	31	0	0	0	0	0	0	0	0	0	0	0	31
Day Total	1	1043	0	1	7	0	0	0	0	0	0	0	0	1052
Percent	0.1%	99.1%	0.0%	0.1%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00		09:00	06:00									07:00
Vol.		92		1	1									92
PM Peak	16:00	16:00			12:00									16:00
Vol.	1	87			2									89
Grand Total	1	2045	0	7	8	0	0	0	0	0	0	0	0	2061
Percent	0.0%	99.2%	0.0%	0.3%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/01/07	0	23	18	0	0	0	0	0	0	0	0	0	0	41
01:00	0	11	9	0	0	0	0	0	0	0	0	0	0	20
02:00	1	7	9	0	0	0	0	0	0	0	0	0	0	17
03:00	0	7	4	0	1	0	0	0	0	0	0	0	0	12
04:00	0	16	8	0	5	0	0	0	0	0	0	0	0	29
05:00	0	37	14	0	7	0	0	0	1	0	0	0	0	59
06:00	**2**	59	37	**1**	21	1	0	1	0	0	0	0	0	122
07:00	2	**95**	**62**	0	18	0	0	**3**	2	0	0	0	0	**182**
08:00	0	51	55	1	**22**	**2**	0	0	0	0	**1**	0	0	132
09:00	0	49	36	0	16	0	0	0	**3**	0	0	0	0	104
10:00	0	48	43	1	5	0	0	3	0	0	0	0	0	100
11:00	0	60	46	0	11	0	0	2	1	0	0	0	0	120
12 PM	0	64	52	0	19	1	0	2	**1**	0	0	0	0	139
13:00	2	84	52	2	14	0	0	1	0	0	0	0	0	155
14:00	0	81	43	0	18	0	0	**3**	1	0	0	0	0	146
15:00	2	150	76	1	25	**2**	0	1	1	0	0	0	0	258
16:00	**6**	208	134	**5**	**35**	2	0	2	0	0	0	**1**	0	393
17:00	5	**260**	**153**	3	30	2	0	1	0	0	0	0	0	**454**
18:00	1	178	112	0	26	0	0	0	1	0	0	0	0	318
19:00	0	114	65	0	15	0	0	0	0	0	0	0	0	194
20:00	1	111	69	0	9	0	0	0	0	0	0	0	0	190
21:00	1	95	44	0	7	0	0	0	0	0	0	0	0	147
22:00	0	59	34	0	5	0	0	0	0	0	0	0	0	98
23:00	0	40	24	0	4	0	0	1	0	0	0	0	0	69
Day Total	23	1907	1199	14	313	10	0	20	11	0	1	1	0	3499
Percent	0.7%	54.5%	34.3%	0.4%	8.9%	0.3%	0.0%	0.6%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	06:00	08:00	08:00		07:00	09:00		08:00			07:00
Vol.	2	95	62	1	22	2		3	3		1			182
PM Peak	16:00	17:00	17:00	16:00	16:00	15:00		14:00	12:00			16:00		17:00
Vol.	6	260	153	5	35	2		3	1			1		454

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
05/02/07	0	19	14	0	2	0	0	0	0	0	0	0	0	35
01:00	1	14	4	1	1	0	0	0	0	0	0	0	0	21
02:00	0	11	2	0	0	0	0	0	0	0	0	0	0	13
03:00	0	5	7	0	4	0	0	0	0	0	0	0	0	16
04:00	0	17	11	0	2	0	0	0	0	0	0	0	0	30
05:00	0	38	17	0	7	0	0	0	0	0	0	0	0	62
06:00	**2**	56	38	1	25	0	0	0	**2**	0	0	0	0	124
07:00	0	**96**	**63**	1	**28**	1	0	**1**	0	0	0	0	0	**190**
08:00	0	65	41	0	12	**2**	0	1	0	0	**1**	0	0	122
09:00	0	56	36	**3**	19	1	0	1	0	0	0	**1**	0	117
10:00	0	60	52	3	9	1	0	0	0	0	0	0	0	125
11:00	0	53	42	0	23	1	0	1	0	0	0	0	0	120
12 PM	0	61	65	3	10	0	0	0	1	0	0	0	0	140
13:00	0	72	48	0	18	0	0	0	1	0	0	0	0	139
14:00	0	85	39	0	15	0	0	1	0	0	0	0	0	140
15:00	2	161	85	5	25	1	0	0	0	0	0	0	0	279
16:00	0	217	149	2	**38**	**2**	0	1	2	0	0	0	0	411
17:00	1	**267**	**159**	**7**	31	1	0	**6**	**3**	0	0	0	0	**475**
18:00	**3**	187	105	0	35	2	0	1	0	0	0	0	0	333
19:00	0	121	70	0	15	0	0	2	0	0	0	0	0	208
20:00	2	104	71	0	17	0	0	1	0	0	0	0	0	195
21:00	2	100	70	1	15	0	0	1	0	0	0	0	0	189
22:00	0	72	48	0	3	0	0	0	0	0	0	0	0	123
23:00	0	36	21	0	6	0	0	0	0	0	0	0	0	63
Day Total	13	1973	1257	27	360	12	0	17	9	0	1	1	0	3670
Percent	0.4%	53.8%	34.3%	0.7%	9.8%	0.3%	0.0%	0.5%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	09:00	07:00	08:00		07:00	06:00		08:00	09:00		07:00
Vol.	2	96	63	3	28	2		1	2		1	1		190
PM Peak	18:00	17:00	17:00	17:00	16:00	16:00		17:00	17:00					17:00
Vol.	3	267	159	7	38	2		6	3					475
Grand Total	36	3880	2456	41	673	22	0	37	20	0	2	2	0	7169
Percent	0.5%	54.1%	34.3%	0.6%	9.4%	0.3%	0.0%	0.5%	0.3%	0.0%	0.0%	0.0%	0.0%	

APPENDIX C
SYNCHRO REPORTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1081	1652	1392	1597	1743	1509	1372	1409	1233	1770	1429	
Flt Permitted	0.10	1.00	1.00	0.33	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	117	1652	1392	549	1743	1509	1372	1409	1233	1770	1429	
Volume (vph)	2	381	280	93	569	2	132	10	46	1	1	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.83	0.83	0.83	0.25	0.25	0.25
Adj. Flow (vph)	2	405	298	109	669	2	159	12	55	4	4	0
RTOR Reduction (vph)	0	0	182	0	0	1	0	0	28	0	0	0
Lane Group Flow (vph)	2	405	116	109	669	1	80	91	27	4	4	0
Heavy Vehicles (%)	67%	15%	16%	13%	9%	7%	25%	8%	31%	2%	33%	2%
Turn Type	Perm		Perm	Perm		Perm	Split		Perm	Split		
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6		6	2		2			8			
Actuated Green, G (s)	37.0	37.0	37.0	37.0	37.0	37.0	46.7	46.7	46.7	1.3	1.3	
Effective Green, g (s)	39.0	39.0	39.0	39.0	39.0	39.0	48.7	48.7	48.7	3.3	3.3	
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.39	0.39	0.49	0.49	0.49	0.03	0.03	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	46	644	543	214	680	589	668	686	600	58	47	
v/s Ratio Prot		0.25			c0.38		0.06	c0.06		0.00	c0.00	
v/s Ratio Perm	0.02		0.08	0.20		0.00			0.02			
v/c Ratio	0.04	0.63	0.21	0.51	0.98	0.00	0.12	0.13	0.04	0.07	0.09	
Uniform Delay, d1	18.9	24.7	20.3	23.2	30.2	18.6	14.0	14.1	13.5	46.9	46.9	
Progression Factor	1.34	1.30	5.39	0.70	0.71	0.69	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	4.4	0.9	7.2	28.2	0.0	0.4	0.4	0.1	0.5	0.8	
Delay (s)	27.0	36.5	110.3	23.5	49.5	12.8	14.3	14.5	13.6	47.4	47.7	
Level of Service	C	D	F	C	D	B	B	B	B	D	D	
Approach Delay (s)		67.7			45.8			14.2			47.5	
Approach LOS		E			D			B			D	

Intersection Summary			
HCM Average Control Delay	50.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1652	1392	1736	1792	1687	1468
Flt Permitted	1.00	1.00	0.60	1.00	0.95	1.00
Satd. Flow (perm)	1652	1392	1095	1792	1687	1468
Volume (vph)	207	121	177	517	198	39
Peak-hour factor, PHF	0.88	0.88	0.87	0.87	0.72	0.72
Adj. Flow (vph)	235	138	203	594	275	54
RTOR Reduction (vph)	0	41	0	0	0	41
Lane Group Flow (vph)	235	97	203	594	275	13
Heavy Vehicles (%)	15%	16%	4%	6%	7%	10%
Turn Type		Perm	Perm			Perm
Protected Phases	2			2	4	
Permitted Phases		2	2			4
Actuated Green, G (s)	68.0	68.0	68.0	68.0	22.0	22.0
Effective Green, g (s)	70.0	70.0	70.0	70.0	24.0	24.0
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.24	0.24
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1156	974	767	1254	405	352
v/s Ratio Prot	0.14			c0.33	c0.16	
v/s Ratio Perm		0.07	0.19			0.01
v/c Ratio	0.20	0.10	0.26	0.47	0.68	0.04
Uniform Delay, d1	5.2	4.8	5.5	6.7	34.5	29.1
Progression Factor	0.89	2.41	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.8	1.3	8.9	0.2
Delay (s)	5.0	11.8	6.4	8.0	43.4	29.3
Level of Service	A	B	A	A	D	C
Approach Delay (s)	7.5			7.6	41.1	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	296	9	12	581	56	21
Peak Hour Factor	0.88	0.88	0.88	0.88	0.84	0.84
Hourly flow rate (vph)	336	10	14	660	67	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			347		1029	341
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			347		1029	341
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		74	96
cM capacity (veh/h)			1212		256	701

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	347	674	67	25
Volume Left	0	14	67	0
Volume Right	10	0	0	25
cSH	1700	1212	256	701
Volume to Capacity	0.20	0.01	0.26	0.04
Queue Length 95th (ft)	0	1	25	3
Control Delay (s)	0.0	0.3	23.9	10.3
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.3	20.2	
Approach LOS			C	

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	316	18	11	546	37	27
Peak Hour Factor	0.85	0.85	0.88	0.88	0.73	0.73
Hourly flow rate (vph)	372	21	12	620	51	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			393		1028	382
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			393		1028	382
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		80	94
cM capacity (veh/h)			1134		257	665

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	393	633	88
Volume Left	0	12	51
Volume Right	21	0	37
cSH	1700	1134	444
Volume to Capacity	0.23	0.01	0.20
Queue Length 95th (ft)	0	1	18
Control Delay (s)	0.0	0.3	17.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.3	17.5
Approach LOS			C

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	144	183	106	357	167	60
Peak Hour Factor	0.82	0.82	0.90	0.90	0.84	0.84
Hourly flow rate (vph)	176	223	118	397	199	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			399		808	176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			399		808	176
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			90		36	92
cM capacity (veh/h)			1144		309	868

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	176	223	514	199	71
Volume Left	0	0	118	199	0
Volume Right	0	223	0	0	71
cSH	1700	1700	1144	309	868
Volume to Capacity	0.10	0.13	0.10	0.64	0.08
Queue Length 95th (ft)	0	0	9	104	7
Control Delay (s)	0.0	0.0	2.8	35.4	9.5
Lane LOS			A	E	A
Approach Delay (s)	0.0		2.8	28.5	
Approach LOS				D	

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1712	1524	1736	1827						1684	1583
Flt Permitted		1.00	1.00	0.47	1.00						0.96	1.00
Satd. Flow (perm)		1712	1524	851	1827						1684	1583
Volume (vph)	0	186	53	834	399	0	0	0	0	6	2	79
Peak-hour factor, PHF	0.86	0.86	0.86	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	216	62	878	420	0	0	0	0	6	2	83
RTOR Reduction (vph)	0	0	42	0	0	0	0	0	0	0	0	67
Lane Group Flow (vph)	0	216	20	878	420	0	0	0	0	0	8	16
Heavy Vehicles (%)	2%	11%	6%	4%	4%	2%	2%	2%	2%	11%	2%	2%
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6	2						8		8
Actuated Green, G (s)		27.6	27.6	65.0	65.0						15.0	15.0
Effective Green, g (s)		29.6	29.6	67.0	67.0						17.0	17.0
Actuated g/C Ratio		0.33	0.33	0.74	0.74						0.19	0.19
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		563	501	972	1360						318	299
v/s Ratio Prot		0.13		c0.35	0.23							
v/s Ratio Perm			0.01	c0.33							0.00	c0.01
v/c Ratio		0.38	0.04	0.90	0.31						0.03	0.05
Uniform Delay, d1		23.2	20.5	8.1	3.8						29.7	29.9
Progression Factor		1.00	1.00	1.42	0.88						1.00	1.00
Incremental Delay, d2		2.0	0.2	5.7	0.3						0.1	0.3
Delay (s)		25.2	20.7	17.2	3.6						29.9	30.2
Level of Service		C	C	B	A						C	C
Approach Delay (s)		24.2			12.8			0.0			30.2	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

56th Avenue
9: E. 56th Ave & Pena Blvd NB

AM Peak Hour
1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	1652			1810	1583		1770	1583			
Flt Permitted	0.06	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	113	1652			1810	1583		1770	1583			
Volume (vph)	45	147	0	0	1163	2	70	0	119	0	0	0
Peak-hour factor, PHF	0.68	0.68	0.68	0.97	0.97	0.97	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	66	216	0	0	1199	2	84	0	143	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	1	0	0	125	0	0	0
Lane Group Flow (vph)	66	216	0	0	1199	1	0	84	18	0	0	0
Heavy Vehicles (%)	2%	15%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt					Perm	Perm		Perm			
Protected Phases	1	6			2			4				
Permitted Phases	6					2	4		4			
Actuated Green, G (s)	70.7	70.7			60.9	60.9		9.3	9.3			
Effective Green, g (s)	72.7	72.7			62.9	62.9		11.3	11.3			
Actuated g/C Ratio	0.81	0.81			0.70	0.70		0.13	0.13			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	216	1334			1265	1106		222	199			
v/s Ratio Prot	c0.02	0.13			c0.66							
v/s Ratio Perm	0.22					0.00		0.05	0.01			
v/c Ratio	0.31	0.16			0.95	0.00		0.38	0.09			
Uniform Delay, d1	19.9	1.9			12.1	4.1		36.1	34.8			
Progression Factor	4.38	0.79			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.8	0.3			15.6	0.0		1.1	0.2			
Delay (s)	87.8	1.8			27.6	4.1		37.2	35.0			
Level of Service	F	A			C	A		D	D			
Approach Delay (s)		21.9			27.6			35.8			0.0	
Approach LOS		C			C			D			A	

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

56th Avenue
3: E. 56th Ave & Havana Street

Noon
1/14/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1289	1597	1346	1626	1624	1272	1441	1440	1369	1770	1243	
Flt Permitted	0.45	1.00	1.00	0.47	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	615	1597	1346	811	1624	1272	1441	1440	1369	1770	1243	
Volume (vph)	3	210	140	96	205	15	126	12	53	1	6	1
Peak-hour factor, PHF	0.87	0.87	0.87	0.80	0.80	0.80	0.92	0.92	0.92	0.67	0.67	0.67
Adj. Flow (vph)	3	241	161	120	256	19	137	13	58	1	9	1
RTOR Reduction (vph)	0	0	109	0	0	13	0	0	27	0	1	0
Lane Group Flow (vph)	3	241	52	120	256	6	76	74	31	1	9	0
Heavy Vehicles (%)	40%	19%	20%	11%	17%	27%	19%	27%	18%	2%	56%	2%
Turn Type	Perm		Perm	Perm		Perm	Split		Perm	Split		
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6		6	2		2			8			
Actuated Green, G (s)	27.0	27.0	27.0	27.0	27.0	27.0	46.5	46.5	46.5	1.5	1.5	
Effective Green, g (s)	29.0	29.0	29.0	29.0	29.0	29.0	48.5	48.5	48.5	3.5	3.5	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.54	0.54	0.54	0.04	0.04	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	198	515	434	261	523	410	777	776	738	69	48	
v/s Ratio Prot		0.15			c0.16		c0.05	0.05		0.00	c0.01	
v/s Ratio Perm	0.00		0.04	0.15		0.00			0.02			
v/c Ratio	0.02	0.47	0.12	0.46	0.49	0.01	0.10	0.10	0.04	0.01	0.19	
Uniform Delay, d1	20.8	24.3	21.5	24.3	24.5	20.8	10.1	10.1	9.8	41.6	41.9	
Progression Factor	0.81	0.97	3.48	0.93	0.92	1.08	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	3.0	0.6	5.7	3.2	0.1	0.3	0.2	0.1	0.1	1.9	
Delay (s)	17.0	26.7	75.5	28.2	25.9	22.6	10.4	10.3	9.9	41.7	43.8	
Level of Service	B	C	E	C	C	C	B	B	A	D	D	
Approach Delay (s)		46.0			26.4			10.2			43.6	
Approach LOS		D			C			B			D	

Intersection Summary			
HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1624	1369	1736	1652	1556	1568
Flt Permitted	1.00	1.00	0.62	1.00	0.95	1.00
Satd. Flow (perm)	1624	1369	1141	1652	1556	1568
Volume (vph)	172	83	82	189	86	114
Peak-hour factor, PHF	0.86	0.86	0.87	0.87	0.93	0.93
Adj. Flow (vph)	200	97	94	217	92	123
RTOR Reduction (vph)	0	32	0	0	0	90
Lane Group Flow (vph)	200	65	94	217	92	33
Heavy Vehicles (%)	17%	18%	4%	15%	16%	3%
Turn Type		Perm	Perm			Perm
Protected Phases	2			2	4	
Permitted Phases		2	2			4
Actuated Green, G (s)	58.0	58.0	58.0	58.0	22.0	22.0
Effective Green, g (s)	60.0	60.0	60.0	60.0	24.0	24.0
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.27	0.27
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1083	913	761	1101	415	418
v/s Ratio Prot	0.12			c0.13	c0.06	
v/s Ratio Perm		0.05	0.08			0.02
v/c Ratio	0.18	0.07	0.12	0.20	0.22	0.08
Uniform Delay, d1	5.7	5.2	5.4	5.8	25.7	24.7
Progression Factor	0.23	0.11	0.93	0.91	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.3	0.4	1.2	0.4
Delay (s)	1.6	0.7	5.4	5.6	27.0	25.1
Level of Service	A	A	A	A	C	C
Approach Delay (s)	1.3			5.5	25.9	
Approach LOS	A			A	C	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	269	19	15	244	31	7
Peak Hour Factor	0.87	0.87	0.90	0.90	0.73	0.73
Hourly flow rate (vph)	309	22	17	271	42	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			331		625	320
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			331		625	320
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		90	99
cM capacity (veh/h)			1228		443	721

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	331	288	42	10
Volume Left	0	17	42	0
Volume Right	22	0	0	10
cSH	1700	1228	443	721
Volume to Capacity	0.19	0.01	0.10	0.01
Queue Length 95th (ft)	0	1	8	1
Control Delay (s)	0.0	0.6	14.0	10.1
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.6	13.3	
Approach LOS			B	

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	254	46	29	233	27	37
Peak Hour Factor	0.89	0.89	0.90	0.90	0.89	0.89
Hourly flow rate (vph)	285	52	32	259	30	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			337		635	311
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			337		635	311
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			97		93	94
cM capacity (veh/h)			1222		428	717

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	337	291	72
Volume Left	0	32	30
Volume Right	52	0	42
cSH	1700	1222	1015
Volume to Capacity	0.20	0.03	0.07
Queue Length 95th (ft)	0	2	6
Control Delay (s)	0.0	1.1	11.9
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	11.9
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	125	125	38	111	137	51
Peak Hour Factor	0.92	0.92	0.73	0.73	0.80	0.80
Hourly flow rate (vph)	136	136	52	152	171	64
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			272		392	136
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			272		392	136
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			96		70	93
cM capacity (veh/h)			1292		573	910

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	136	136	204	171	64
Volume Left	0	0	52	171	0
Volume Right	0	136	0	0	64
cSH	1700	1700	1292	573	910
Volume to Capacity	0.08	0.08	0.04	0.30	0.07
Queue Length 95th (ft)	0	0	3	31	6
Control Delay (s)	0.0	0.0	2.3	13.9	9.3
Lane LOS			A	B	A
Approach Delay (s)	0.0		2.3	12.7	
Approach LOS				B	

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1743	1369	1687	1681						1770	1583
Flt Permitted		1.00	1.00	0.60	1.00						0.95	1.00
Satd. Flow (perm)		1743	1369	1062	1681						1770	1583
Volume (vph)	0	162	33	247	123	0	0	0	0	5	0	55
Peak-hour factor, PHF	0.86	0.86	0.86	0.92	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	0	188	38	268	134	0	0	0	0	6	0	62
RTOR Reduction (vph)	0	0	14	0	0	0	0	0	0	0	0	50
Lane Group Flow (vph)	0	188	24	268	134	0	0	0	0	0	6	12
Heavy Vehicles (%)	2%	9%	18%	7%	13%	2%	2%	2%	2%	2%	2%	2%
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6	2						8		8
Actuated Green, G (s)		55.0	55.0	65.0	65.0						15.0	15.0
Effective Green, g (s)		57.0	57.0	67.0	67.0						17.0	17.0
Actuated g/C Ratio		0.63	0.63	0.74	0.74						0.19	0.19
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1104	867	839	1251						334	299
v/s Ratio Prot		0.11		c0.02	0.08							
v/s Ratio Perm			0.02	c0.21							0.00	c0.01
v/c Ratio		0.17	0.03	0.32	0.11						0.02	0.04
Uniform Delay, d1		6.8	6.2	3.6	3.2						29.7	29.8
Progression Factor		1.61	2.49	0.79	0.76						1.00	1.00
Incremental Delay, d2		0.3	0.1	0.2	0.2						0.1	0.2
Delay (s)		11.3	15.4	3.1	2.6						29.8	30.1
Level of Service		B	B	A	A						C	C
Approach Delay (s)		12.0			2.9			0.0			30.0	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	1712			1743	1583		1777	1583			
Flt Permitted	0.46	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	864	1712			1743	1583		1777	1583			
Volume (vph)	30	137	0	0	347	4	23	1	133	0	0	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.91	0.91	0.91	0.87	0.87	0.87	0.92	0.92	0.92
Adj. Flow (vph)	32	147	0	0	381	4	26	1	153	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	1	0	0	124	0	0	0
Lane Group Flow (vph)	32	147	0	0	381	3	0	27	29	0	0	0
Heavy Vehicles (%)	2%	11%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt					Perm	Perm		Perm			
Protected Phases	1	6			2			4				
Permitted Phases	6					2	4		4			
Actuated Green, G (s)	65.0	65.0			57.0	57.0		15.0	15.0			
Effective Green, g (s)	67.0	67.0			59.0	59.0		17.0	17.0			
Actuated g/C Ratio	0.74	0.74			0.66	0.66		0.19	0.19			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	694	1274			1143	1038		336	299			
v/s Ratio Prot	0.00	c0.09			c0.22							
v/s Ratio Perm	0.03					0.00		0.02	c0.02			
v/c Ratio	0.05	0.12			0.33	0.00		0.08	0.10			
Uniform Delay, d1	3.4	3.2			6.8	5.3		30.1	30.2			
Progression Factor	0.63	0.61			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.0	0.2			0.8	0.0		0.5	0.6			
Delay (s)	2.2	2.1			7.6	5.4		30.5	30.8			
Level of Service	A	A			A	A		C	C			
Approach Delay (s)		2.1			7.6			30.8			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)		1810	1404	1703	1776	1583	1559	1564	1482	1770	1833	
Flt Permitted		1.00	1.00	0.23	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)		1810	1404	409	1776	1583	1559	1564	1482	1770	1833	
Volume (vph)	0	637	134	50	581	2	442	1	82	19	36	4
Peak-hour factor, PHF	0.91	0.91	0.91	0.82	0.82	0.82	0.87	0.87	0.87	0.70	0.70	0.70
Adj. Flow (vph)	0	700	147	61	709	2	508	1	94	27	51	6
RTOR Reduction (vph)	0	0	63	0	0	1	0	0	69	0	5	0
Lane Group Flow (vph)	0	700	84	61	709	1	254	255	25	27	52	0
Heavy Vehicles (%)	2%	5%	15%	6%	7%	2%	10%	2%	9%	2%	2%	2%
Turn Type	Perm		Perm	Perm		Perm	Split		Perm	Split		
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6		6	2		2			8			
Actuated Green, G (s)		55.0	55.0	55.0	55.0	55.0	24.4	24.4	24.4	5.6	5.6	
Effective Green, g (s)		57.0	57.0	57.0	57.0	57.0	26.4	26.4	26.4	7.6	7.6	
Actuated g/C Ratio		0.57	0.57	0.57	0.57	0.57	0.26	0.26	0.26	0.08	0.08	
Clearance Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1032	800	233	1012	902	412	413	391	135	139	
v/s Ratio Prot		0.39			c0.40		0.16	c0.16		0.02	c0.03	
v/s Ratio Perm			0.06	0.15		0.00			0.02			
v/c Ratio		0.68	0.10	0.26	0.70	0.00	0.62	0.62	0.06	0.20	0.38	
Uniform Delay, d1		15.1	9.8	10.9	15.4	9.3	32.3	32.4	27.5	43.3	43.9	
Progression Factor		1.80	5.91	0.72	0.84	0.58	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		3.4	0.2	2.7	4.0	0.0	6.8	6.8	0.3	0.7	1.7	
Delay (s)		30.6	58.3	10.5	16.8	5.4	39.1	39.1	27.9	44.1	45.7	
Level of Service		C	E	B	B	A	D	D	C	D	D	
Approach Delay (s)		35.4			16.3			37.4			45.2	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1827	1482	1770	1776	1641	1583
Flt Permitted	1.00	1.00	0.36	1.00	0.95	1.00
Satd. Flow (perm)	1827	1482	677	1776	1641	1583
Volume (vph)	533	172	71	280	170	200
Peak-hour factor, PHF	0.89	0.89	0.90	0.90	0.78	0.78
Adj. Flow (vph)	599	193	79	311	218	256
RTOR Reduction (vph)	0	58	0	0	0	195
Lane Group Flow (vph)	599	135	79	311	218	61
Heavy Vehicles (%)	4%	9%	2%	7%	10%	2%
Turn Type		Perm	Perm			Perm
Protected Phases	2			2	4	
Permitted Phases		2	2			4
Actuated Green, G (s)	68.0	68.0	68.0	68.0	22.0	22.0
Effective Green, g (s)	70.0	70.0	70.0	70.0	24.0	24.0
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.24	0.24
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1279	1037	474	1243	394	380
v/s Ratio Prot	c0.33			0.18	c0.13	
v/s Ratio Perm		0.09	0.12			0.04
v/c Ratio	0.47	0.13	0.17	0.25	0.55	0.16
Uniform Delay, d1	6.7	5.0	5.1	5.5	33.3	30.0
Progression Factor	1.36	4.72	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.2	0.8	0.5	5.5	0.9
Delay (s)	10.1	23.6	5.9	5.9	38.8	31.0
Level of Service	B	C	A	A	D	C
Approach Delay (s)	13.4			5.9	34.6	
Approach LOS	B			A	C	

Intersection Summary			
HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	694	64	28	327	36	20
Peak Hour Factor	0.94	0.94	0.83	0.83	0.74	0.74
Hourly flow rate (vph)	738	68	34	394	49	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			806		1234	772
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			806		1234	772
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		74	93
cM capacity (veh/h)			818		187	399

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	806	428	49	27
Volume Left	0	34	49	0
Volume Right	68	0	0	27
cSH	1700	818	187	399
Volume to Capacity	0.47	0.04	0.26	0.07
Queue Length 95th (ft)	0	3	25	5
Control Delay (s)	0.0	1.2	30.9	14.7
Lane LOS		A	D	B
Approach Delay (s)	0.0	1.2	25.1	
Approach LOS			D	

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	723	38	33	336	19	37
Peak Hour Factor	0.93	0.93	0.94	0.94	0.83	0.83
Hourly flow rate (vph)	777	41	35	357	23	45
Pedestrians					14	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					1	
Right turn flare (veh)						6
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			832		1240	812
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			832		1240	812
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		87	88
cM capacity (veh/h)			791		183	373

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	818	393	67
Volume Left	0	35	23
Volume Right	41	0	45
cSH	1700	791	539
Volume to Capacity	0.48	0.04	0.13
Queue Length 95th (ft)	0	3	11
Control Delay (s)	0.0	1.4	19.9
Lane LOS		A	C
Approach Delay (s)	0.0	1.4	19.9
Approach LOS			C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	394	278	82	164	190	88
Peak Hour Factor	0.94	0.94	0.90	0.90	0.88	0.88
Hourly flow rate (vph)	419	296	91	182	216	100
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			715		784	419
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			715		784	419
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		33	84
cM capacity (veh/h)			881		325	634

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	419	296	273	216	100
Volume Left	0	0	91	216	0
Volume Right	0	296	0	0	100
cSH	1700	1700	881	325	634
Volume to Capacity	0.25	0.17	0.10	0.67	0.16
Queue Length 95th (ft)	0	0	9	112	14
Control Delay (s)	0.0	0.0	3.9	35.6	11.7
Lane LOS			A	E	B
Approach Delay (s)	0.0		3.9	28.0	
Approach LOS				D	

Intersection Summary			
Average Delay	7.6		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1845	1524	1736	1827						1770	1495
Flt Permitted		1.00	1.00	0.42	1.00						0.95	1.00
Satd. Flow (perm)		1845	1524	766	1827						1770	1495
Volume (vph)	0	393	84	368	223	0	0	0	0	4	0	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.92	0.92	0.92	0.75	0.75	0.75
Adj. Flow (vph)	0	437	93	404	245	0	0	0	0	5	0	67
RTOR Reduction (vph)	0	0	34	0	0	0	0	0	0	0	0	54
Lane Group Flow (vph)	0	437	59	404	245	0	0	0	0	0	5	13
Heavy Vehicles (%)	2%	3%	6%	4%	4%	2%	2%	2%	2%	2%	2%	8%
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6	2						8		8
Actuated Green, G (s)		55.0	55.0	65.0	65.0						15.0	15.0
Effective Green, g (s)		57.0	57.0	67.0	67.0						17.0	17.0
Actuated g/C Ratio		0.63	0.63	0.74	0.74						0.19	0.19
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1169	965	646	1360						334	282
v/s Ratio Prot		0.24		c0.05	0.13							
v/s Ratio Perm			0.04	c0.42							0.00	c0.01
v/c Ratio		0.37	0.06	0.63	0.18						0.01	0.04
Uniform Delay, d1		7.9	6.3	4.9	3.4						29.7	29.9
Progression Factor		1.00	1.00	1.74	0.71						1.00	1.00
Incremental Delay, d2		0.9	0.1	1.7	0.3						0.1	0.3
Delay (s)		8.8	6.4	10.3	2.7						29.8	30.2
Level of Service		A	A	B	A						C	C
Approach Delay (s)		8.4			7.4			0.0			30.1	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	1827			1827	1583		1776	1583			
Flt Permitted	0.31	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	584	1827			1827	1583		1776	1583			
Volume (vph)	92	305	0	0	554	4	37	1	415	0	0	0
Peak-hour factor, PHF	0.88	0.88	0.88	0.90	0.90	0.90	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	105	347	0	0	616	4	39	1	441	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	1	0	0	358	0	0	0
Lane Group Flow (vph)	105	347	0	0	616	3	0	40	83	0	0	0
Heavy Vehicles (%)	2%	4%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt					Perm	Perm		Perm			
Protected Phases	1	6			2			4				
Permitted Phases	6					2	4		4			
Actuated Green, G (s)	65.0	65.0			56.0	56.0		15.0	15.0			
Effective Green, g (s)	67.0	67.0			58.0	58.0		17.0	17.0			
Actuated g/C Ratio	0.74	0.74			0.64	0.64		0.19	0.19			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	514	1360			1177	1020		335	299			
v/s Ratio Prot	0.01	c0.19			c0.34							
v/s Ratio Perm	0.14					0.00		0.02	c0.05			
v/c Ratio	0.20	0.26			0.52	0.00		0.12	0.28			
Uniform Delay, d1	4.9	3.6			8.6	5.7		30.3	31.3			
Progression Factor	0.67	0.59			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.2	0.4			1.7	0.0		0.7	2.3			
Delay (s)	3.4	2.6			10.3	5.7		31.0	33.6			
Level of Service	A	A			B	A		C	C			
Approach Delay (s)		2.8			10.2			33.3			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1081	1652	1392	1597	1743	1509	2801	1759	1233	1770	1787	
Flt Permitted	0.15	1.00	1.00	0.13	1.00	1.00	0.67	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	175	1652	1392	223	1743	1509	1989	1759	1233	1364	1787	
Volume (vph)	10	405	320	475	855	70	245	35	280	45	40	15
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	440	348	516	929	76	266	38	304	49	43	16
RTOR Reduction (vph)	0	0	219	0	0	22	0	0	135	0	13	0
Lane Group Flow (vph)	11	440	129	516	929	54	266	38	169	49	46	0
Heavy Vehicles (%)	67%	15%	16%	13%	9%	7%	25%	8%	31%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		pm+ov	pm+pt		
Protected Phases	1	6		5	2		3	8	5	7	4	
Permitted Phases	6		6	2		2	8		8	4		
Actuated Green, G (s)	32.1	32.1	32.1	64.0	64.0	64.0	39.0	29.0	62.9	12.3	7.3	
Effective Green, g (s)	34.1	34.1	34.1	66.0	66.0	66.0	41.0	31.0	66.9	16.3	9.3	
Actuated g/C Ratio	0.28	0.28	0.28	0.55	0.55	0.55	0.34	0.26	0.56	0.14	0.08	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	80	469	396	534	959	830	874	454	687	209	138	
v/s Ratio Prot	0.00	c0.27		0.29	c0.53		c0.07	0.02	0.07	0.01	c0.03	
v/s Ratio Perm	0.03		0.09	0.24		0.04	0.03		0.06	0.02		
v/c Ratio	0.14	0.94	0.33	0.97	0.97	0.07	0.30	0.08	0.25	0.23	0.33	
Uniform Delay, d1	44.3	41.9	33.9	33.5	26.0	12.6	30.3	33.7	13.6	46.5	52.4	
Progression Factor	1.09	1.07	1.47	0.97	1.05	0.96	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	20.0	1.3	5.9	4.1	0.0	0.2	0.4	0.2	0.6	1.4	
Delay (s)	48.8	64.7	51.1	38.4	31.4	12.1	30.5	34.1	13.8	47.1	53.8	
Level of Service	D	E	D	D	C	B	C	C	B	D	D	
Approach Delay (s)		58.6			32.8			22.4			50.8	
Approach LOS		E			C			C			D	

Intersection Summary			
HCM Average Control Delay	38.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1652	1392	1736	1792		1687	1484			1737	
Flt Permitted	0.10	1.00	1.00	0.36	1.00		0.53	1.00			1.00	
Satd. Flow (perm)	189	1652	1392	657	1792		934	1484			1737	
Volume (vph)	5	275	220	450	1055	5	585	5	105	0	5	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	299	239	489	1147	5	636	5	114	0	5	5
RTOR Reduction (vph)	0	0	160	0	0	0	0	70	0	0	5	0
Lane Group Flow (vph)	5	299	79	489	1152	0	636	49	0	0	5	0
Heavy Vehicles (%)	2%	15%	16%	4%	6%	2%	7%	2%	10%	2%	2%	2%
Turn Type	Perm		Perm	pm+pt			pm+pt			Perm		
Protected Phases		6		5	2		7	4			8	
Permitted Phases	6		6	2			4			8		
Actuated Green, G (s)	37.5	37.5	37.5	66.0	66.0		44.0	44.0			5.0	
Effective Green, g (s)	39.5	39.5	39.5	68.0	68.0		46.0	46.0			7.0	
Actuated g/C Ratio	0.33	0.33	0.33	0.57	0.57		0.38	0.38			0.06	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	62	544	458	602	1015		584	569			101	
v/s Ratio Prot		0.18		0.17	c0.64		c0.33	0.03			0.00	
v/s Ratio Perm	0.03		0.06	0.29			c0.09					
v/c Ratio	0.08	0.55	0.17	0.81	1.13		1.09	0.09			0.05	
Uniform Delay, d1	27.7	33.0	28.6	17.7	26.0		35.3	23.6			53.4	
Progression Factor	0.43	0.54	0.32	0.90	0.89		1.00	1.00			1.00	
Incremental Delay, d2	1.9	3.0	0.6	6.8	71.2		63.8	0.1			0.2	
Delay (s)	14.0	20.8	9.9	22.7	94.2		99.0	23.7			53.6	
Level of Service	B	C	A	C	F		F	C			D	
Approach Delay (s)		15.9			72.9			87.1			53.6	
Approach LOS		B			E			F			D	

Intersection Summary			
HCM Average Control Delay	66.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	108.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	405	10	30	1290	90	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	440	11	33	1402	98	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			451		1913	446
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			451		1913	446
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	92
cM capacity (veh/h)			1109		72	613

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	451	1435	98	49
Volume Left	0	33	98	0
Volume Right	11	0	0	49
cSH	1700	1109	72	613
Volume to Capacity	0.27	0.03	1.35	0.08
Queue Length 95th (ft)	0	2	196	6
Control Delay (s)	0.0	1.6	324.5	11.4
Lane LOS		A	F	B
Approach Delay (s)	0.0	1.6	220.2	
Approach LOS			F	

Intersection Summary			
Average Delay	17.0		
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	410	10	40	1165	30	80
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	446	11	43	1266	33	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			457		1804	451
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			457		1804	451
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			96		61	86
cM capacity (veh/h)			1073		84	608

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	457	1310	33	87
Volume Left	0	43	33	0
Volume Right	11	0	0	87
cSH	1700	1073	84	608
Volume to Capacity	0.27	0.04	0.39	0.14
Queue Length 95th (ft)	0	3	39	12
Control Delay (s)	0.0	1.6	73.2	11.9
Lane LOS		A	F	B
Approach Delay (s)	0.0	1.6	28.6	
Approach LOS			D	

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1667	1446	1715	1810	1703	1505
Flt Permitted	1.00	1.00	0.45	1.00	0.95	1.00
Satd. Flow (perm)	1667	1446	820	1810	1703	1505
Volume (vph)	345	200	105	925	310	95
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	375	217	114	1005	337	103
RTOR Reduction (vph)	0	83	0	0	0	78
Lane Group Flow (vph)	375	134	114	1005	337	25
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	14%	9%	5%	5%	6%	2%
Turn Type		Perm	pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	72.0	72.0	83.3	83.3	26.7	26.7
Effective Green, g (s)	74.0	74.0	85.3	85.3	28.7	28.7
Actuated g/C Ratio	0.62	0.62	0.71	0.71	0.24	0.24
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1028	892	645	1287	407	360
v/s Ratio Prot	0.22		0.01	c0.56	c0.20	
v/s Ratio Perm		0.09	0.11			0.02
v/c Ratio	0.36	0.15	0.18	0.78	0.83	0.07
Uniform Delay, d1	11.4	9.7	6.1	11.3	43.3	35.3
Progression Factor	0.61	0.04	1.21	1.30	1.00	1.00
Incremental Delay, d2	1.0	0.3	0.1	3.2	13.0	0.1
Delay (s)	7.9	0.7	7.4	17.9	56.3	35.4
Level of Service	A	A	A	B	E	D
Approach Delay (s)	5.2			16.8	51.4	
Approach LOS	A			B	D	

Intersection Summary			
HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1727	1520	1764	1810	1770	1505
Flt Permitted	1.00	1.00	0.41	1.00	0.95	1.00
Satd. Flow (perm)	1727	1520	762	1810	1770	1505
Volume (vph)	465	30	130	1055	115	230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	505	33	141	1147	125	250
RTOR Reduction (vph)	0	9	0	0	0	217
Lane Group Flow (vph)	505	24	141	1147	125	33
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	10%	2%	2%	5%	2%	2%
Turn Type		Perm	pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	85.2	85.2	96.2	96.2	13.8	13.8
Effective Green, g (s)	87.2	87.2	98.2	98.2	15.8	15.8
Actuated g/C Ratio	0.73	0.73	0.82	0.82	0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1255	1105	690	1481	233	198
v/s Ratio Prot	0.29		0.01	c0.63	c0.07	
v/s Ratio Perm		0.02	0.15			0.02
v/c Ratio	0.40	0.02	0.20	0.77	0.54	0.17
Uniform Delay, d1	6.3	4.6	3.0	5.4	48.7	46.3
Progression Factor	0.88	0.24	0.36	0.42	1.00	1.00
Incremental Delay, d2	0.9	0.0	0.1	2.6	2.4	0.4
Delay (s)	6.5	1.1	1.2	4.9	51.0	46.7
Level of Service	A	A	A	A	D	D
Approach Delay (s)	6.2			4.5	48.1	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		0.95	1.00	0.97	1.00						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	0.96
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		3252	1487	3365	1827						1681	1525
Flt Permitted		1.00	1.00	0.17	1.00						0.96	1.00
Satd. Flow (perm)		3252	1487	590	1827						1681	1525
Volume (vph)	0	620	75	2615	1100	0	0	0	0	15	5	85
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	674	82	2842	1196	0	0	0	0	16	5	92
RTOR Reduction (vph)	0	0	68	0	0	0	0	0	0	0	0	83
Lane Group Flow (vph)	0	674	14	2842	1196	0	0	0	0	0	21	9
Confl. Peds. (#/hr)	10		10	10		10	10					10
Heavy Vehicles (%)	2%	11%	6%	4%	4%	2%	2%	2%	2%	11%	2%	2%
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6	2						8		8
Actuated Green, G (s)		19.0	19.0	100.0	100.0						10.0	10.0
Effective Green, g (s)		21.0	21.0	102.0	102.0						12.0	12.0
Actuated g/C Ratio		0.18	0.18	0.85	0.85						0.10	0.10
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		569	260	2305	1553						168	153
v/s Ratio Prot		0.21		c0.80	0.65							
v/s Ratio Perm			0.01	c0.25							0.01	0.01
v/c Ratio		1.18	0.06	1.23	0.77						0.12	0.06
Uniform Delay, d1		49.5	41.2	23.3	3.9						49.2	48.9
Progression Factor		0.80	0.59	0.57	0.28						1.00	1.00
Incremental Delay, d2		98.7	0.4	105.2	0.3						1.5	0.8
Delay (s)		138.3	24.8	118.6	1.4						50.7	49.6
Level of Service		F	C	F	A						D	D
Approach Delay (s)		126.0			83.9			0.0			49.8	
Approach LOS		F			F			A			D	

Intersection Summary			
HCM Average Control Delay	89.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	133.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	0.95			0.91	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	3139			4940	1583		1770	1583			
Flt Permitted	0.04	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	84	3139			4940	1583		1770	1583			
Volume (vph)	180	455	0	0	3645	70	70	0	940	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	495	0	0	3962	76	76	0	1022	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	0
Lane Group Flow (vph)	196	495	0	0	3962	62	0	76	1022	0	0	0
Heavy Vehicles (%)	2%	15%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt					Perm	Perm		Free			
Protected Phases	1	6			2			4				
Permitted Phases	6					2	4		Free			
Actuated Green, G (s)	100.9	100.9			84.0	84.0		9.1	120.0			
Effective Green, g (s)	102.9	102.9			86.0	86.0		11.1	120.0			
Actuated g/C Ratio	0.86	0.86			0.72	0.72		0.09	1.00			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	267	2692			3540	1134		164	1583			
v/s Ratio Prot	0.08	0.16			c0.80							
v/s Ratio Perm	0.55					0.04		0.04	c0.65			
v/c Ratio	0.73	0.18			1.12	0.05		0.46	0.65			
Uniform Delay, d1	52.7	1.4			17.0	5.0		51.6	0.0			
Progression Factor	0.75	9.28			1.00	1.00		1.00	1.00			
Incremental Delay, d2	1.0	0.0			58.1	0.1		2.1	2.0			
Delay (s)	40.5	13.4			75.1	5.1		53.7	2.0			
Level of Service	D	B			E	A		D	A			
Approach Delay (s)		21.1			73.7			5.6			0.0	
Approach LOS		C			E			A			A	

Intersection Summary			
HCM Average Control Delay	54.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	133.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1810	1404	1703	1776	1583	3183	1863	1482	1770	1806	
Flt Permitted	0.42	1.00	1.00	0.06	1.00	1.00	0.61	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	776	1810	1404	110	1776	1583	2038	1863	1482	1364	1806	
Volume (vph)	20	965	215	325	530	70	330	35	410	100	40	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1049	234	353	576	76	359	38	446	109	43	11
RTOR Reduction (vph)	0	0	68	0	0	28	0	0	69	0	8	0
Lane Group Flow (vph)	22	1049	166	353	576	48	359	38	377	109	46	0
Heavy Vehicles (%)	2%	5%	15%	6%	7%	2%	10%	2%	9%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		pm+ov	pm+pt		
Protected Phases	1	6		5	2		3	8	5	7	4	
Permitted Phases	6		6	2		2	8		8	4		
Actuated Green, G (s)	62.4	60.0	60.0	81.0	73.6	73.6	28.8	20.0	36.0	19.2	15.2	
Effective Green, g (s)	66.4	62.0	62.0	83.0	75.6	75.6	31.0	22.0	40.0	23.2	17.2	
Actuated g/C Ratio	0.55	0.52	0.52	0.69	0.63	0.63	0.26	0.18	0.33	0.19	0.14	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	466	935	725	315	1119	997	630	342	531	284	259	
v/s Ratio Prot	0.00	0.58		c0.17	0.32		c0.05	0.02	c0.11	0.02	0.03	
v/s Ratio Perm	0.02		0.12	c0.61		0.03	0.10		0.15	0.06		
v/c Ratio	0.05	1.12	0.23	1.12	0.51	0.05	0.57	0.11	0.71	0.38	0.18	
Uniform Delay, d1	12.2	29.0	15.9	53.2	12.2	8.5	37.4	40.8	34.9	41.6	45.2	
Progression Factor	0.56	0.62	0.18	1.20	0.81	1.17	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	63.9	0.4	84.5	1.5	0.1	1.2	0.7	4.5	0.9	0.3	
Delay (s)	6.8	81.9	3.3	148.5	11.3	10.0	38.6	41.5	39.4	42.5	45.5	
Level of Service	A	F	A	F	B	A	D	D	D	D	D	
Approach Delay (s)		66.6			59.4			39.1			43.5	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM Average Control Delay	56.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1770	1827	1482	1770	1774		1641	1583			1757	
Flt Permitted	0.42	1.00	1.00	0.05	1.00		0.73	1.00			0.44	
Satd. Flow (perm)	789	1827	1482	97	1774		1268	1583			785	
Volume (vph)	5	1155	420	210	580	5	215	0	320	10	5	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1255	457	228	630	5	234	0	348	11	5	5
RTOR Reduction (vph)	0	0	119	0	0	0	0	176	0	0	5	0
Lane Group Flow (vph)	5	1255	338	228	635	0	234	172	0	0	16	0
Heavy Vehicles (%)	2%	4%	9%	2%	7%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Perm		Perm	pm+pt			pm+pt			Perm		
Protected Phases		6		5	2		7	4			8	
Permitted Phases	6		6	2			4			8		
Actuated Green, G (s)	72.2	72.2	72.2	89.0	89.0		21.0	21.0			5.0	
Effective Green, g (s)	74.2	74.2	74.2	91.0	91.0		23.0	23.0			7.0	
Actuated g/C Ratio	0.62	0.62	0.62	0.76	0.76		0.19	0.19			0.06	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	488	1130	916	266	1345		283	303			46	
v/s Ratio Prot		c0.69		c0.10	0.36		c0.09	0.11				
v/s Ratio Perm	0.01		0.23	0.55			c0.07				0.02	
v/c Ratio	0.01	1.11	0.37	0.86	0.47		0.83	0.57			0.35	
Uniform Delay, d1	8.8	22.9	11.3	53.9	5.5		46.4	44.0			54.3	
Progression Factor	0.75	0.83	0.42	0.95	1.32		1.00	1.00			1.00	
Incremental Delay, d2	0.0	55.8	0.5	20.9	1.1		17.6	2.4			4.6	
Delay (s)	6.6	74.8	5.2	72.3	8.3		64.0	46.4			59.0	
Level of Service	A	E	A	E	A		E	D			E	
Approach Delay (s)		56.1			25.2			53.5			59.0	
Approach LOS		E			C			D			E	

Intersection Summary			
HCM Average Control Delay	47.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1305	140	20	745	85	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1418	152	22	810	92	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1571		2348	1495
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1571		2348	1495
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		0	89
cM capacity (veh/h)			420		38	151

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	1571	832	92	16
Volume Left	0	22	92	0
Volume Right	152	0	0	16
cSH	1700	420	38	151
Volume to Capacity	0.92	0.05	2.46	0.11
Queue Length 95th (ft)	0	4	256	9
Control Delay (s)	0.0	1.7	890.0	31.7
Lane LOS		A	F	D
Approach Delay (s)	0.0	1.7	761.3	
Approach LOS			F	

Intersection Summary			
Average Delay	33.5		
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1225	55	65	770	30	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1332	60	71	837	33	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1391		2340	1361
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1391		2340	1361
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		5	61
cM capacity (veh/h)			492		34	180

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	1391	908	33	71
Volume Left	0	71	33	0
Volume Right	60	0	0	71
cSH	1700	492	34	180
Volume to Capacity	0.82	0.14	0.95	0.39
Queue Length 95th (ft)	0	12	85	43
Control Delay (s)	0.0	4.6	309.9	37.3
Lane LOS		A	F	E
Approach Delay (s)	0.0	4.6	123.4	
Approach LOS			F	

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1827	1530	1752	1776	1770	1536
Flt Permitted	1.00	1.00	0.12	1.00	0.95	1.00
Satd. Flow (perm)	1827	1530	227	1776	1770	1536
Volume (vph)	935	315	35	630	240	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1016	342	38	685	261	27
RTOR Reduction (vph)	0	109	0	0	0	22
Lane Group Flow (vph)	1016	233	38	685	261	5
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	4%	3%	3%	7%	2%	2%
Turn Type		Perm	pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	79.7	79.7	88.2	88.2	21.8	21.8
Effective Green, g (s)	81.7	81.7	90.2	90.2	23.8	23.8
Actuated g/C Ratio	0.68	0.68	0.75	0.75	0.20	0.20
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1244	1042	241	1335	351	305
v/s Ratio Prot	c0.56		0.01	c0.39	c0.15	
v/s Ratio Perm		0.15	0.11			0.00
v/c Ratio	0.82	0.22	0.16	0.51	0.74	0.02
Uniform Delay, d1	13.8	7.2	14.8	6.0	45.2	38.7
Progression Factor	0.52	0.10	0.70	0.34	1.00	1.00
Incremental Delay, d2	1.9	0.2	0.3	1.3	8.3	0.0
Delay (s)	9.1	0.9	10.6	3.4	53.5	38.7
Level of Service	A	A	B	A	D	D
Approach Delay (s)	7.1			3.8	52.1	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

11: E. 56th Ave & Airport Way

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1827	1520	1770	1827	1770	1536
Flt Permitted	1.00	1.00	0.12	1.00	0.95	1.00
Satd. Flow (perm)	1827	1520	228	1827	1770	1536
Volume (vph)	970	105	195	645	60	150
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1054	114	212	701	65	163
RTOR Reduction (vph)	0	30	0	0	0	145
Lane Group Flow (vph)	1054	84	212	701	65	18
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	4%	2%	2%	4%	2%	2%
Turn Type		Perm	pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	82.5	82.5	99.1	99.1	10.9	10.9
Effective Green, g (s)	84.5	84.5	101.1	101.1	12.9	12.9
Actuated g/C Ratio	0.70	0.70	0.84	0.84	0.11	0.11
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1287	1070	367	1539	190	165
v/s Ratio Prot	c0.58		c0.07	0.38	c0.04	
v/s Ratio Perm		0.06	0.42			0.01
v/c Ratio	0.82	0.08	0.58	0.46	0.34	0.11
Uniform Delay, d1	12.4	5.6	19.1	2.4	49.6	48.3
Progression Factor	0.11	0.01	1.32	1.22	1.00	1.00
Incremental Delay, d2	4.3	0.1	1.9	0.9	1.1	0.3
Delay (s)	5.6	0.1	27.1	3.8	50.7	48.6
Level of Service	A	A	C	A	D	D
Approach Delay (s)	5.1			9.2	49.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

12: E. 56th Ave & Pena Blvd SB

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰↰	↑						↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		0.95	1.00	0.97	1.00						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	0.98
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		3505	1487	3367	1827						1770	1462
Flt Permitted		1.00	1.00	0.10	1.00						0.95	1.00
Satd. Flow (perm)		3505	1487	354	1827						1770	1462
Volume (vph)	0	1075	45	1655	705	0	0	0	0	80	0	135
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1168	49	1799	766	0	0	0	0	87	0	147
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	0	0	0	129
Lane Group Flow (vph)	0	1168	18	1799	766	0	0	0	0	0	87	18
Confl. Peds. (#/hr)	10		10	10		10	10					10
Heavy Vehicles (%)	2%	3%	6%	4%	4%	2%	2%	2%	2%	2%	2%	8%
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6	2						8		8
Actuated Green, G (s)		35.0	35.0	97.0	97.0						13.0	13.0
Effective Green, g (s)		37.0	37.0	99.0	99.0						15.0	15.0
Actuated g/C Ratio		0.31	0.31	0.82	0.82						0.12	0.12
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1081	458	1773	1507						221	183
v/s Ratio Prot		0.33		c0.50	0.42							
v/s Ratio Perm			0.01	c0.34							0.05	0.01
v/c Ratio		1.08	0.04	1.01	0.51						0.39	0.10
Uniform Delay, d1		41.5	29.1	32.7	3.2						48.3	46.5
Progression Factor		0.73	0.55	1.78	1.52						1.00	1.00
Incremental Delay, d2		47.0	0.1	21.1	0.9						5.2	1.1
Delay (s)		77.3	16.0	79.3	5.7						53.5	47.6
Level of Service		E	B	E	A						D	D
Approach Delay (s)		74.8			57.3			0.0			49.8	
Approach LOS		E			E			A			D	

Intersection Summary			
HCM Average Control Delay	62.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	113.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM No-Action HCM Signalized Intersection Capacity Analysis
13: E. 56th Ave & Pena Blvd NB 1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	0.95			0.91	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.96	1.00			
Satd. Flow (prot)	1770	3471			4988	1583		1779	1583			
Flt Permitted	0.05	1.00			1.00	1.00		0.96	1.00			
Satd. Flow (perm)	90	3471			4988	1583		1779	1583			
Volume (vph)	220	935	0	0	2290	30	70	5	1800	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	1016	0	0	2489	33	76	5	1957	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	10	0	0	0	0	0	0
Lane Group Flow (vph)	239	1016	0	0	2489	23	0	81	1957	0	0	0
Heavy Vehicles (%)	2%	4%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt					Perm	Perm		Free			
Protected Phases	1	6			2			4				
Permitted Phases	6					2	4		Free			
Actuated Green, G (s)	100.6	100.6			78.2	78.2		9.4	120.0			
Effective Green, g (s)	102.6	102.6			80.2	80.2		11.4	120.0			
Actuated g/C Ratio	0.85	0.85			0.67	0.67		0.10	1.00			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	349	2968			3334	1058		169	1583			
v/s Ratio Prot	0.11	0.29			0.50							
v/s Ratio Perm	0.48					0.01		0.05	c1.24			
v/c Ratio	0.68	0.34			0.75	0.02		0.48	1.24			
Uniform Delay, d1	35.3	1.8			13.2	6.7		51.5	60.0			
Progression Factor	1.86	0.13			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.5	0.0			1.6	0.0		2.1	112.0			
Delay (s)	66.2	0.3			14.7	6.7		53.6	172.0			
Level of Service	E	A			B	A		D	F			
Approach Delay (s)		12.8			14.6			167.3			0.0	
Approach LOS		B			B			F			A	

Intersection Summary			
HCM Average Control Delay	67.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	113.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

2035 AM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
6: E. 56th Ave & Havana Street 1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.91		0.97	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1081	3139	1365	3095	4730		2789	1759	1219	1756	1503	
Flt Permitted	0.95	1.00	1.00	0.27	1.00		0.51	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	1081	3139	1365	884	4730		1486	1759	1219	1389	1503	
Volume (vph)	15	780	495	605	2455	90	315	10	190	40	20	45
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	780	495	605	2455	90	315	10	190	40	20	45
RTOR Reduction (vph)	0	0	94	0	3	0	0	0	134	0	41	0
Lane Group Flow (vph)	15	780	401	605	2542	0	315	10	56	40	24	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	67%	15%	16%	13%	9%	7%	25%	8%	31%	2%	33%	2%
Turn Type	Prot		pm+ov	pm+pt			pm+pt		pm+ov	pm+pt		
Protected Phases	1	6	3	5	2		3	8	5	7	4	
Permitted Phases			6	2			8		8	4		
Actuated Green, G (s)	3.6	63.1	76.1	83.0	74.4		27.0	16.7	31.6	14.3	9.0	
Effective Green, g (s)	5.6	65.1	80.1	85.0	76.4		29.0	18.7	35.6	18.3	11.0	
Actuated g/C Ratio	0.05	0.54	0.67	0.71	0.64		0.24	0.16	0.30	0.15	0.09	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	50	1703	945	938	3011		522	274	392	234	138	
v/s Ratio Prot	0.01	0.25	0.05	c0.09	c0.54		c0.08	0.01	0.02	0.01	0.02	
v/s Ratio Perm			0.24	0.37			c0.07		0.03	0.02		
v/c Ratio	0.30	0.46	0.42	0.64	0.84		0.60	0.04	0.14	0.17	0.17	
Uniform Delay, d1	55.3	16.7	9.3	8.6	17.1		39.0	43.0	31.0	44.1	50.3	
Progression Factor	1.21	0.19	0.47	1.28	0.98		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.8	0.3	0.6	1.3		2.0	0.2	0.2	0.3	0.6	
Delay (s)	70.0	4.0	4.6	11.7	18.1		41.0	43.3	31.2	44.4	50.9	
Level of Service	E	A	A	B	B		D	D	C	D	D	
Approach Delay (s)		5.0			16.8			37.4			48.5	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor		0.95	1.00	0.97	0.95		0.97	1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			0.93	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		3139	1359	3355	3404		3273	1436			1687	
Flt Permitted		1.00	1.00	0.43	1.00		0.76	1.00			0.83	
Satd. Flow (perm)		3139	1359	1503	3404		2607	1436			1428	
Volume (vph)	0	485	165	740	2475	10	495	0	135	5	0	5
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	485	165	740	2475	10	495	0	135	5	0	5
RTOR Reduction (vph)	0	0	66	0	0	0	0	106	0	0	5	0
Lane Group Flow (vph)	0	485	99	740	2485	0	495	29	0	0	5	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	15%	16%	4%	6%	2%	7%	2%	10%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt			pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6		6	2			4			8		
Actuated Green, G (s)		70.2	70.2	86.4	86.4		23.6	23.6			6.6	
Effective Green, g (s)		72.2	72.2	88.4	88.4		25.6	25.6			8.6	
Actuated g/C Ratio		0.60	0.60	0.74	0.74		0.21	0.21			0.07	
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		1889	818	1311	2508		634	306			102	
v/s Ratio Prot		0.15		0.06	c0.73		c0.09	0.02				
v/s Ratio Perm			0.07	0.35			c0.08				0.00	
v/c Ratio		0.26	0.12	0.56	0.99		0.78	0.09			0.05	
Uniform Delay, d1		11.3	10.3	5.8	15.4		44.2	37.9			51.9	
Progression Factor		0.72	0.80	0.77	0.61		1.00	1.00			1.00	
Incremental Delay, d2		0.3	0.3	0.1	3.7		6.2	0.1			0.2	
Delay (s)		8.4	8.5	4.5	13.0		50.4	38.0			52.1	
Level of Service		A	A	A	B		D	D			D	
Approach Delay (s)		8.4			11.1			47.8			52.1	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3226		1767	3406	1770	1548
Flt Permitted	1.00		0.38	1.00	0.95	1.00
Satd. Flow (perm)	3226		702	3406	1770	1548
Volume (vph)	590	55	20	3040	185	55
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	590	55	20	3040	185	55
RTOR Reduction (vph)	5	0	0	0	0	48
Lane Group Flow (vph)	640	0	20	3040	185	7
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	11%	2%	2%	6%	2%	2%
Turn Type			pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases			2			4
Actuated Green, G (s)	88.7		95.7	95.7	14.3	14.3
Effective Green, g (s)	90.7		97.7	97.7	16.3	16.3
Actuated g/C Ratio	0.76		0.81	0.81	0.14	0.14
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2438		607	2773	240	210
v/s Ratio Prot	0.20		0.00	c0.89	c0.10	
v/s Ratio Perm			0.03			0.00
v/c Ratio	0.26		0.03	1.10	0.77	0.04
Uniform Delay, d1	4.5		2.3	11.1	50.0	45.0
Progression Factor	0.29		0.34	0.29	1.00	1.00
Incremental Delay, d2	0.3		0.0	44.0	14.2	0.1
Delay (s)	1.6		0.8	47.2	64.2	45.1
Level of Service	A		A	D	E	D
Approach Delay (s)	1.6			46.9	59.8	
Approach LOS	A			D	E	

Intersection Summary			
HCM Average Control Delay	40.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	106.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
9: E. 56th Ave & Crown Blvd 1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3238		1667	3438	1770	1548
Flt Permitted	1.00		0.36	1.00	0.95	1.00
Satd. Flow (perm)	3238		632	3438	1770	1548
Volume (vph)	645	25	40	2880	180	45
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	645	25	40	2880	180	45
RTOR Reduction (vph)	2	0	0	0	0	38
Lane Group Flow (vph)	668	0	40	2880	180	7
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	11%	3%	8%	5%	2%	2%
Turn Type			pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases			2			4
Actuated Green, G (s)	84.2		93.5	93.5	16.5	16.5
Effective Green, g (s)	86.2		95.5	95.5	18.5	18.5
Actuated g/C Ratio	0.72		0.80	0.80	0.15	0.15
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2326		557	2736	273	239
v/s Ratio Prot	0.21		0.00	c0.84	c0.10	
v/s Ratio Perm			0.05			0.00
v/c Ratio	0.29		0.07	1.05	0.66	0.03
Uniform Delay, d1	6.0		2.9	12.3	47.8	43.1
Progression Factor	0.46		1.00	0.85	1.00	1.00
Incremental Delay, d2	0.3		0.0	28.3	5.7	0.0
Delay (s)	3.0		2.9	38.7	53.4	43.2
Level of Service	A		A	D	D	D
Approach Delay (s)	3.0			38.2	51.4	
Approach LOS	A			D	D	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
10: E. 56th Ave & Chambers Rd 1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3167	1459	1714	3438	3303	1548
Flt Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	3167	1459	838	3438	3303	1548
Volume (vph)	410	300	105	2100	820	85
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	410	300	105	2100	820	85
RTOR Reduction (vph)	0	41	0	0	0	61
Lane Group Flow (vph)	410	260	105	2100	820	24
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	14%	9%	5%	5%	6%	2%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	6	4	5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	68.5	99.8	78.7	78.7	31.3	31.3
Effective Green, g (s)	70.5	103.8	80.7	80.7	33.3	33.3
Actuated g/C Ratio	0.59	0.86	0.67	0.67	0.28	0.28
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1861	1299	616	2312	917	430
v/s Ratio Prot	0.13	0.06	0.01	c0.61	c0.25	
v/s Ratio Perm		0.12	0.10			0.02
v/c Ratio	0.22	0.20	0.17	0.91	0.89	0.05
Uniform Delay, d1	11.7	1.3	7.1	16.5	41.7	31.8
Progression Factor	1.39	12.66	1.12	0.83	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.1	4.3	11.1	0.1
Delay (s)	16.5	16.8	8.0	17.9	52.7	31.9
Level of Service	B	B	A	B	D	C
Approach Delay (s)	16.6			17.4	50.8	
Approach LOS	B			B	D	

Intersection Summary			
HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
11: E. 56th Ave & Airport Way
1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3282	1520	1763	3438	1770	1548
Flt Permitted	1.00	1.00	0.43	1.00	0.95	1.00
Satd. Flow (perm)	3282	1520	789	3438	1770	1548
Volume (vph)	530	25	135	2230	130	215
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	530	25	135	2230	130	215
RTOR Reduction (vph)	0	3	0	0	0	187
Lane Group Flow (vph)	530	22	135	2230	130	28
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	10%	2%	2%	5%	2%	2%
Turn Type		Perm	pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	85.6	85.6	96.5	96.5	13.5	13.5
Effective Green, g (s)	87.6	87.6	98.5	98.5	15.5	15.5
Actuated g/C Ratio	0.73	0.73	0.82	0.82	0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2396	1110	712	2822	229	200
v/s Ratio Prot	0.16		0.01	c0.65	c0.07	
v/s Ratio Perm		0.01	0.14			0.02
v/c Ratio	0.22	0.02	0.19	0.79	0.57	0.14
Uniform Delay, d1	5.2	4.4	2.3	5.5	49.1	46.3
Progression Factor	0.62	0.59	0.59	0.32	1.00	1.00
Incremental Delay, d2	0.2	0.0	0.1	1.3	3.2	0.3
Delay (s)	3.4	2.6	1.4	3.1	52.3	46.7
Level of Service	A	A	A	A	D	D
Approach Delay (s)	3.4			3.0	48.8	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
12: E. 56th Ave & Pena Blvd SB
1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱	↰↰	↑↑						↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		0.91	1.00	0.97	0.95						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	0.98
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		4673	1487	3367	3471						1684	1548
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		4673	1487	3367	3471						1684	1548
Volume (vph)	0	605	140	2045	2055	0	0	0	0	15	5	310
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	605	140	2045	2055	0	0	0	0	15	5	310
RTOR Reduction (vph)	0	0	120	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	0	605	20	2045	2055	0	0	0	0	0	20	293
Confl. Peds. (#/hr)	10		10	10		10	10					10
Heavy Vehicles (%)	2%	11%	6%	4%	4%	2%	2%	2%	2%	11%	2%	2%
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6							8		8
Actuated Green, G (s)		15.0	15.0	65.0	85.0						25.0	25.0
Effective Green, g (s)		17.0	17.0	67.0	87.0						27.0	27.0
Actuated g/C Ratio		0.14	0.14	0.56	0.72						0.22	0.22
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		662	211	1880	2516						379	348
v/s Ratio Prot		0.13		c0.61	c0.59							
v/s Ratio Perm			0.01								0.01	c0.19
v/c Ratio		0.91	0.09	1.09	0.82						0.05	0.84
Uniform Delay, d1		50.8	44.8	26.5	11.1						36.5	44.5
Progression Factor		0.71	0.77	0.59	0.13						1.00	1.00
Incremental Delay, d2		18.8	0.9	44.0	1.4						0.3	21.2
Delay (s)		54.8	35.5	59.7	2.9						36.7	65.7
Level of Service		D	D	E	A						D	E
Approach Delay (s)		51.2			31.3			0.0			63.9	
Approach LOS		D			C			A			E	

Intersection Summary			
HCM Average Control Delay	36.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	121.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
13: E. 56th Ave & Pena Blvd NB

1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	0.95			0.86	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	3139			6225	1520		1770	1560			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1770	3139			6225	1520		1770	1560			
Volume (vph)	185	435	0	0	4025	70	75	0	950	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	185	435	0	0	4025	70	75	0	950	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	0
Lane Group Flow (vph)	185	435	0	0	4025	56	0	75	950	0	0	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	15%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Free			
Protected Phases	1	6			2			4				
Permitted Phases						2	4		Free			
Actuated Green, G (s)	12.0	100.8			83.8	83.8		9.2	120.0			
Effective Green, g (s)	14.0	102.8			85.8	85.8		11.2	120.0			
Actuated g/C Ratio	0.12	0.86			0.72	0.72		0.09	1.00			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	207	2689			4451	1087		165	1560			
v/s Ratio Prot	c0.10	0.14			c0.65							
v/s Ratio Perm						0.04		0.04	c0.61			
v/c Ratio	0.89	0.16			0.90	0.05		0.45	0.61			
Uniform Delay, d1	52.3	1.4			13.8	5.1		51.5	0.0			
Progression Factor	0.36	3.44			1.00	1.00		1.00	1.00			
Incremental Delay, d2	17.6	0.1			3.5	0.1		2.0	1.8			
Delay (s)	36.5	5.0			17.3	5.2		53.5	1.8			
Level of Service	D	A			B	A		D	A			
Approach Delay (s)		14.4			17.1			5.6			0.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	121.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
6: E. 56th Ave & Havana Street

1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.91		0.97	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00	1.00	0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3438	1378	3303	4818		3161	1863	1465	1756	1626	
Flt Permitted	0.95	1.00	1.00	0.07	1.00		0.73	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	1770	3438	1378	229	4818		2432	1863	1465	1389	1626	
Volume (vph)	50	2590	350	230	1440	65	535	10	295	105	10	30
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	2590	350	230	1440	65	535	10	295	105	10	30
RTOR Reduction (vph)	0	0	71	0	4	0	0	0	56	0	28	0
Lane Group Flow (vph)	50	2590	279	230	1501	0	535	10	239	105	12	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	5%	15%	6%	7%	2%	10%	2%	9%	2%	2%	2%
Turn Type	Prot		pm+ov	pm+pt			pm+pt		pm+ov	pm+pt		
Protected Phases	1	6	3	5	2		3	8	5	7	4	
Permitted Phases			6	2			8		8	4		
Actuated Green, G (s)	8.0	68.7	85.6	70.4	70.4		26.6	10.0	19.7	16.3	4.7	
Effective Green, g (s)	10.0	70.7	89.6	72.4	72.4		28.6	12.0	23.7	20.3	6.7	
Actuated g/C Ratio	0.08	0.59	0.75	0.60	0.60		0.24	0.10	0.20	0.17	0.06	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	148	2026	1029	438	2907		694	186	289	277	91	
v/s Ratio Prot	0.03	c0.75	0.04	0.05	0.31		c0.12	0.01	c0.08	0.04	0.01	
v/s Ratio Perm			0.16	0.27			0.06		0.08	0.02		
v/c Ratio	0.34	1.28	0.27	0.53	0.52		0.77	0.05	0.83	0.38	0.13	
Uniform Delay, d1	51.9	24.6	4.8	52.5	13.7		41.3	48.9	46.2	44.3	53.9	
Progression Factor	0.81	0.67	1.79	1.31	1.19		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	128.0	0.1	1.0	0.6		5.3	0.5	17.3	0.9	0.6	
Delay (s)	42.8	144.4	8.7	69.9	16.9		46.6	49.4	63.5	45.2	54.5	
Level of Service	D	F	A	E	B		D	D	E	D	D	
Approach Delay (s)		126.8			24.0			52.6			47.8	
Approach LOS		F			C			D			D	

Intersection Summary			
HCM Average Control Delay	82.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	117.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1769	3471	1446	3433	3372		3183	1548			1715	
Flt Permitted	0.15	1.00	1.00	0.05	1.00		0.76	1.00			0.55	
Satd. Flow (perm)	286	3471	1446	190	3372		2557	1548			967	
Volume (vph)	5	2585	390	255	1380	5	205	0	380	10	0	5
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	2585	390	255	1380	5	205	0	380	10	0	5
RTOR Reduction (vph)	0	0	93	0	0	0	0	144	0	0	4	0
Lane Group Flow (vph)	5	2585	297	255	1385	0	205	236	0	0	11	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	4%	9%	2%	7%	2%	10%	2%	2%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt			pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6		6	2			4			8		
Actuated Green, G (s)	71.9	70.9	70.9	85.0	79.0		25.0	25.0			10.3	
Effective Green, g (s)	75.9	72.9	72.9	87.0	81.0		27.0	27.0			12.3	
Actuated g/C Ratio	0.63	0.61	0.61	0.72	0.68		0.22	0.22			0.10	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	218	2109	878	438	2276		636	348			99	
v/s Ratio Prot	0.00	c0.74		c0.05	0.41		0.03	c0.15				
v/s Ratio Perm	0.01		0.21	0.37			0.04				0.01	
v/c Ratio	0.02	1.23	0.34	0.58	0.61		0.32	0.68			0.11	
Uniform Delay, d1	9.1	23.5	11.6	53.4	10.8		38.6	42.5			48.9	
Progression Factor	0.40	0.34	0.03	0.96	0.79		1.00	1.00			1.00	
Incremental Delay, d2	0.0	102.0	0.1	1.7	1.1		0.3	5.2			0.5	
Delay (s)	3.6	110.0	0.5	53.1	9.6		38.9	47.7			49.3	
Level of Service	A	F	A	D	A		D	D			D	
Approach Delay (s)		95.5			16.4			44.6			49.3	
Approach LOS		F			B			D			D	

Intersection Summary			
HCM Average Control Delay	64.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	114.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3462		1770	3438	1770	1548
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3462		1770	3438	1770	1548
Volume (vph)	2705	220	25	1545	95	60
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2705	220	25	1545	95	60
RTOR Reduction (vph)	4	0	0	0	0	53
Lane Group Flow (vph)	2921	0	25	1545	95	7
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	3%	2%	2%	5%	2%	2%
Turn Type			Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases						4
Actuated Green, G (s)	89.9		3.7	98.6	11.4	11.4
Effective Green, g (s)	91.9		5.7	100.6	13.4	13.4
Actuated g/C Ratio	0.77		0.05	0.84	0.11	0.11
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2651		84	2882	198	173
v/s Ratio Prot	c0.84		0.01	c0.45	c0.05	
v/s Ratio Perm						0.00
v/c Ratio	1.10		0.30	0.54	0.48	0.04
Uniform Delay, d1	14.0		55.2	2.8	50.0	47.6
Progression Factor	0.53		0.89	1.30	1.00	1.00
Incremental Delay, d2	46.4		1.7	0.6	1.8	0.1
Delay (s)	53.9		50.7	4.3	51.9	47.6
Level of Service	D		D	A	D	D
Approach Delay (s)	53.9			5.1	50.2	
Approach LOS	D			A	D	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3479		1770	3438	1770	1533
Flt Permitted	1.00		0.04	1.00	0.95	1.00
Satd. Flow (perm)	3479		80	3438	1770	1533
Volume (vph)	2605	110	95	1480	90	35
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2605	110	95	1480	90	35
RTOR Reduction (vph)	2	0	0	0	0	31
Lane Group Flow (vph)	2713	0	95	1480	90	4
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	3%	2%	2%	5%	2%	3%
Turn Type			pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases			2			4
Actuated Green, G (s)	87.6		98.9	98.9	11.1	11.1
Effective Green, g (s)	89.6		100.9	100.9	13.1	13.1
Actuated g/C Ratio	0.75		0.84	0.84	0.11	0.11
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2598		184	2891	193	167
v/s Ratio Prot	c0.78		0.04	c0.43	c0.05	
v/s Ratio Perm			0.40			0.00
v/c Ratio	1.04		0.52	0.51	0.47	0.02
Uniform Delay, d1	15.2		39.8	2.7	50.2	47.7
Progression Factor	0.08		1.36	0.97	1.00	1.00
Incremental Delay, d2	21.2		2.1	0.6	1.8	0.1
Delay (s)	22.5		56.1	3.2	51.9	47.8
Level of Service	C		E	A	D	D
Approach Delay (s)	22.5			6.4	50.8	
Approach LOS	C			A	D	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3471	1541	1752	3374	3433	1548
Flt Permitted	1.00	1.00	0.05	1.00	0.95	1.00
Satd. Flow (perm)	3471	1541	90	3374	3433	1548
Volume (vph)	1930	660	115	1135	440	85
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1930	660	115	1135	440	85
RTOR Reduction (vph)	0	59	0	0	0	70
Lane Group Flow (vph)	1930	601	115	1135	440	15
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	4%	3%	3%	7%	2%	2%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	6	4	5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	77.1	96.5	90.6	90.6	19.4	19.4
Effective Green, g (s)	79.1	100.5	92.6	92.6	21.4	21.4
Actuated g/C Ratio	0.66	0.84	0.77	0.77	0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2288	1329	215	2604	612	276
v/s Ratio Prot	c0.56	0.08	c0.05	0.34	c0.13	
v/s Ratio Perm		0.31	0.37			0.01
v/c Ratio	0.84	0.45	0.53	0.44	0.72	0.05
Uniform Delay, d1	15.7	2.6	28.1	4.7	46.5	40.9
Progression Factor	0.78	0.24	1.78	0.24	1.00	1.00
Incremental Delay, d2	0.4	0.0	2.4	0.5	4.0	0.1
Delay (s)	12.6	0.6	52.4	1.6	50.5	41.0
Level of Service	B	A	D	A	D	D
Approach Delay (s)	9.5			6.3	49.0	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3471	1520	1770	3471	1770	1548
Flt Permitted	1.00	1.00	0.05	1.00	0.95	1.00
Satd. Flow (perm)	3471	1520	101	3471	1770	1548
Volume (vph)	1990	115	185	1270	60	145
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1990	115	185	1270	60	145
RTOR Reduction (vph)	0	3	0	0	0	126
Lane Group Flow (vph)	1990	112	185	1270	60	19
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	4%	2%	2%	4%	2%	2%
Turn Type		Perm	pm+pt			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6	2			4
Actuated Green, G (s)	86.3	86.3	101.4	101.4	8.6	8.6
Effective Green, g (s)	88.3	88.3	103.4	103.4	10.6	10.6
Actuated g/C Ratio	0.74	0.74	0.86	0.86	0.09	0.09
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2554	1118	255	2991	156	137
v/s Ratio Prot	c0.57		c0.07	0.37	c0.03	
v/s Ratio Perm		0.07	0.55			0.01
v/c Ratio	0.78	0.10	0.73	0.42	0.38	0.14
Uniform Delay, d1	9.8	4.5	33.5	1.8	51.6	50.5
Progression Factor	0.04	0.01	0.74	1.99	1.00	1.00
Incremental Delay, d2	1.5	0.1	8.8	0.4	1.6	0.5
Delay (s)	1.9	0.2	33.5	4.0	53.2	51.0
Level of Service	A	A	C	A	D	D
Approach Delay (s)	1.8			7.7	51.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		0.91	1.00	0.97	0.95						1.00	1.00
Frpb, ped/bikes		1.00	0.98	1.00	1.00						1.00	0.98
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		5036	1492	3367	3471						1770	1462
Flt Permitted		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (perm)		5036	1492	3367	3471						1770	1462
Volume (vph)	0	2035	100	1275	1220	0	0	0	0	50	0	235
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2035	100	1275	1220	0	0	0	0	50	0	235
RTOR Reduction (vph)	0	0	52	0	0	0	0	0	0	0	0	144
Lane Group Flow (vph)	0	2035	48	1275	1220	0	0	0	0	0	50	91
Confl. Peds. (#/hr)	10		10	10		10	10					10
Heavy Vehicles (%)	2%	3%	6%	4%	4%	2%	2%	2%	2%	2%	2%	8%
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6							8		8
Actuated Green, G (s)		49.0	49.0	46.0	100.0						10.0	10.0
Effective Green, g (s)		51.0	51.0	48.0	102.0						12.0	12.0
Actuated g/C Ratio		0.42	0.42	0.40	0.85						0.10	0.10
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		2140	634	1347	2950						177	146
v/s Ratio Prot		c0.40		c0.38	0.35							
v/s Ratio Perm			0.03								0.03	c0.06
v/c Ratio		0.95	0.08	0.95	0.41						0.28	0.62
Uniform Delay, d1		33.3	20.5	34.8	2.1						50.0	51.8
Progression Factor		1.01	1.77	0.32	0.41						1.00	1.00
Incremental Delay, d2		7.6	0.1	10.1	0.3						4.0	18.4
Delay (s)		41.2	36.5	21.4	1.2						54.0	70.2
Level of Service		D	D	C	A						D	E
Approach Delay (s)		41.0			11.5			0.0			67.4	
Approach LOS		D			B			A			E	

Intersection Summary			
HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 4 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
13: E. 56th Ave & Pena Blvd NB 1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	1.00	0.95			0.86	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.96	1.00			
Satd. Flow (prot)	1770	3471			6285	1520		1779	1560			
Flt Permitted	0.95	1.00			1.00	1.00		0.96	1.00			
Satd. Flow (perm)	1770	3471			6285	1520		1779	1560			
Volume (vph)	435	1650	0	0	2415	25	80	5	1565	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	435	1650	0	0	2415	25	80	5	1565	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	9	0	0	0	0	0	0
Lane Group Flow (vph)	435	1650	0	0	2415	16	0	85	1565	0	0	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	4%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Free			
Protected Phases	1	6			2			4				
Permitted Phases						2	4		Free			
Actuated Green, G (s)	34.0	99.7			60.7	60.7		10.3	120.0			
Effective Green, g (s)	36.0	101.7			62.7	62.7		12.3	120.0			
Actuated g/C Ratio	0.30	0.85			0.52	0.52		0.10	1.00			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	531	2942			3284	794		182	1560			
v/s Ratio Prot	0.25	0.48			0.38							
v/s Ratio Perm						0.01		0.05	c1.00			
v/c Ratio	0.82	0.56			0.74	0.02		0.47	1.00			
Uniform Delay, d1	39.0	2.7			22.2	13.8		50.8	60.0			
Progression Factor	1.28	1.14			1.00	1.00		1.00	1.00			
Incremental Delay, d2	3.4	0.3			1.5	0.0		1.9	23.6			
Delay (s)	53.4	3.3			23.7	13.9		52.7	83.6			
Level of Service	D	A			C	B		D	F			
Approach Delay (s)		13.8			23.6			82.0			0.0	
Approach LOS		B			C			F			A	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
6: E. 56th Ave & Havana Street 1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.95	0.95	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	0.98	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	0.85	1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1081	4510	1359	3099	4759	1449	2783	1189	1166	1758	1479	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.71	1.00	1.00	0.70	1.00	
Satd. Flow (perm)	1081	4510	1359	3099	4759	1449	2087	1189	1166	1297	1479	
Volume (vph)	5	775	365	1075	3110	100	220	5	255	55	25	25
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	775	365	1075	3110	100	220	5	255	55	25	25
RTOR Reduction (vph)	0	0	224	0	0	17	0	41	102	0	23	0
Lane Group Flow (vph)	5	775	141	1075	3110	83	220	10	108	55	27	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	67%	15%	16%	13%	9%	7%	25%	8%	31%	2%	33%	2%
Turn Type	Prot		Perm	Prot		Perm	pm+pt		pm+ov	pm+pt		
Protected Phases	1	6		5	2		3	8	5	7	4	
Permitted Phases			6			2	8		8	4		
Actuated Green, G (s)	0.8	36.9	36.9	47.7	83.8	83.8	19.0	10.0	57.7	11.8	6.4	
Effective Green, g (s)	2.8	38.9	38.9	49.7	85.8	85.8	22.4	12.0	61.7	15.8	8.4	
Actuated g/C Ratio	0.02	0.32	0.32	0.41	0.72	0.72	0.19	0.10	0.51	0.13	0.07	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	25	1462	441	1284	3403	1036	453	119	600	199	104	
v/s Ratio Prot	0.00	c0.17		0.35	c0.65		c0.04	0.01	0.07	0.02	0.02	
v/s Ratio Perm			0.10			0.06	c0.05		0.02	0.02		
v/c Ratio	0.20	0.53	0.32	0.84	0.91	0.08	0.49	0.08	0.18	0.28	0.26	
Uniform Delay, d1	57.5	33.1	30.6	31.5	14.1	5.2	44.5	49.0	15.6	47.4	52.8	
Progression Factor	0.54	0.38	1.30	0.92	0.62	0.30	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	1.2	1.6	2.1	2.2	0.1	0.8	1.3	0.1	0.8	1.3	
Delay (s)	34.2	13.7	41.5	31.0	10.8	1.6	45.3	50.3	15.8	48.2	54.2	
Level of Service	C	B	D	C	B	A	D	D	B	D	D	
Approach Delay (s)		22.6			15.7			32.9			51.0	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	102.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor		0.91	1.00	0.97	0.91		0.97	0.95	0.95		1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00		1.00	0.98	0.98		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85	0.85		0.93	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)		4510	1359	3367	4890		3273	1364	1364		1687	
Flt Permitted		1.00	1.00	0.95	1.00		0.76	1.00	1.00		0.85	
Satd. Flow (perm)		4510	1359	3367	4890		2607	1364	1364		1471	
Volume (vph)	0	555	160	1045	3600	15	440	0	140	5	0	5
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	555	160	1045	3600	15	440	0	140	5	0	5
RTOR Reduction (vph)	0	0	133	0	0	0	0	56	56	0	5	0
Lane Group Flow (vph)	0	555	27	1045	3615	0	440	14	14	0	5	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	15%	16%	4%	6%	2%	7%	2%	10%	2%	2%	2%
Turn Type	Prot		Perm	Prot			pm+pt		Perm	Perm		
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4		4	8		
Actuated Green, G (s)		18.3	18.3	65.0	88.3		21.7	21.7	21.7		6.7	
Effective Green, g (s)		20.3	20.3	67.0	90.3		23.7	23.7	23.7		8.7	
Actuated g/C Ratio		0.17	0.17	0.56	0.75		0.20	0.20	0.20		0.07	
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		763	230	1880	3680		581	269	269		107	
v/s Ratio Prot		0.12		0.31	c0.74		c0.08	0.01				
v/s Ratio Perm			0.02				c0.07		0.01		0.00	
v/c Ratio		0.73	0.12	0.56	0.98		0.76	0.05	0.05		0.05	
Uniform Delay, d1		47.2	42.3	17.0	14.1		45.2	39.0	39.0		51.8	
Progression Factor		0.59	0.34	0.58	0.38		1.00	1.00	1.00		1.00	
Incremental Delay, d2		5.5	0.9	0.0	2.0		5.6	0.1	0.1		0.2	
Delay (s)		33.2	15.3	9.9	7.4		50.8	39.1	39.1		52.0	
Level of Service		C	B	A	A		D	D	D		D	
Approach Delay (s)		29.2			7.9			48.0			52.0	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4657		1770	4893	1770	1548
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4657		1770	4893	1770	1548
Volume (vph)	650	25	30	4540	120	120
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	650	25	30	4540	120	120
RTOR Reduction (vph)	3	0	0	0	0	106
Lane Group Flow (vph)	672	0	30	4540	120	15
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	11%	2%	2%	6%	2%	2%
Turn Type			Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases						4
Actuated Green, G (s)	89.2		3.3	97.5	12.5	12.5
Effective Green, g (s)	91.2		5.3	99.5	14.5	14.5
Actuated g/C Ratio	0.76		0.04	0.83	0.12	0.12
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3539		78	4057	214	187
v/s Ratio Prot	0.14		0.02	c0.93	c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.19		0.38	1.12	0.56	0.08
Uniform Delay, d1	4.0		55.8	10.2	49.7	46.8
Progression Factor	1.60		1.16	0.18	1.00	1.00
Incremental Delay, d2	0.1		0.3	53.9	3.3	0.2
Delay (s)	6.6		64.9	55.7	53.1	47.0
Level of Service	A		E	E	D	D
Approach Delay (s)	6.6			55.8	50.0	
Approach LOS	A			E	D	

Intersection Summary			
HCM Average Control Delay	49.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	107.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
9: E. 56th Ave & Crown Blvd
1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4658		1671	4940	1770	1548
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4658		1671	4940	1770	1548
Volume (vph)	720	20	65	4450	120	95
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	720	20	65	4450	120	95
RTOR Reduction (vph)	2	0	0	0	0	83
Lane Group Flow (vph)	738	0	65	4450	120	12
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	11%	3%	8%	5%	2%	2%
Turn Type			Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases						4
Actuated Green, G (s)	84.4		7.8	97.2	12.8	12.8
Effective Green, g (s)	86.4		9.8	99.2	14.8	14.8
Actuated g/C Ratio	0.72		0.08	0.83	0.12	0.12
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3354		136	4084	218	191
v/s Ratio Prot	0.16		0.04	c0.90	c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.22		0.48	1.09	0.55	0.06
Uniform Delay, d1	5.6		52.7	10.4	49.5	46.5
Progression Factor	0.27		1.05	0.92	1.00	1.00
Incremental Delay, d2	0.1		0.7	41.8	3.0	0.1
Delay (s)	1.7		56.0	51.4	52.5	46.6
Level of Service	A		E	D	D	D
Approach Delay (s)	1.7			51.4	49.9	
Approach LOS	A			D	D	

Intersection Summary			
HCM Average Control Delay	44.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	105.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2035 AM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
10: E. 56th Ave & Chambers Rd
1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.94	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	4550	1446	1719	4940	4802	1548
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	4550	1446	1719	4940	4802	1548
Volume (vph)	475	315	90	3235	1280	85
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	475	315	90	3235	1280	85
RTOR Reduction (vph)	0	141	0	0	0	60
Lane Group Flow (vph)	475	174	90	3235	1280	25
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	14%	9%	5%	5%	6%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6				4
Actuated Green, G (s)	64.1	64.1	7.9	77.0	33.0	33.0
Effective Green, g (s)	66.1	66.1	9.9	79.0	35.0	35.0
Actuated g/C Ratio	0.55	0.55	0.08	0.66	0.29	0.29
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2506	797	142	3252	1401	452
v/s Ratio Prot	0.10		0.05	c0.65	c0.27	
v/s Ratio Perm		0.12				0.02
v/c Ratio	0.19	0.22	0.63	0.99	0.91	0.05
Uniform Delay, d1	13.5	13.8	53.3	20.3	41.0	30.6
Progression Factor	0.34	1.39	1.23	0.78	1.00	1.00
Incremental Delay, d2	0.2	0.6	5.4	11.0	9.4	0.1
Delay (s)	4.8	19.7	70.8	26.8	50.4	30.6
Level of Service	A	B	E	C	D	C
Approach Delay (s)	10.8			28.0	49.2	
Approach LOS	B			C	D	

Intersection Summary			
HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	4715	1520	1770	4940	1770	1548
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	4715	1520	1770	4940	1770	1548
Volume (vph)	595	30	130	3215	150	195
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	595	30	130	3215	150	195
RTOR Reduction (vph)	0	11	0	0	0	168
Lane Group Flow (vph)	595	19	130	3215	150	27
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	10%	2%	2%	5%	2%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6				4
Actuated Green, G (s)	75.4	75.4	15.0	95.4	14.6	14.6
Effective Green, g (s)	77.4	77.4	17.0	97.4	16.6	16.6
Actuated g/C Ratio	0.64	0.64	0.14	0.81	0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3041	980	251	4010	245	214
v/s Ratio Prot	0.13		0.07	c0.65	c0.08	
v/s Ratio Perm		0.01				0.02
v/c Ratio	0.20	0.02	0.52	0.80	0.61	0.13
Uniform Delay, d1	8.7	7.7	47.7	6.1	48.7	45.3
Progression Factor	1.28	2.58	0.96	0.84	1.00	1.00
Incremental Delay, d2	0.1	0.0	1.0	1.0	4.5	0.3
Delay (s)	11.3	19.8	46.9	6.2	53.1	45.6
Level of Service	B	B	D	A	D	D
Approach Delay (s)	11.7			7.7	48.9	
Approach LOS	B			A	D	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		0.86	1.00	0.97	0.91						0.95	0.95
Frpb, ped/bikes		1.00	0.98	1.00	1.00						0.98	0.98
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						0.86	0.85
Flt Protected		1.00	1.00	0.95	1.00						1.00	1.00
Satd. Flow (prot)		5888	1487	3367	4988						1479	1471
Flt Permitted		1.00	1.00	0.95	1.00						1.00	1.00
Satd. Flow (perm)		5888	1487	3367	4988						1479	1471
Volume (vph)	0	625	165	1670	2635	0	0	0	0	20	5	710
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	625	165	1670	2635	0	0	0	0	20	5	710
RTOR Reduction (vph)	0	0	146	0	0	0	0	0	0	0	4	4
Lane Group Flow (vph)	0	625	19	1670	2635	0	0	0	0	0	376	351
Confl. Peds. (#/hr)	10		10	10		10	10					10
Heavy Vehicles (%)	2%	11%	6%	4%	4%	2%	2%	2%	2%	11%	2%	2%
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6							8		8
Actuated Green, G (s)		12.0	12.0	63.0	80.0						30.0	30.0
Effective Green, g (s)		14.0	14.0	65.0	82.0						32.0	32.0
Actuated g/C Ratio		0.12	0.12	0.54	0.68						0.27	0.27
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		687	173	1824	3408						394	392
v/s Ratio Prot		c0.11		c0.50	0.53							
v/s Ratio Perm			0.01								0.25	0.24
v/c Ratio		0.91	0.11	0.92	0.77						0.96	0.90
Uniform Delay, d1		52.4	47.4	25.0	12.8						43.3	42.4
Progression Factor		0.76	1.26	1.02	1.26						1.00	1.00
Incremental Delay, d2		17.9	1.3	4.7	1.1						35.4	25.6
Delay (s)		57.9	61.1	30.3	17.2						78.7	68.0
Level of Service		E	E	C	B						E	E
Approach Delay (s)		58.6			22.3			0.0			73.5	
Approach LOS		E			C			A			E	

Intersection Summary			
HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	111.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	0.97	0.91			0.81	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	3433	4510			7329	1545		1770	1560			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	3433	4510			7329	1545		1770	1560			
Volume (vph)	180	465	0	0	4220	60	85	0	945	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	180	465	0	0	4220	60	85	0	945	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	11	0	0	0	0	0	0
Lane Group Flow (vph)	180	465	0	0	4220	49	0	85	945	0	0	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	15%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Free			
Protected Phases	1	6			2			4				
Permitted Phases						2	4		Free			
Actuated Green, G (s)	11.7	100.4			83.7	83.7		9.6	120.0			
Effective Green, g (s)	13.7	102.4			85.7	85.7		11.6	120.0			
Actuated g/C Ratio	0.11	0.85			0.71	0.71		0.10	1.00			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	392	3849			5234	1103		171	1560			
v/s Ratio Prot	0.05	0.10			c0.58							
v/s Ratio Perm						0.03		0.05	c0.61			
v/c Ratio	0.46	0.12			0.81	0.04		0.50	0.61			
Uniform Delay, d1	49.7	1.4			11.6	5.1		51.4	0.0			
Progression Factor	0.26	6.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.4	0.0			1.4	0.1		2.3	1.8			
Delay (s)	13.4	8.7			13.0	5.1		53.7	1.8			
Level of Service	B	A			B	A		D	A			
Approach Delay (s)		10.0			12.9			6.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	111.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	0.95	0.95	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	0.98	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	0.85	1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4940	1370	3303	4848	1520	3183	1387	1389	1770	1652	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.00	1.00	1.00	0.00	1.00	
Satd. Flow (perm)	1770	4940	1370	3303	4848	1520	0	1387	1389	0	1652	
Volume (vph)	25	3205	230	355	1685	90	490	10	645	130	5	10
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	3205	230	355	1685	90	490	10	645	130	5	10
RTOR Reduction (vph)	0	0	65	0	0	36	0	119	11	0	10	0
Lane Group Flow (vph)	25	3205	165	355	1685	54	490	213	312	130	5	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	5%	15%	6%	7%	2%	10%	2%	9%	2%	2%	2%
Turn Type	Prot		Perm	Prot		Perm	pm+pt		pm+ov	pm+pt		
Protected Phases	1	6		5	2		3	8	5	7	4	
Permitted Phases			6			2	8		8	4		
Actuated Green, G (s)	6.0	64.0	64.0	12.0	70.0	70.0	20.7	18.0	30.0	6.0	3.3	
Effective Green, g (s)	8.0	66.0	66.0	14.0	72.0	72.0	22.7	20.0	34.0	8.0	5.3	
Actuated g/C Ratio	0.07	0.55	0.55	0.12	0.60	0.60	0.19	0.17	0.28	0.07	0.04	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	118	2717	754	385	2909	912	602	231	394	118	73	
v/s Ratio Prot	0.01	c0.65		c0.11	0.35		c0.15	c0.15	0.09	c0.07	0.00	
v/s Ratio Perm			0.12			0.04			0.13			
v/c Ratio	0.21	1.18	0.22	0.92	0.58	0.06	0.81	0.92	0.79	1.10	0.07	
Uniform Delay, d1	53.0	27.0	13.8	52.5	14.7	10.0	46.6	49.2	39.7	56.0	55.0	
Progression Factor	0.86	0.27	0.01	0.91	1.24	3.09	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	81.2	0.1	24.5	0.7	0.1	8.3	41.8	10.4	112.8	0.4	
Delay (s)	45.9	88.5	0.3	72.3	19.0	30.9	54.9	91.1	50.1	168.8	55.4	
Level of Service	D	F	A	E	B	C	D	F	D	F	E	
Approach Delay (s)		82.3			28.4			64.0			157.1	
Approach LOS		F			C			E			F	

Intersection Summary			
HCM Average Control Delay	64.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	121.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		0.97	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.98	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1770	4988	1446	3433	4844		3183	1471	1504		1714	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.48	
Satd. Flow (perm)	1770	4988	1446	3433	4844		3183	1471	1504		844	
Volume (vph)	5	3535	345	290	1840	10	235	0	565	10	0	5
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	3535	345	290	1840	10	235	0	565	10	0	5
RTOR Reduction (vph)	0	0	88	0	0	0	0	112	162	0	5	0
Lane Group Flow (vph)	5	3535	257	290	1850	0	235	170	121	0	10	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	4%	9%	2%	7%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Over	Perm		
Protected Phases	1	6		5	2		7		5		8	
Permitted Phases			6					4		8		
Actuated Green, G (s)	1.0	75.0	75.0	10.0	84.0		10.0	20.0	10.0		5.0	
Effective Green, g (s)	3.0	77.0	77.0	12.0	86.0		12.0	22.0	12.0		7.0	
Actuated g/C Ratio	0.02	0.64	0.64	0.10	0.72		0.10	0.18	0.10		0.06	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	44	3201	928	343	3472		318	270	150		49	
v/s Ratio Prot	0.00	c0.71		c0.08	0.38		0.07		0.08			
v/s Ratio Perm			0.18					c0.12			0.01	
v/c Ratio	0.11	1.10	0.28	0.85	0.53		0.74	0.63	0.81		0.21	
Uniform Delay, d1	57.2	21.5	9.4	53.1	7.8		52.5	45.2	52.9		53.9	
Progression Factor	0.92	0.79	0.18	1.05	0.50		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	47.5	0.1	15.5	0.5		8.7	4.7	26.2		2.1	
Delay (s)	52.9	64.4	1.7	71.5	4.4		61.2	50.0	79.0		56.0	
Level of Service	D	E	A	E	A		E	D	E		E	
Approach Delay (s)		58.8			13.5			63.5			56.0	
Approach LOS		E			B			E			E	

Intersection Summary			
HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	106.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4991		1770	4940	1770	1548
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4991		1770	4940	1770	1548
Volume (vph)	3865	220	25	2025	115	40
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3865	220	25	2025	115	40
RTOR Reduction (vph)	4	0	0	0	0	35
Lane Group Flow (vph)	4081	0	25	2025	115	5
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	3%	2%	2%	5%	2%	2%
Turn Type			Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases						4
Actuated Green, G (s)	88.8		3.6	97.4	12.6	12.6
Effective Green, g (s)	90.8		5.6	99.4	14.6	14.6
Actuated g/C Ratio	0.76		0.05	0.83	0.12	0.12
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3777		83	4092	215	188
v/s Ratio Prot	c0.82		0.01	c0.41	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.08		0.30	0.49	0.53	0.03
Uniform Delay, d1	14.6		55.3	3.0	49.5	46.4
Progression Factor	0.65		1.16	0.45	1.00	1.00
Incremental Delay, d2	36.7		1.8	0.4	2.5	0.1
Delay (s)	46.2		66.1	1.7	52.1	46.5
Level of Service	D		E	A	D	D
Approach Delay (s)	46.2			2.5	50.6	
Approach LOS	D			A	D	

Intersection Summary			
HCM Average Control Delay	32.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	99.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
9: E. 56th Ave & Crown Blvd 1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	3.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	4994		1770	4940	1770	1533
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	4994		1770	4940	1770	1533
Volume (vph)	3695	180	25	1935	115	10
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3695	180	25	1935	115	10
RTOR Reduction (vph)	4	0	0	0	0	9
Lane Group Flow (vph)	3871	0	25	1935	115	1
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	3%	2%	2%	5%	2%	3%
Turn Type			Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases						4
Actuated Green, G (s)	88.8		3.6	97.4	12.6	12.6
Effective Green, g (s)	90.8		5.6	99.4	14.6	14.6
Actuated g/C Ratio	0.76		0.05	0.83	0.12	0.12
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3779		83	4092	215	187
v/s Ratio Prot	c0.78		0.01	c0.39	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.02		0.30	0.47	0.53	0.01
Uniform Delay, d1	14.6		55.3	2.9	49.5	46.3
Progression Factor	0.02		0.86	1.87	1.00	1.00
Incremental Delay, d2	12.6		1.9	0.4	2.5	0.0
Delay (s)	12.9		49.4	5.8	52.1	46.3
Level of Service	B		D	A	D	D
Approach Delay (s)	12.9			6.3	51.6	
Approach LOS	B			A	D	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
10: E. 56th Ave & Chambers Rd 1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.91	1.00	1.00	0.91	0.94	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	4988	1530	1752	4848	4990	1548
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	4988	1530	1752	4848	4990	1548
Volume (vph)	2715	965	200	1390	570	150
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2715	965	200	1390	570	150
RTOR Reduction (vph)	0	275	0	0	0	125
Lane Group Flow (vph)	2715	690	200	1390	570	25
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	4%	3%	3%	7%	2%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6				4
Actuated Green, G (s)	69.3	69.3	17.4	91.7	18.3	18.3
Effective Green, g (s)	71.3	71.3	19.4	93.7	20.3	20.3
Actuated g/C Ratio	0.59	0.59	0.16	0.78	0.17	0.17
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2964	909	283	3785	844	262
v/s Ratio Prot	c0.54		c0.11	0.29	c0.11	
v/s Ratio Perm		0.45				0.02
v/c Ratio	0.92	0.76	0.71	0.37	0.68	0.10
Uniform Delay, d1	21.7	18.0	47.6	4.0	46.8	42.1
Progression Factor	0.45	0.67	0.86	0.85	1.00	1.00
Incremental Delay, d2	1.4	1.4	7.4	0.3	2.2	0.2
Delay (s)	11.2	13.5	48.5	3.7	48.9	42.3
Level of Service	B	B	D	A	D	D
Approach Delay (s)	11.8			9.3	47.5	
Approach LOS	B			A	D	

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
11: E. 56th Ave & Airport Way 1/4/2008

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	4988	1520	1770	4988	1770	1548
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	4988	1520	1770	4988	1770	1548
Volume (vph)	2795	120	180	1575	65	145
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2795	120	180	1575	65	145
RTOR Reduction (vph)	0	32	0	0	0	112
Lane Group Flow (vph)	2795	88	180	1575	65	33
Confl. Peds. (#/hr)		10	10			10
Heavy Vehicles (%)	4%	2%	2%	4%	2%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	6		5	2	4	
Permitted Phases		6				4
Actuated Green, G (s)	80.0	80.0	15.0	100.0	10.0	10.0
Effective Green, g (s)	82.0	82.0	17.0	102.0	12.0	12.0
Actuated g/C Ratio	0.68	0.68	0.14	0.85	0.10	0.10
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3408	1039	251	4240	177	155
v/s Ratio Prot	c0.56		c0.10	0.32	c0.04	
v/s Ratio Perm		0.06				0.02
v/c Ratio	0.82	0.09	0.72	0.37	0.37	0.22
Uniform Delay, d1	13.7	6.4	49.2	2.0	50.5	49.7
Progression Factor	0.11	0.00	0.83	2.06	1.00	1.00
Incremental Delay, d2	1.1	0.1	8.6	0.2	1.3	0.7
Delay (s)	2.7	0.1	49.3	4.3	51.7	50.4
Level of Service	A	A	D	A	D	D
Approach Delay (s)	2.5			8.9	50.8	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
12: E. 56th Ave & Pena Blvd SB 1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Util. Factor		0.86	1.00	0.97	0.91						0.95	0.95
Frpb, ped/bikes		1.00	0.98	1.00	1.00						0.98	0.98
Flpb, ped/bikes		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						0.89	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		6346	1487	3367	4988						1462	1389
Flt Permitted		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (perm)		6346	1487	3367	4988						1462	1389
Volume (vph)	0	2770	170	1230	1330	0	0	0	0	65	0	425
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2770	170	1230	1330	0	0	0	0	65	0	425
RTOR Reduction (vph)	0	0	82	0	0	0	0	0	0	0	88	103
Lane Group Flow (vph)	0	2770	88	1230	1330	0	0	0	0	0	167	132
Confl. Peds. (#/hr)	10		10	10		10	10					10
Heavy Vehicles (%)	2%	3%	6%	4%	4%	2%	2%	2%	2%	2%	2%	8%
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		6		5	2						8	
Permitted Phases			6							8		8
Actuated Green, G (s)		48.0	48.0	42.0	95.0						15.0	15.0
Effective Green, g (s)		50.0	50.0	44.0	97.0						17.0	17.0
Actuated g/C Ratio		0.42	0.42	0.37	0.81						0.14	0.14
Clearance Time (s)		5.0	5.0	5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		2644	620	1235	4032						207	197
v/s Ratio Prot		c0.44		c0.37	0.27							
v/s Ratio Perm			0.06								0.11	0.10
v/c Ratio		1.05	0.14	1.00	0.33						0.81	0.67
Uniform Delay, d1		35.0	21.7	37.9	3.0						49.9	48.8
Progression Factor		0.55	0.33	0.61	0.84						1.00	1.00
Incremental Delay, d2		28.0	0.3	22.3	0.2						27.8	16.7
Delay (s)		47.4	7.5	45.4	2.7						77.7	65.5
Level of Service		D	A	D	A						E	E
Approach Delay (s)		45.1			23.2			0.0			71.9	
Approach LOS		D			C			A			E	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	108.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2035 PM CS 6 Lane Havana to Pena Mitigated HCM Signalized Intersection Capacity Analysis
13: E. 56th Ave & Pena Blvd NB 1/4/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Util. Factor	0.97	0.91			0.81	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	3433	4988			7399	1545		1779	1560			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	3433	4988			7399	1545		1779	1560			
Volume (vph)	750	2085	0	0	2475	30	85	5	1400	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	750	2085	0	0	2475	30	85	5	1400	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	12	0	0	0	0	0	0
Lane Group Flow (vph)	750	2085	0	0	2475	18	0	90	1400	0	0	0
Confl. Peds. (#/hr)	10		10	10		10			10	10		
Heavy Vehicles (%)	2%	4%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Free			
Protected Phases	1	6			2			4				
Permitted Phases						2	4		Free			
Actuated Green, G (s)	26.3	100.3			69.0	69.0		9.7	120.0			
Effective Green, g (s)	28.3	102.3			71.0	71.0		11.7	120.0			
Actuated g/C Ratio	0.24	0.85			0.59	0.59		0.10	1.00			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0				
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	810	4252			4378	914		173	1560			
v/s Ratio Prot	0.22	0.42			0.33							
v/s Ratio Perm						0.01		0.05	c0.90			
v/c Ratio	0.93	0.49			0.57	0.02		0.52	0.90			
Uniform Delay, d1	44.8	2.2			15.0	10.1		51.5	0.0			
Progression Factor	1.20	0.40			1.00	1.00		1.00	1.00			
Incremental Delay, d2	2.1	0.0			0.5	0.0		2.8	8.5			
Delay (s)	56.1	0.9			15.6	10.2		54.3	8.5			
Level of Service	E	A			B	B		D	A			
Approach Delay (s)		15.5			15.5			11.3			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	108.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX D
LAYOUT OF RECOMMENDED ALTERNATIVE

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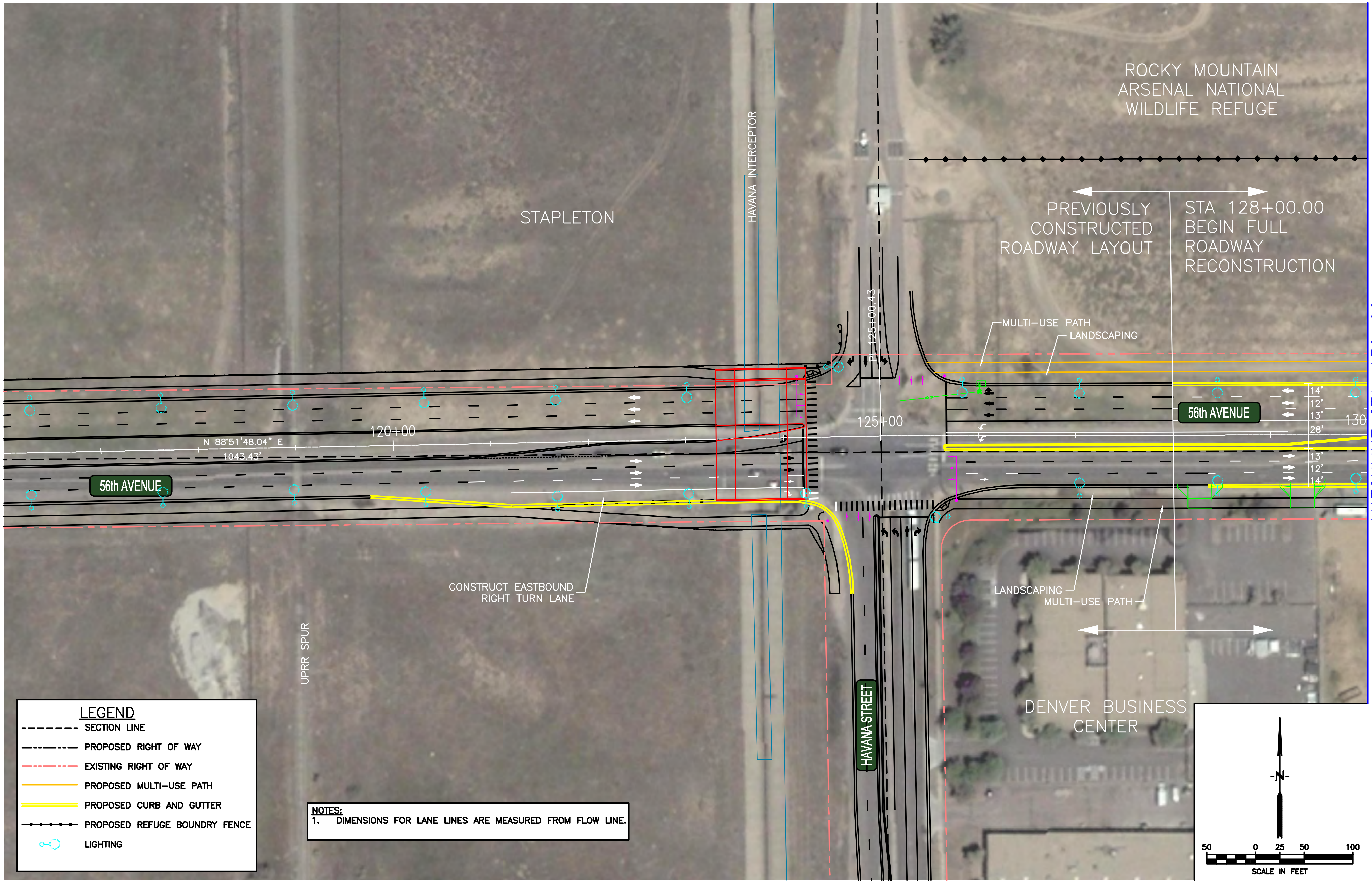

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 1 of 18
STA. 125+00 to STA. 130+00

URS
DENVER

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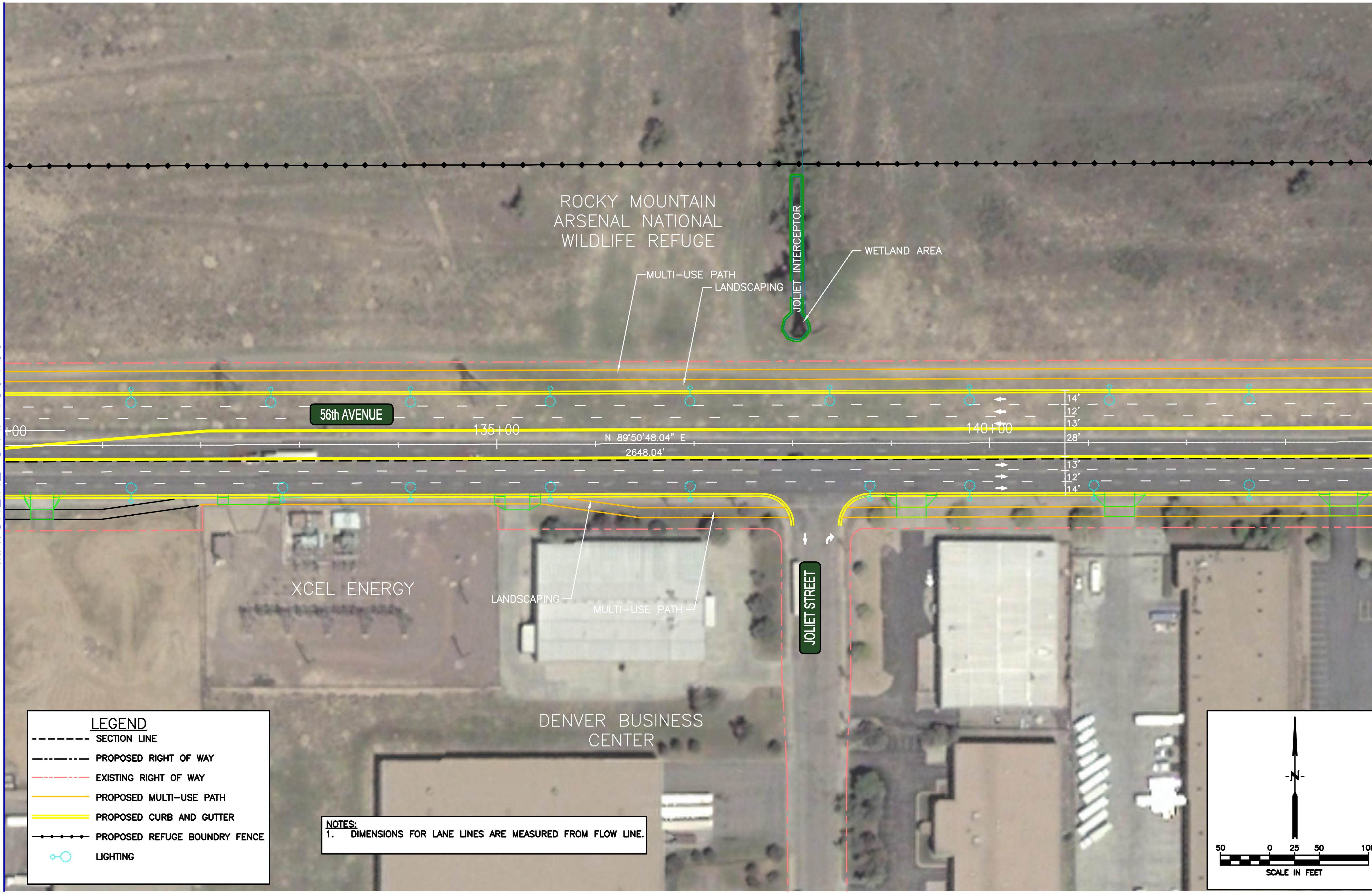

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 2 of 18
STA. 130+00 to STA. 144+00

URS
DENVER

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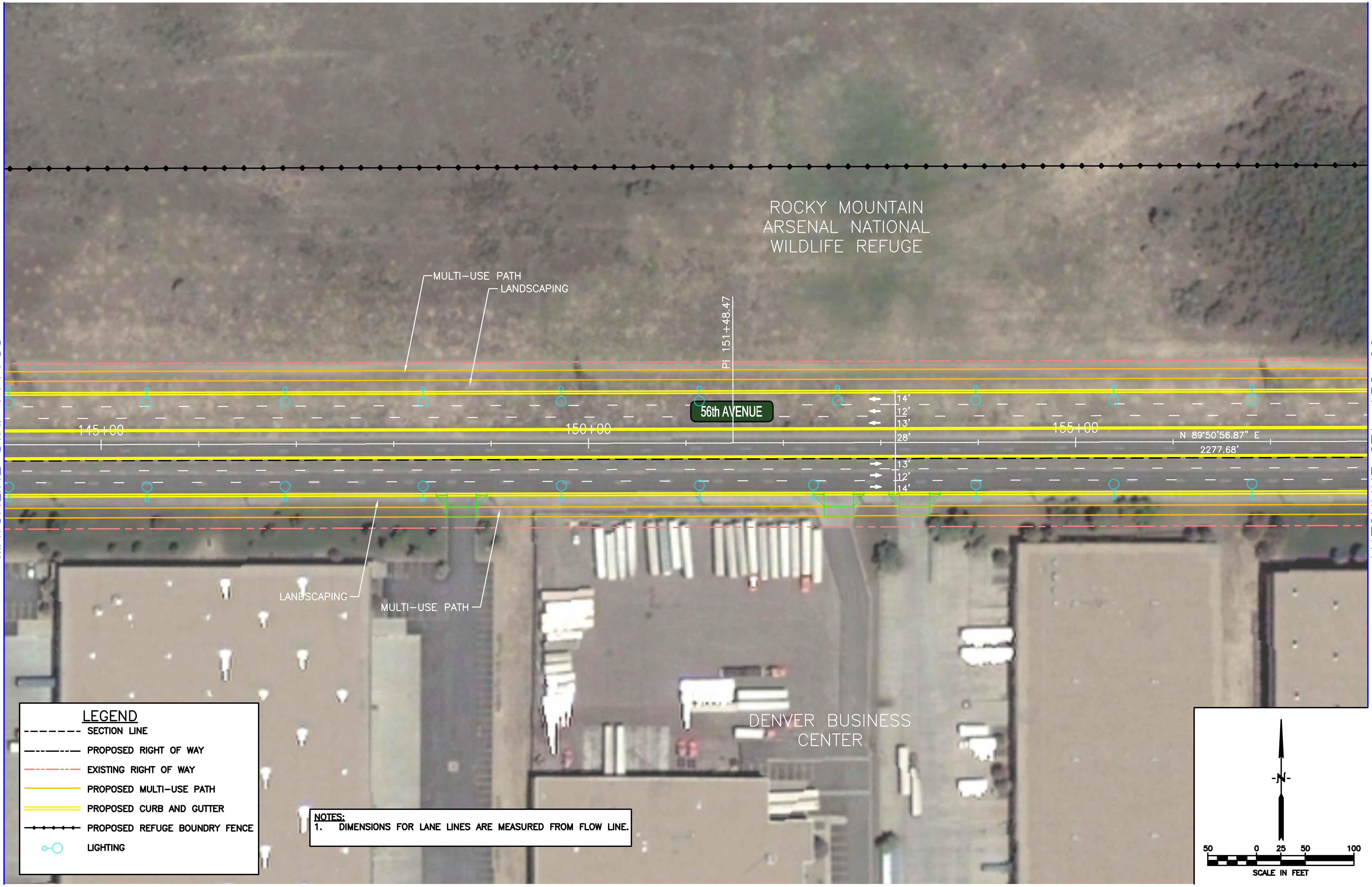

NOTES:
1. DIMENSIONS FOR LANE LINES ARE MEASURED FROM FLOW LINE.

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 3 of 18
STA. 144+00 to STA. 158+00

URS
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Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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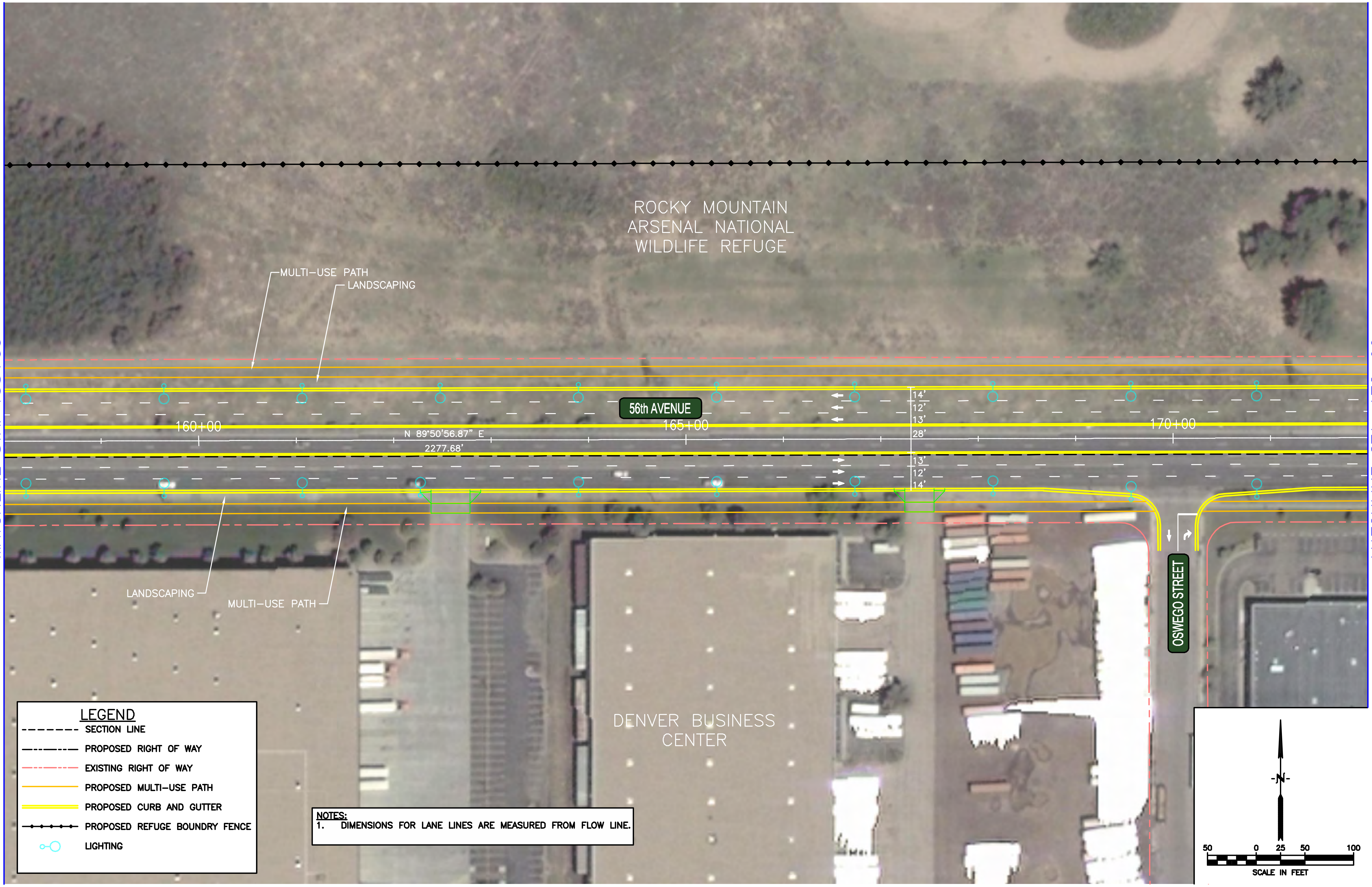

NOTES:

1. DIMENSIONS FOR LANE LINES ARE MEASURED FROM FLOW LINE.

56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 4 of 18

STA. 158+00 to STA. 172+00

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Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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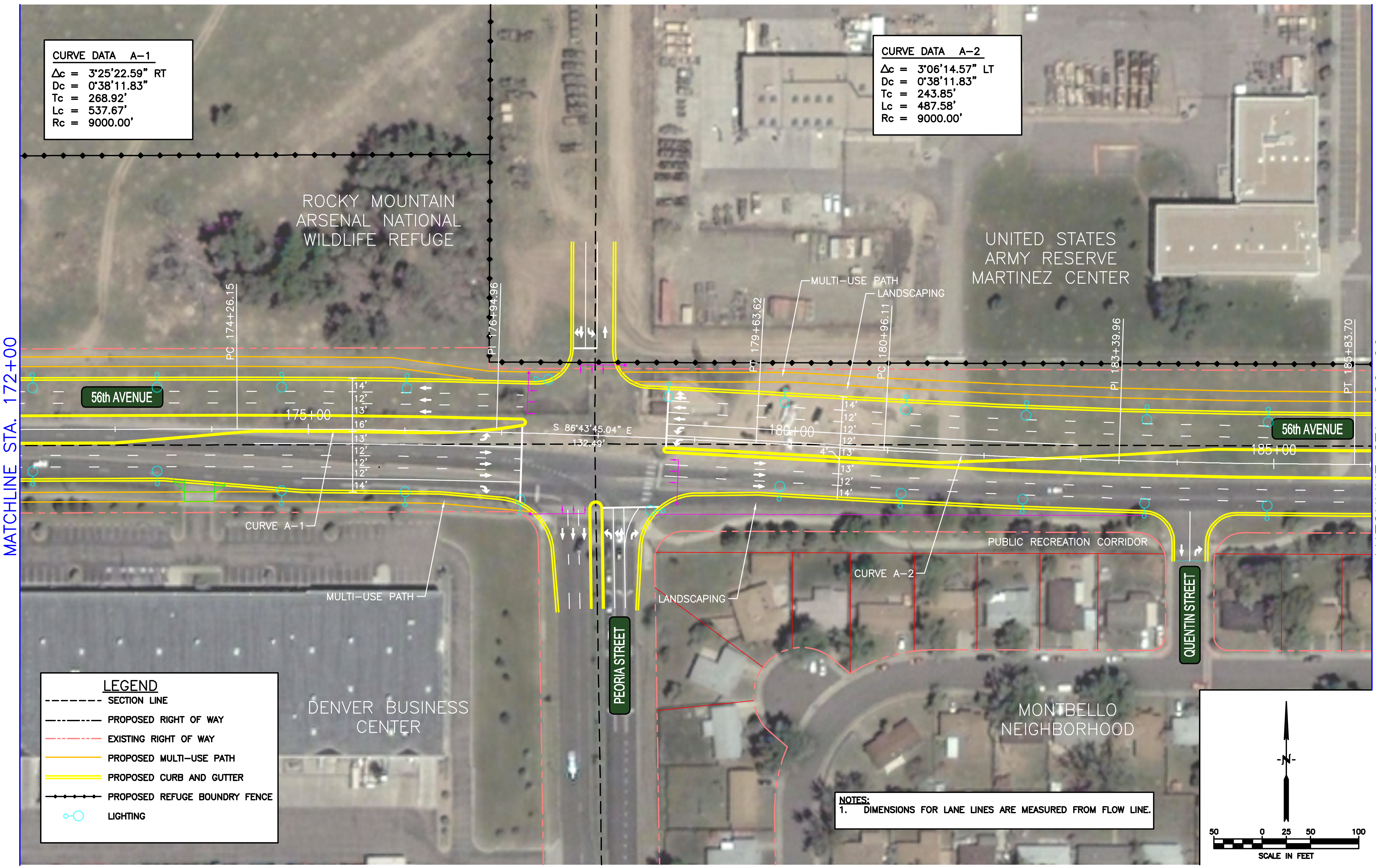

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 5 of 18
STA. 172+00 to STA. 186+00

URS
DENVER

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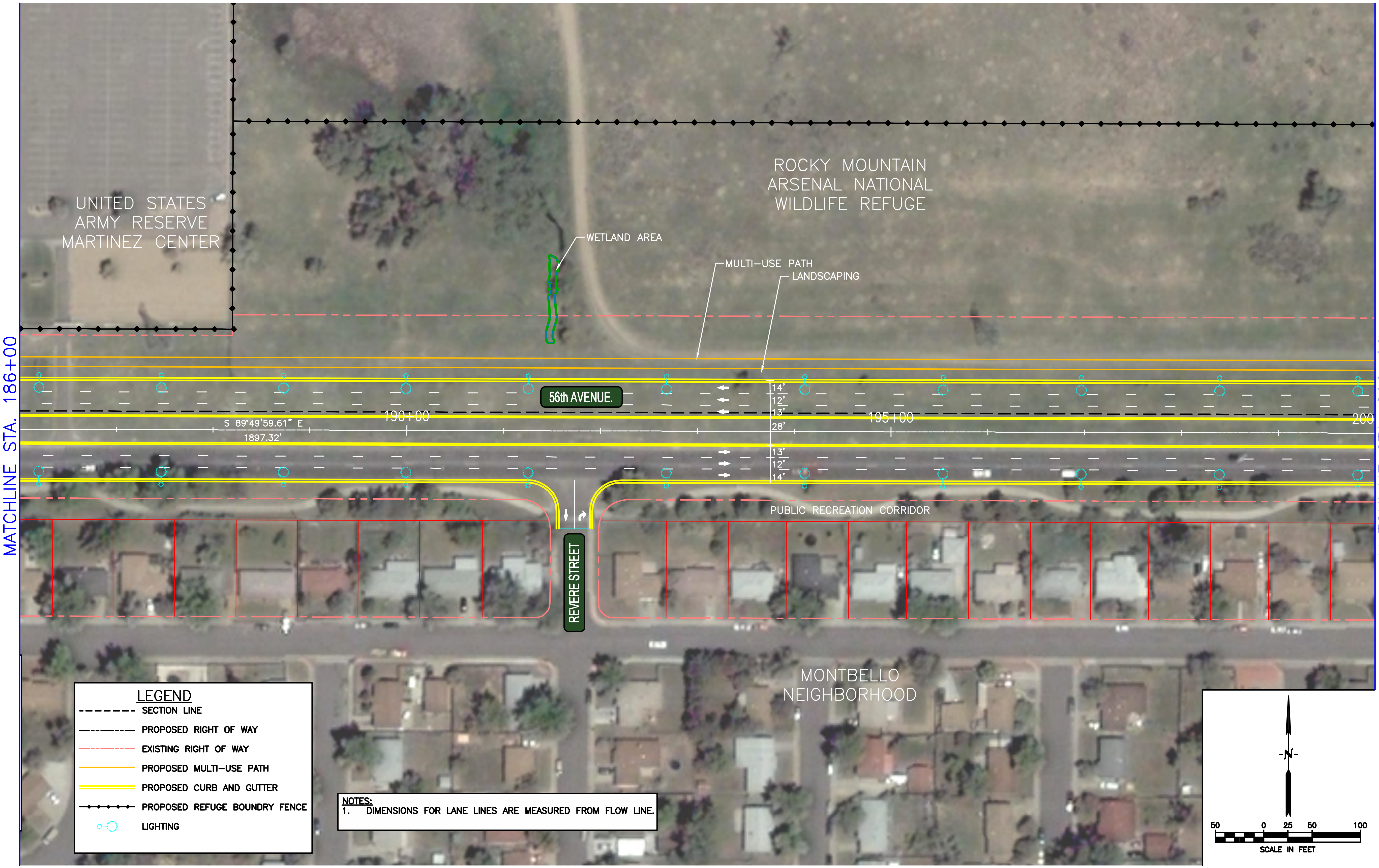

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 6 of 18
STA. 186+00 to STA. 200+00

URS
DENVER

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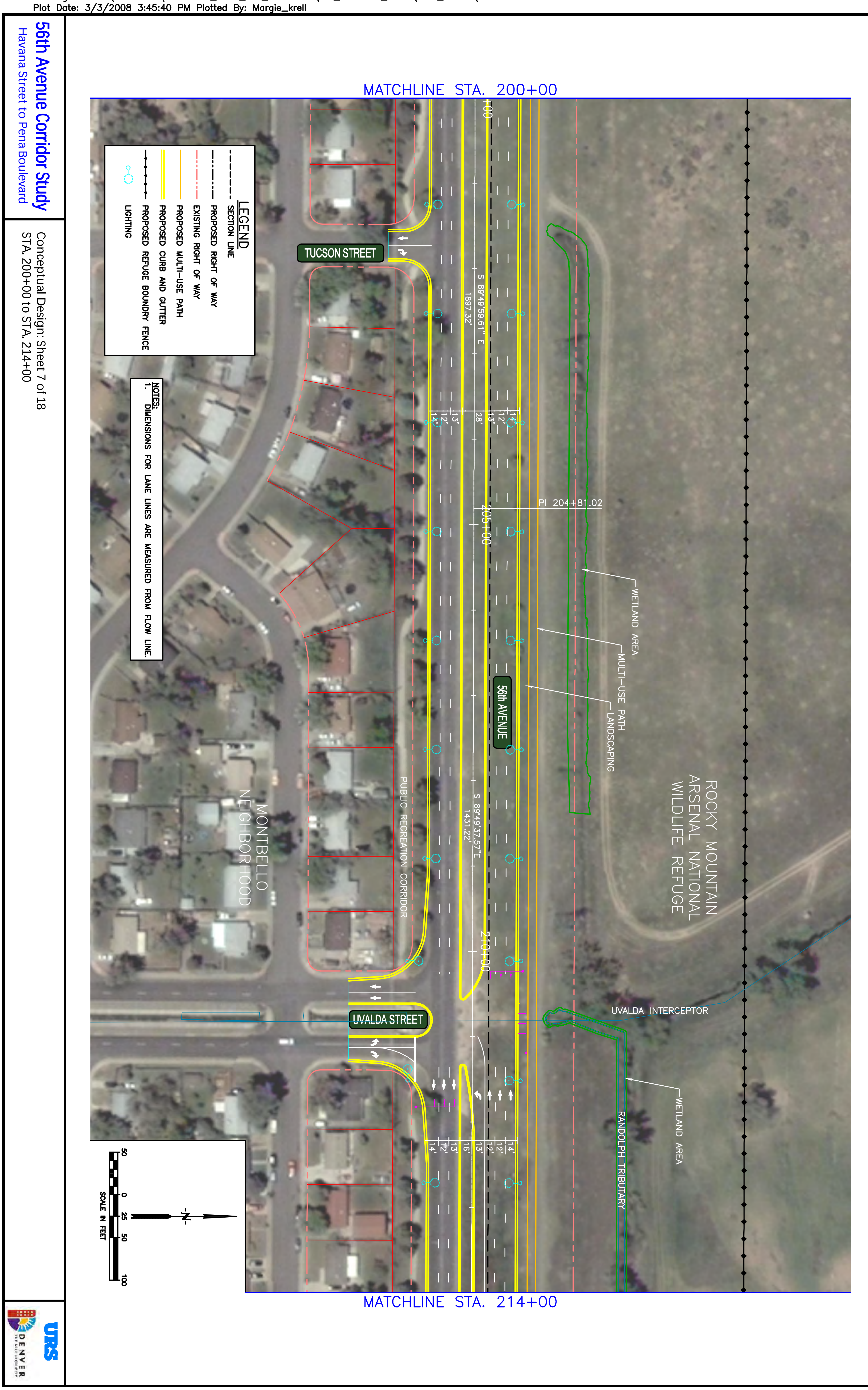

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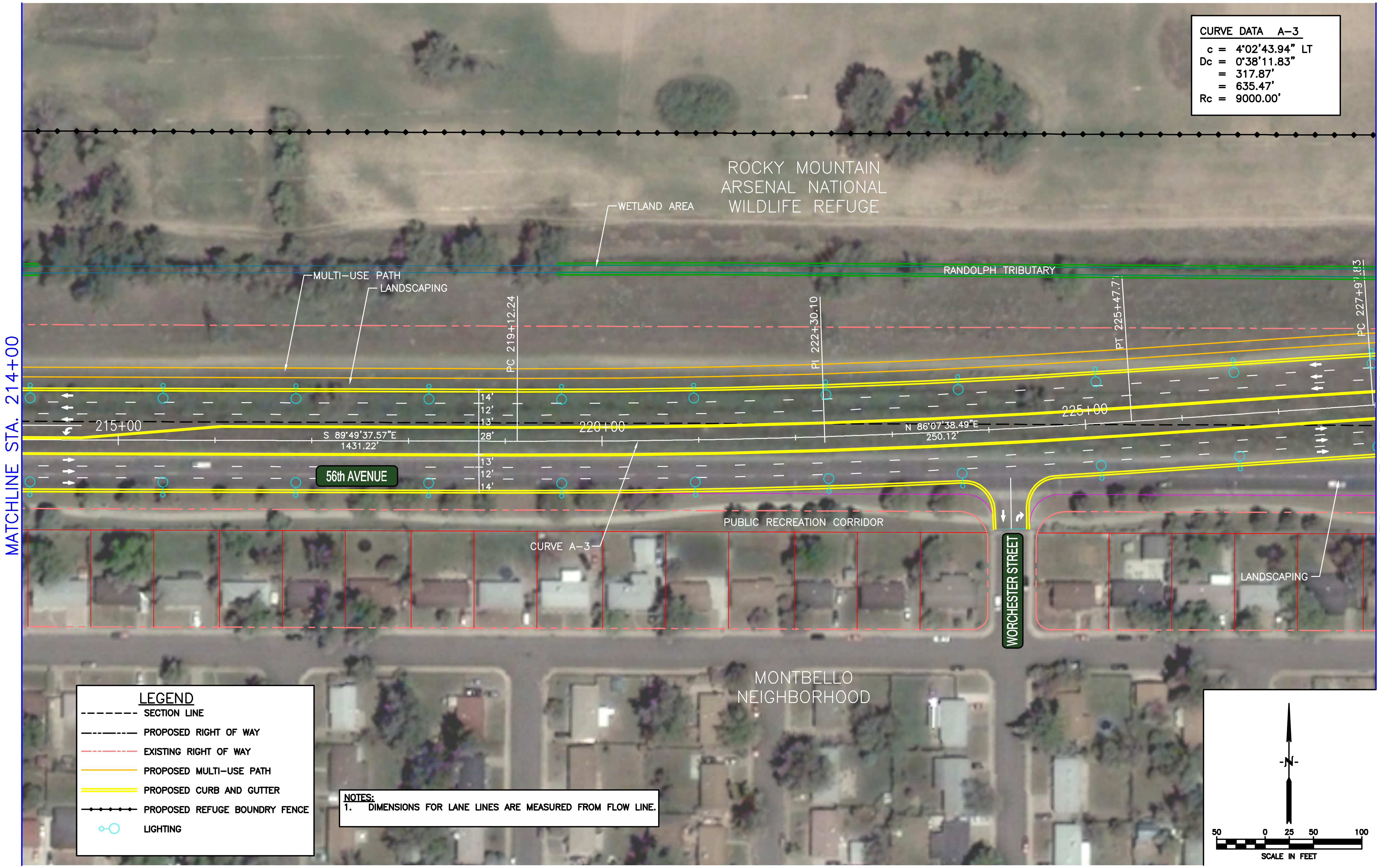

CURVE DATA A-3

c = 4°02'43.94" LT
Dc = 0°38'11.83"
= 317.87'
= 635.47'
Rc = 9000.00'

LEGEND

- SECTION LINE
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY
- PROPOSED MULTI-USE PATH
- PROPOSED CURB AND GUTTER
- PROPOSED REFUGE BOUNDRY FENCE
- LIGHTING

NOTES:

1. DIMENSIONS FOR LANE LINES ARE MEASURED FROM FLOW LINE.

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 8 of 18
STA. 214+00 to STA. 228+00

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Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 9 of 18
STA. 228+00 to STA. 242+00

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Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 10 of 18
STA. 242+00 to STA. 256+00

URS
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Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
Plot Date: 3/3/2008 3:48:48 PM Plotted By: Margie_krell

MATCHLINE STA. 256+00

MATCHLINE STA. 270+00

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 11 of 18
STA. 256+00 to STA. 270+00

URS
DENVER

Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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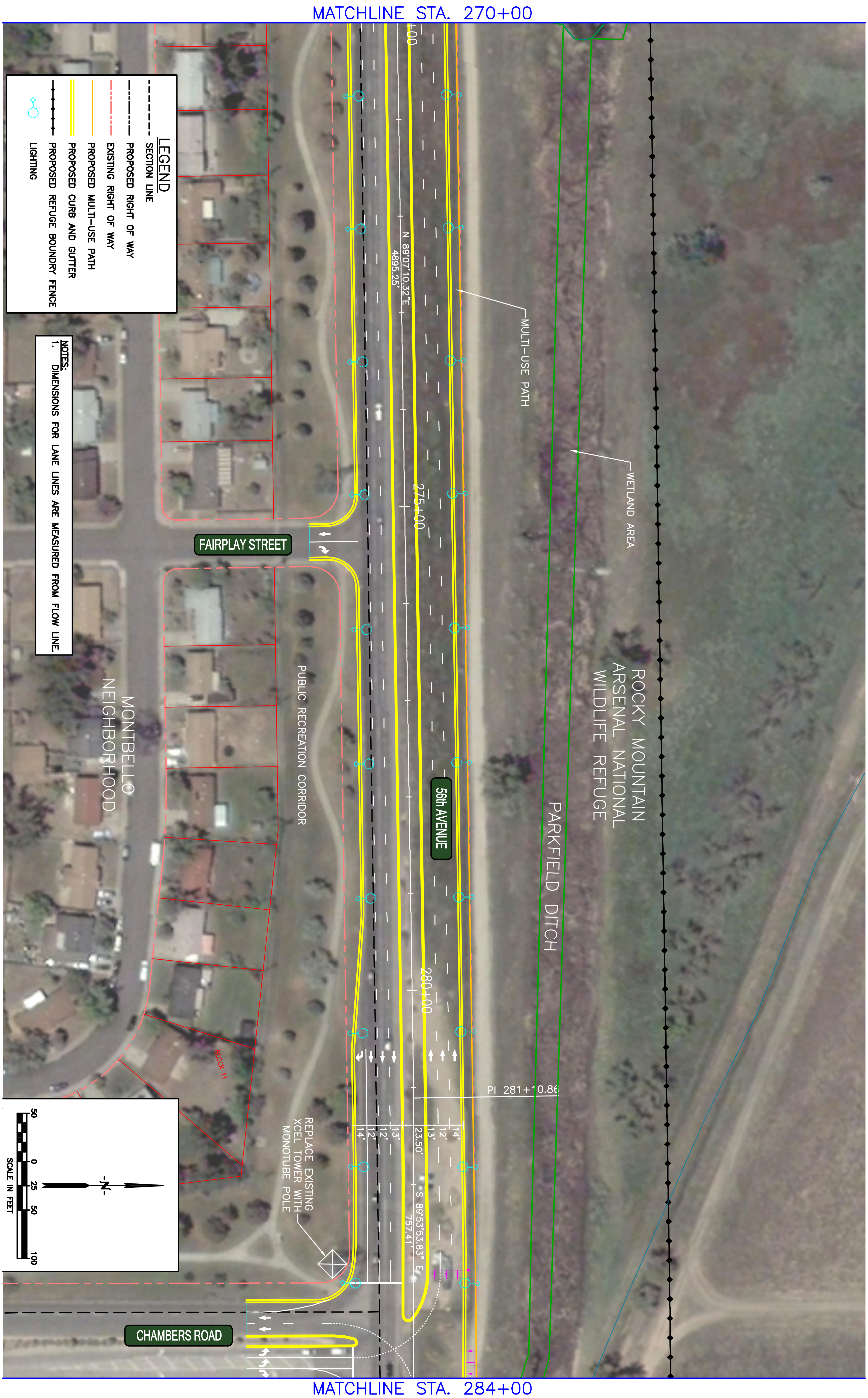
56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 12 of 18

STA. 270+00 to STA. 284+00



URS

DENVER

Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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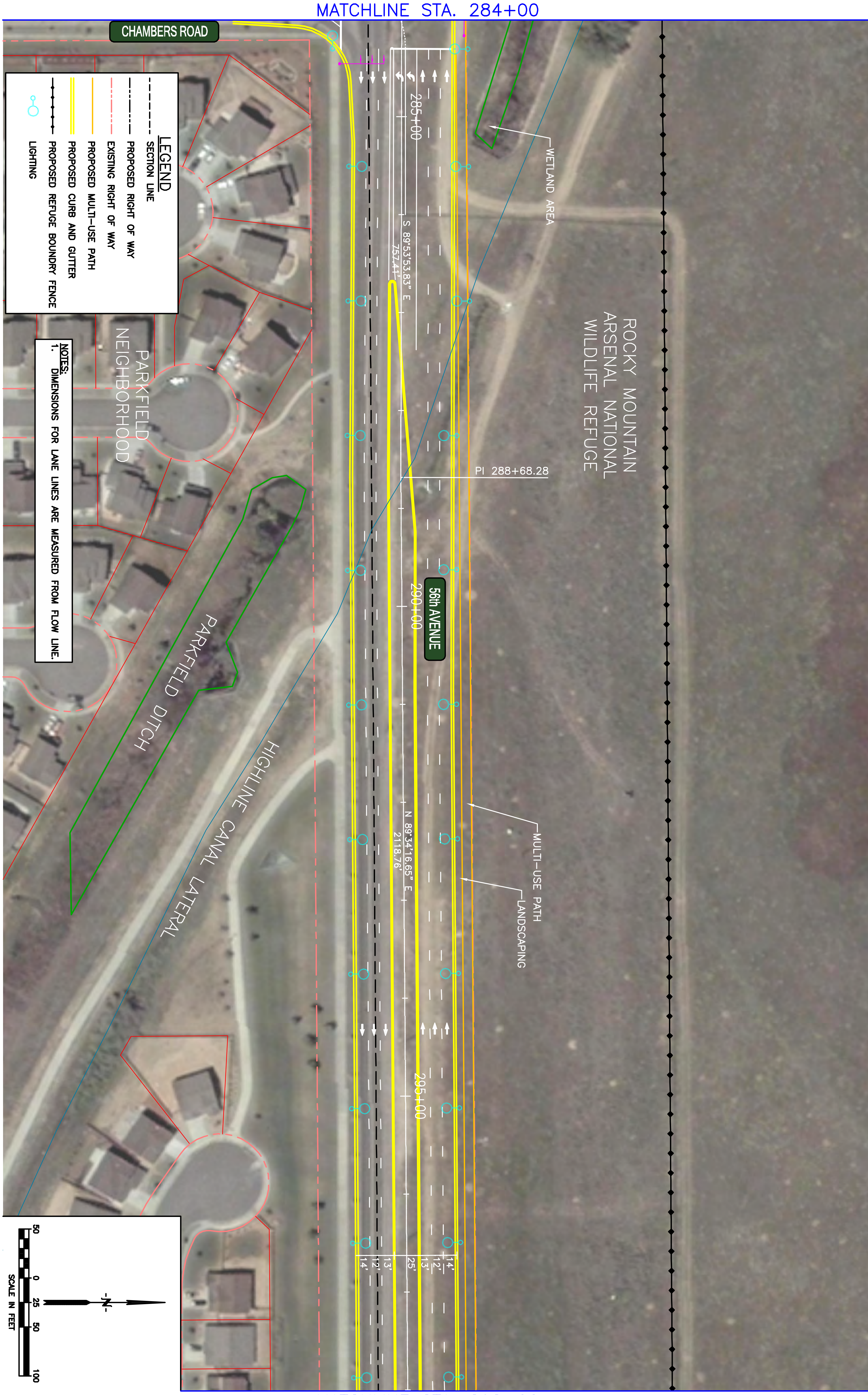
56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 13 of 18

STA. 284+00 to STA. 298+00



URS

DENVER

Drawing Path: I:\PROJECTS\22238763_56TH_AVE_CORRIDOR\7.0_CURRENT_FILES\7.01_PLANS\63047-RD-CS-01-20.DWG
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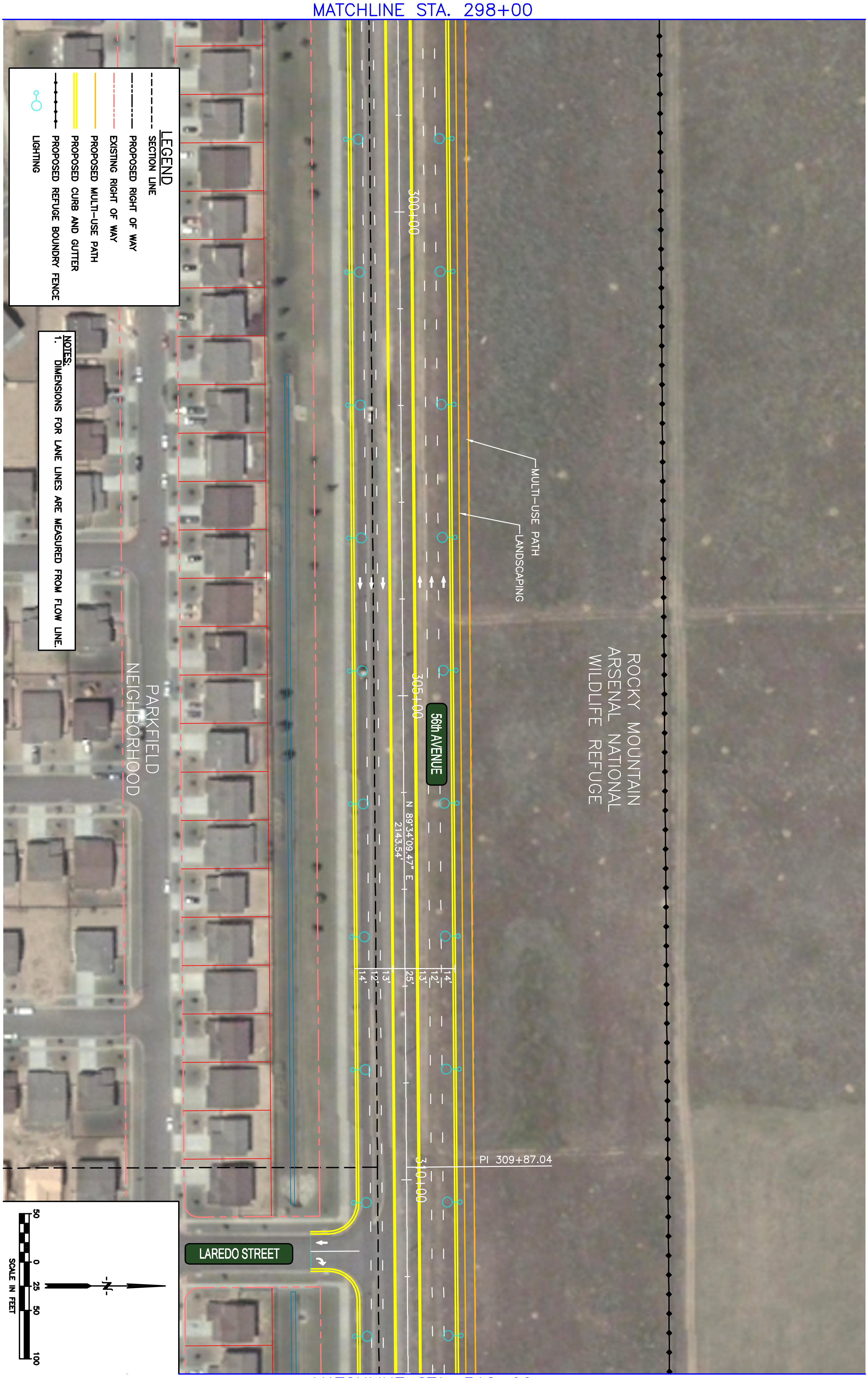
56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 14 of 18

STA. 298+00 to STA. 312+00

MATCHLINE STA. 298+00



MATCHLINE STA. 312+00

URS

DENVER

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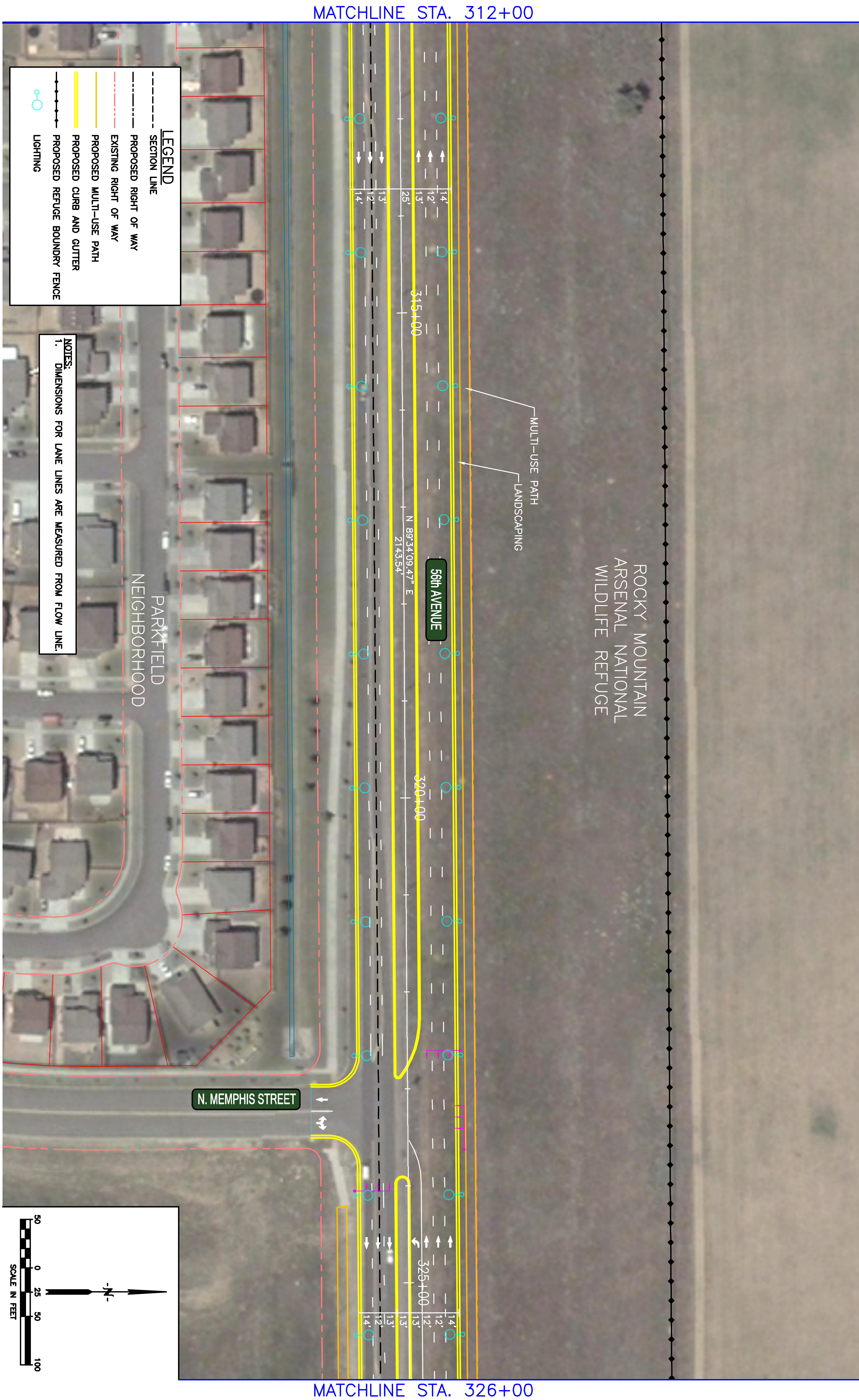
56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 15 of 18

STA. 312+00 to STA. 326+00



URS

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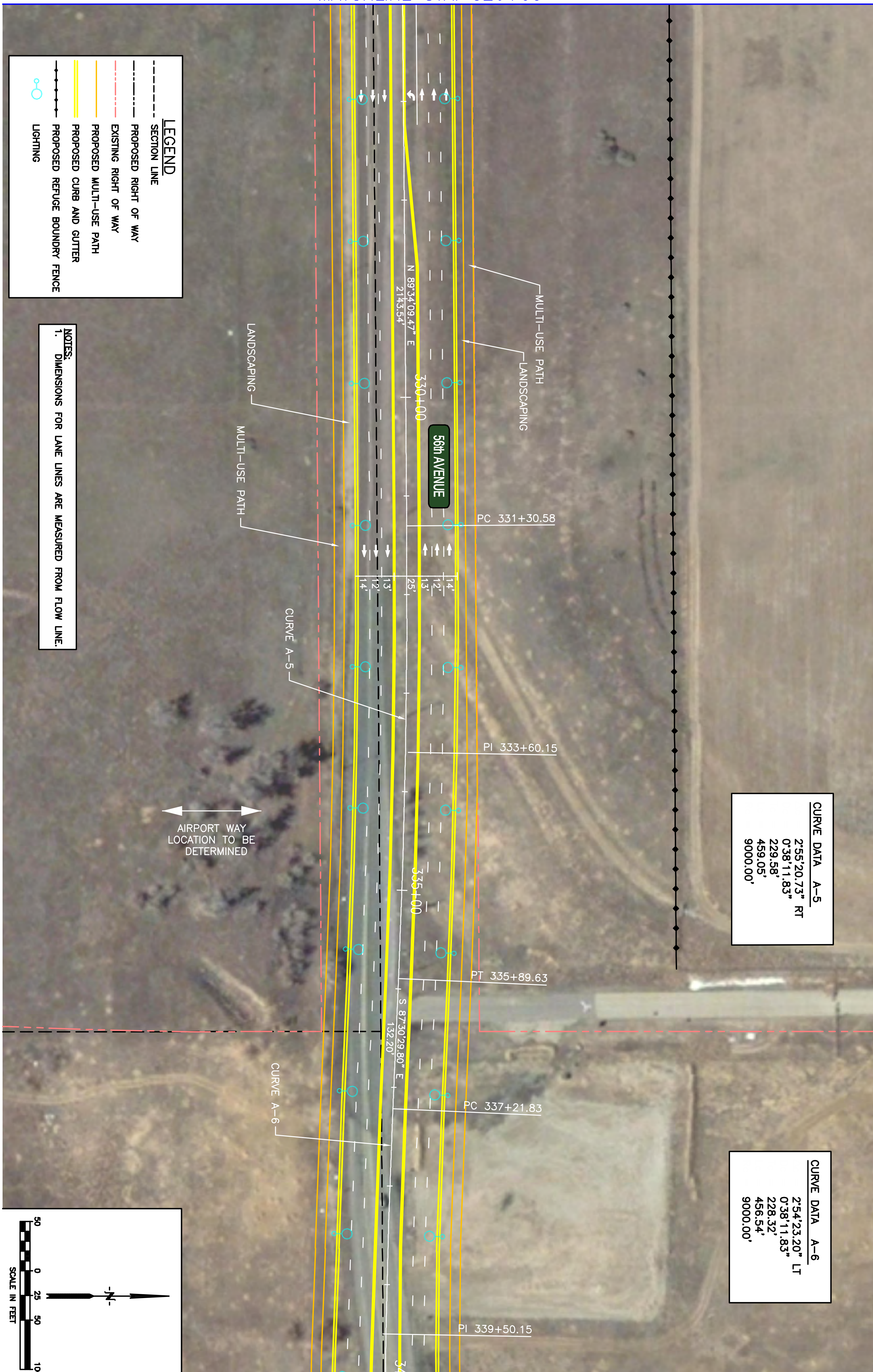
56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 16 of 18

STA. 326+00 to STA. 340+00

MATCHLINE STA. 326+00



MATCHLINE STA. 340+00

URS

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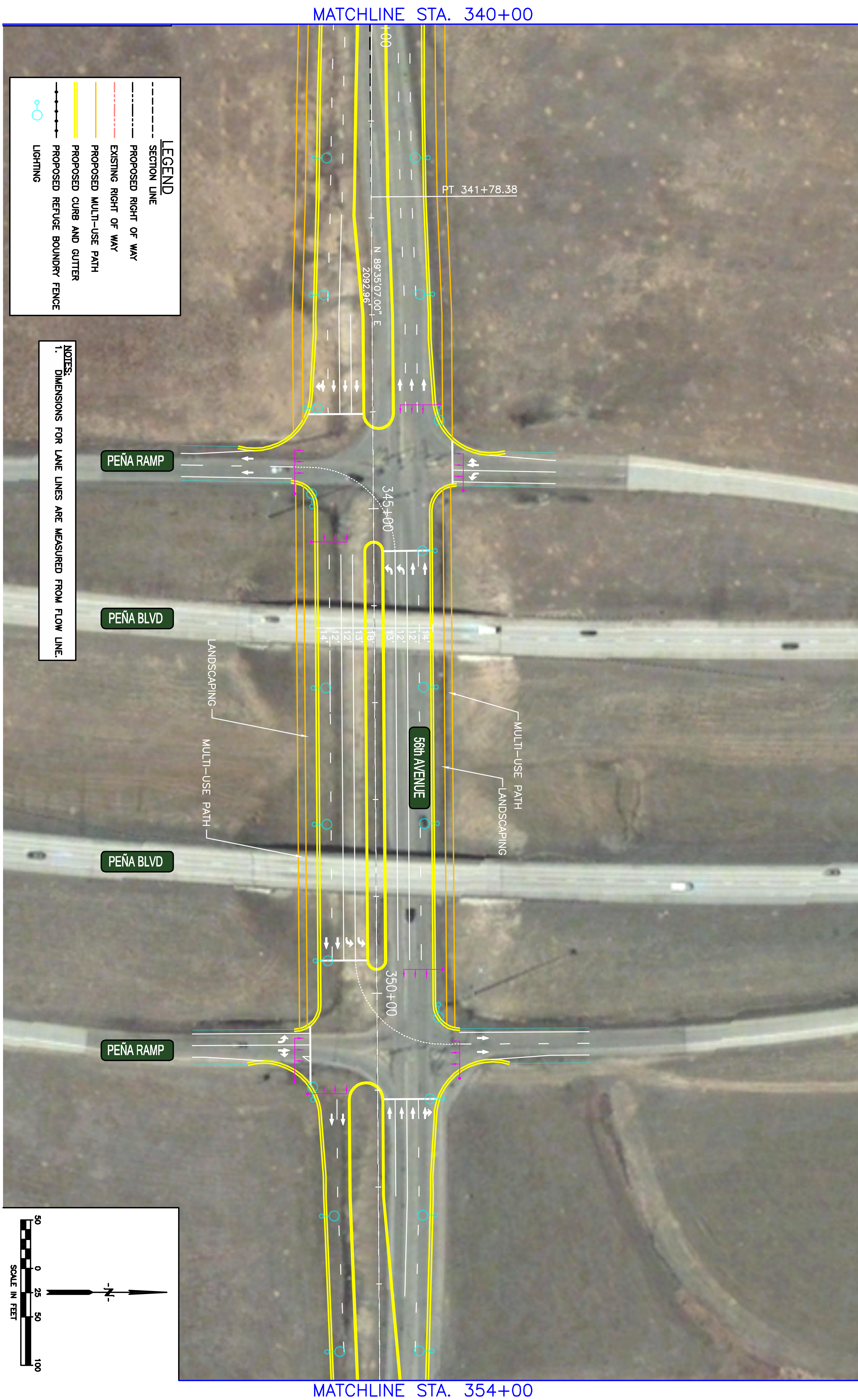
56th Avenue Corridor Study

Havana Street to Pena Boulevard

Conceptual Design: Sheet 17 of 18

STA. 340+00 to STA. 354+00



URS

DENVER

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NOTES:

1. DIMENSIONS FOR LANE LINES ARE MEASURED FROM FLOW LINE.

56th Avenue Corridor Study
Havana Street to Pena Boulevard

Conceptual Design: Sheet 18 of 18
STA. 354+00 to STA. 357+79

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APPENDIX E
PAVEMENT DESIGN

APPENDIX E

PAVEMENT DESIGN

A pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade without overstressing the subgrade soils. Performance of the pavement structure is a function of a number of factors including but not limited to the physical properties of the subgrade soils, drainage, and traffic loading. The pavement section analyses and design for the 56th Avenue corridor are based on the Metropolitan Government Pavement Engineering Council (MGPEC) and the AASHTO design procedures.

According to traffic information for 56th Avenue which included 2035 daily traffic forecasts, the number of traffic lanes, and vehicle-type distribution, forecast traffic growth over 20 years was estimated to be from just under four percent to about six percent annually, generally increasing toward Peña Boulevard. No industrial growth is planned for the corridor, so it was assumed that the number of heavy vehicles would remain similar to the May 2007 estimates.

An 18-kip Equivalent Single Axle Load (ESAL) is the equivalent of an 18,000 pound axle loading, and 20-year ESALs are the total number of equivalent loadings for 20 years. Thirty percent (30%) of the total ESAL is taken for the design lane pavement section based on current practice, and for three lanes in one direction.

Portland Cement Concrete Pavements (PCCP) and Hot Mix Asphalt Pavement (HMAP) sections were calculated using MGPEC software. The recommended sections are shown in Table E-1.

Along 56th Avenue, the roadway segments for each specific pavement sections were selected where there was a significant change in the calculated ESALs or a change in the soil resilient modulus. Once the design moves toward construction, CCD will select a pavement section or combination of sections that is considered most appropriate.

Table E-1
56^{th} Avenue Preliminary Pavement Design

Roadway Segment	Resistance R-Value	$ESAL_{20}$	PCCP (inches) on 4-inches ABC	Full-depth HMAP (inches)	Layered HMAP on 12-inches Treated Base (inches)
Peña Blvd to Chambers Rd	50	2,262,431	8	10	6.5
Chambers Rd to Crown Blvd	50	3,358,044	8.5	11*	7.5
Crown Blvd to Peoria St	15	3,358,044	8.5	12.5*	9
Peoria St to Havana St	45	4,408,503	8.5	12*	8.5

Source: URS Corporation and Geocal, Inc.
Notes: ABC: Aggregate Base Course
PCCP: Portland Cement Concrete
HMAP: Hot Mix Asphalt Pavement
ESAL: 18-kip Equivalent Single Axle Load
*: Not Recommended

City and County of Denver ■ Capital Projects Management

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